# LAND, SOILS AND GEOLOGY

## 7.1 INTRODUCTION

### 7.1.1 Background and Objectives

Dr. Robert Meehan was retained on behalf of Stephen Ward Planning and Development Consultants Limited in September 2024, to undertake an assessment of the potential likely and significant effects of the proposed Large Scale Residential Development (LRD) by Lagan Homes Ballycullen Limited (Proposed Project) on a site south of Stocking Avenue, in the townland of Woodtown, Ballycullen, Dublin 16 (*Irish Transverse Mercator Grid Reference 712000 725740*), where it is proposed to construct a residential development comprising a number of accommodation unit types, on the Land, Soils and Geology aspects of the receiving environment.

The Proposed LRD Project is described in full in Chapter 3 of this EIAR.

Where the 'proposed LRD Site' is referred to it refers to the entire site boundary encompassing the proposed

- 4 no. Type A1 dwelling houses (three-bedroomed, semi-detached),
- 10 no. Type A2 dwelling houses (three-bedroomed, end of terrace),
- 6 no. Type B1 dwelling houses (three-bedroomed, semi-detached),
- 36 no. Type B2 dwelling houses (three-bedroomed, end of terrace),
- 16 no. Type C1 dwelling houses (four-bedroomed, semi-detached),
- 8 no. Type C2 dwelling houses (four-bedroomed, semi-detached),
- 1 no. Type C3 dwelling house (four-bedroomed, detached),
- 19 no. Type D dwelling houses (two-bedroomed, mid-terrace),
- 9 no. Type E1 dwelling houses (four-bedroomed, detached),
- 28 no. Type E2 dwelling houses (four-bedroomed, semi-detached),
- 30 no. Type F dwelling houses (three-bedroomed, semi-detached),
- 30 no. Type G dwelling houses (3-bedroomed, mid-terrace)
- 108 no. Type 1 Apartments (one-bedroomed),
- 63 no. Type2 Apartments (two-bedroomed),
- 88 no. Type 3 Apartments (two-bedroomed), and
- 46 no. Type 4 Apartments (three-bedroomed)

and all ancillary site works.

This report provides a baseline assessment of the environmental setting of the Proposed Project, as described in Chapter 3, in terms of Land, Soils and Geology and discusses the potential likely and significant effects that the construction and operation of the Proposed Project will have. Where required, appropriate mitigation measures to avoid any identified significant effects to Land, Soils and Geology (i.e. natural resources) are recommended and the residual effects of the Proposed Project post-mitigation are assessed.

The Proposed Project study area with regard Land, Soils and Geology is defined by the EIAR Site Boundary. The full extent of the area which is the subject of the investigations is identified in **Figure 7.1** below as a red outline, which is a site covering 10.35 hectares. Through the desk study and investigations undertaken and having regard to other environmental and design considerations a suitable design of the Proposed Project was subsequently identified for the site, which includes the absence of basement storeys and associated inherent construction mitigation measures. This has also in turn informed the extent and level of detail of this report on land, soils and geology (again for the site outlined in red below). Because the regional geology has a bearing on the site geology, in this case, the study area is larger than the application site; thus, much of the baseline data presented in this chapter extends beyond the application site itself.

### 7.1.2 Statement of Authority

EurGeol. Dr. Robert Meehan, PGeo. is a specialist geological, hydrological, hydrogeological and environmental sole trader who delivers a range of water and environmental management consultancy services to the private and public sectors across the Republic of Ireland. Robert began working a as a self-employed Consultant Geologist in 2003, with his office located in Navan, County Meath.

Robert's core areas of expertise and experience includes soils, subsoils, geology, hydrogeology and hydrology. Robert routinely completes impact assessments for land, soils and geology, hydrology and hydrogeology for a large variety of project types including housing developments, large-scale infrastructure projects and quarry enterprises.

Robert Meehan (B.A., Ph. D, PGeo., EurGeol.) is an Environmental Geologist / Hydrogeologist with over 30 years' environmental consultancy experience in Ireland. Robert initially worked for Geological Survey Ireland (GSI, 1993 – 1998) on the initiation of Groundwater Protection Schemes across the country, and then worked for Teagasc between 1998 and 2006 completing the first countrywide mapping of subsoil (and related soils) coverage, which is that still used today in all Environmental Impact Assessments across the country. Since beginning life as a consultant while with Teagasc in 2003, Robert has completed numerous hydrological and hydrogeological impact assessments of various types of development in Ireland. He has also worked for GSI on their National Groundwater Protection Scheme, as well as Irish Geological Heritage Audits of all counties across Ireland. Robert acts as a consultant to the EPA on on-site waste water treatment systems, and was a co-author of the current Code of Practice (Domestic Waste Water Treatment Systems, 2021). Robert has been a lead trainer on the (formerly FAS, now Water Services Training Group) course on 'Site Assessment for On-Site Waste Water Treatment Systems' since in's inception in 1998. Robert has managed the geological and hydrogeological aspects of EIAR assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in geological and hydrogeological site investigations, site suitability assessments for on-site waste water, geological heritage mapping and appraisal, wetland hydrology and hydrogeology, water resource assessments, surface water drainage and SUDs design, and surface water/groundwater interactions.

### 7.1.3 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- the Planning and Development Acts
- the Planning and Development Regulations, 2001 (as amended);
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment;
- S.I. No. 296 of 2018 European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, and;
- The Heritage Act 1995, as amended.

### 7.1.4 Relevant Guidance

The Land, Soils and Geology chapter of this EIAR was prepared in accordance with, where relevant, the guidance contained in the following documents:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Institute of Geologists Ireland (2013): Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018); and,
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Commission 2017).

## 7.2 ASSESSMENT METHODOLOGY

### 7.2.1 Desk Study

A desk study of the Site was completed in advance of undertaking the walkover survey, mapping and site investigations. This involved collecting all relevant geological data for the Site and receiving environment. This included consultation with the following data sources:

- the Environmental Protection Agency's online environmental database (www.epa.ie);
- Geological Survey Ireland's (GSI's) Groundwater and Geology Databases (www.gsi.ie/ geology or www.gsi.ie/groundwater);
- Geological Survey Ireland's Geological Heritage site mapping (www.gsi.ie/geoheritage);
- GSI's Bedrock Geology 1:100,000 Scale Map Series, Sheet 16 (Geology of Kildare - Wicklow). Geological Survey Ireland (GSI, 1994);
- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Geological Survey Ireland (2003) – Kilcullen Groundwater Body Initial Characterization Reports;
- General Soil Map of Ireland (Teagasc, 1980, 2nd edition, viewable on www.epa.ie); and,
- Aerial Photography, 1:5,000 and 6 inch sheet base mapping.

### 7.2.2 Baseline Monitoring and Site Investigations

Walkover surveys, including geological mapping and investigations of the Site, were undertaken by Robert Meehan (refer to Section 1.2 above for qualifications and experience) on 6th and 7th November 2024.

Intrusive Site Investigations had previously been conducted across the site area by Ground Investigations Ireland, The Grange, 12th Lock Road, Lucan, County Dublin, on 21st September 2006, and by Waterman Moylan Ltd., Block S, EastPoint Business Park, Alfie Byrne Road, Dublin D03 H3F4, on 16th February 2024.

The objectives of the intrusive site investigations included mapping the distribution and depth of mineral subsoils at the proposed LRD Site along with assessing the mineral subsoil / bedrock conditions at key Proposed Project locations. These data were used to inform the final layout design.

Site investigations to address the Land, Soil and Geology section of the EIAR included the following:

- Walkover surveys and geological mapping of the Site area were undertaken to assess ground conditions;
- A total of 26 no. deep trial pits excavated inside the proposed LRD Site boundary, and 2 no. excavated just outside of it at the southeast, to determine the thickness and geomorphology of mineral subsoils overlying the Site;
- Measurement of flow in streams flanking the site and that running through the site; and
- Mineral subsoils were logged according to the British Standard BS: 5930 Subsoil Classification scheme.

As there is an absence of peat of any depth across all portions of the site (see following Sections), and as the soil and subsoil is all mineral, the requirement for a Peat Stability Risk Assessment Report and Peat Management Plan does not arise.

### 7.2.3 Impact Assessment Methodology

The desk study investigations commissioned were to characterise the detailed three-dimensional soils, subsoils and bedrock geology of the proposed LRD Site, as well as resultant interpreted hydrogeology (see Chapter 8). As well as this, an assessment as to whether there would be any impact on any SACs, SPAs, NHAs or pNHAs around the site, was an inherent part of this study. It should be noted that a Natura Impact Statement also accompanies this Planning Application, and also espouses this paradigm. This planning application is accompanied by an NIS which you can refer to. The resulting report provided the resultant description of the geological character of the lands, and details the nature, extent and complexity of the geological material from the surface downwards through the mineral subsoil to the bedrock. As part of this desk study mapping and modelling exercise, field investigations were undertaken and involved a detailed walk over of the site and its surrounding environs, and mapping of salient features.

Overall therefore, the results of the desk study, visual assessment of the site, groundwater and surface water level analysis (see Chapter 8) and trial pit analysis have been collated to conclude that the lands could be used for the construction of the proposed LRD development, as well as the associated drainage scheme, and assert that there will be no detrimental impact on the soils and subsoils geology, or hydrogeology and drainage on the site (Chapter 8) or at any nearby SACs, SPAs, NHAs or pNHAs, from the construction of same.

The rating of potential environmental impacts on the soils and geology environment is based on Table 1 following which takes account of the quality, significance, duration and type of impact characteristic identified.

The appraisal methodology is completed in accordance with the Environmental Protection Agency (EPA) document '*Guidance on the Information to be contained in Environmental Impact Statements*' (EPA, 2002), the Institute of Geologists of Ireland (IGI) publication '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapter of Environmental Impact Statements*' (2013) and the EPA document entitled '*Guidelines on the information to be contained in Environmental Impact Assessment Reports*' (2022) classification of environmental impacts. In addition, the document entitled '*Guidelines on Procedures for Assessment and Hydrogeology for National Road Schemes*' by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate.

In EIA assessment, consideration is given to both the importance of an attribute and the magnitude of the environmental impacts of the proposed activities on that cited attribute. These impact ratings presented in below are in accordance with impact assessment criteria provided in the EPA (2022) publication.

The duration of each impact is considered to be either temporary, short-term, medium term, long-term, or a permanent impact. Temporary impacts are considered to be those which are construction related and last less than one year. Short term impacts were seen as impacts lasting one to seven years; medium-term impacts lasting

seven to fifteen years; long-term impacts lasting fifteen to sixty years; and permanent impacts lasting over sixty years. The proposed LRD project is planned to be developed in two distinct phases. Phase 1 is programmed to be fully constructed by mid-2028 and Phase 2 by 2030. Therefore, it is anticipated that the total construction period for the development will be approximately 5 years, meaning an overall short term impact in the EIA (EPA, 2022) assessment methodology.

| Impact characteristic | Term | Description |
|---|---|---|
| Quality | Positive | A change which improves the quality of the environment |
| | Neutral | A change which does not affect the quality of the environment |
| | Negative | A change which reduces the quality of the environment |
| Significance | Imperceptible | An impact capable of measurement but without noticeable consequences |
| | Slight | An impact which causes noticeable changes in the character |
| Impact | Moderate | An impact that alters the character of the environment in a manner consistent with existing and emerging trends |
| | Significant | An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment |
| | Profound | An impact which obliterates sensitive characteristics |
| Duration | Short term | Impact lasting one to seven years |
| | Medium-term | Impact lasting seven to fifteen years |
| | Long-term | Impact lasting fifteen to sixty years |
| | Permanent | Impact lasting over sixty years |
| | Temporary | Impact lasting for one year or less |
| | Cumulative | The addition of many small impacts to create one larger, more significant impact |
| Type | 'Do Nothing' | The environment as it would be in the future should no development of any kind be carried out |
| | Indeterminate | When the full consequences of a change in the environment cannot be described |
| | Irreversible | When the character, distinctiveness, diversity, or reproductive capacity of an environment is not permanently lost |
| | Residual | Degree of environmental change that will occur after the proposed mitigation measures have taken effect |
| | Synergistic | Where the resultant impact is of greater significance than the sum of its constituents |

| | | |
|---|---|---|
| | 'Worst Case' | The impact arising from a development in the case where the mitigation measures may substantially fail |

*Table 7.1 Glossary of potential impacts following EPA ( 2022) Guidance documents.*

The NRA criteria for rating the magnitude and significance of impacts at EIA stage on the geological related attributes are also relevant in determining impact assessment and area presented in Table 2 below.

| Magnitude of Impact | Criteria | Typical Examples |
|---|---|---|
| Large Adverse | Results in loss of attribute | Loss of high proportion of future quarry or pit reserves |
| Moderate Adverse | Results in impact on integrity of attribute or loss of part of attribute | Loss of moderate proportion of future quarry or pit reserves |
| Small Adverse | Results in minor impact on integrity of attribute or loss of small part of attribute | Loss of small proportion of future quarry or pit reserves |
| Negligible | Results in an impact on attribute but of insufficient magnitude to affect either use or integrity | No measurable changes in attributes |
| Minor Beneficial | Results in minor improvement of attribute quality | Minor enhancement of geological heritage feature |
| Moderate Beneficial | Results in moderate improvement of attribute quality | Moderate enhancement of geological heritage feature |
| Major Beneficial | Results in major improvement of attribute quality | Major enhancement of geological heritage feature |

*Table 7.2 Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on soil / geology attribute (NRA, 2009).*

The guideline criteria (EPA, 2022) for the assessment of likely significant effects require that likely effects are described with respect to their extent, magnitude, type (i.e. negative, positive or neutral) probability, duration, frequency, reversibility, and transfrontier nature (if applicable). The descriptors used in this environmental impact assessment report are those set out in the EPA (2022) Glossary of effects as shown in Chapter 1 of this EIAR. In addition, the two impact characteristics proximity and probability are described for each impact and these are defined in Table 3.

| Impact Characteristic | Degree/ Nature | Description |
|---|---|---|
| Proximity | Direct | An impact which occurs within the area of the proposed project, as a direct result of the proposed project. |

| | | |
|---|---|---|
| | Indirect | An impact which is caused by the interaction of effects, or by off-site developments. |
| Probability | Unlikely | A low likelihood of occurrence of the impact. |
| | Likely | A medium likelihood of occurrence of the impact |

***Table 7.3 Additional Impact Characteristics***

In order to provide an understanding of this descriptive system in terms of the geological/hydrological environment, elements of this system of description of effects are related to examples of potential likely significant effects on the geology and morphology of the existing environment, as listed in Table 4.

| **Impact Characteristics** | **Potential Hydrological Impacts** | |
|---|---|---|
| **Quality** | **Significance** | **Potential Hydrological Impacts** |
| Negative only | Profound | Widespread permanent impact on:<br>• The extent or morphology of a cSAC.<br>• Regionally important aquifers.<br>• Extents of floodplains.<br>Mitigation measures unlikely to remove impacts. |
| Positive or Negative | Significant | Local or widespread time-dependent impacts on:<br>• The extent or morphology of a cSAC / ecologically important area.<br>• A regionally important hydrogeological feature (or widespread effects to minor hydrogeological features).<br>• Extent of floodplains.<br>Widespread permanent impacts on the extent or morphology of an NHA/ecologically important area.<br>Mitigation measures (to design) will reduce but not fully remove impact – residual impacts will occur. |
| Positive or Negative | Moderate | Local time-dependent impacts on:<br>• The extent or morphology of a cSAC / NHA / ecologically important area.<br>• A minor hydrogeological feature.<br>• Extent of floodplains.<br>Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends |

| | | |
|---|---|---|
| Positive, Negative or Neutral | Slight | Local perceptible time-dependent impacts not requiring mitigation. |
| Neutral | Imperceptible | No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error. |

***Table 7.4 Impact Descriptors relating to the Receiving Environment***

### 7.2.4 Limitations and Difficulties Encountered

No limitations or difficulties were encountered during the preparation of the Land, Soils and Geology Chapter of this EIAR. The site investigations and follow up monitoring carried out were thorough and exhaustive.

## 7.3 EXISTING ENVIRONMENT

### 7.3.1 Site Description and Topography

The Site is located in the northern foothills of the Dublin – Wicklow Mountains, in the townland of Woodtown, approximately 1.5 kilometres southeast of the centre of the town of Firhouse and immediately south of Ballycullen, in south central County Dublin (see **Figure 7.1**). The site lies at ground surface elevations between approximately 106 and 126 mAOD, and is bounded by the Ballycullen Road at the west and the Regional R115 road approximately 150 m to the southwest. The existing Abbott's Grove and Stocking Wood housing developments are immediately adjacent at the northwest and northeast of the site, respectively (see **Figure 7.1**). The site itself is made up of two long, west-southwest to east-northeast oriented fields, and the entrance to the proposed LRD site is proposed from the existing spur road to the east of Abbott's Grove, at the northwest, and via Stocking Wood development into the (current) western field.

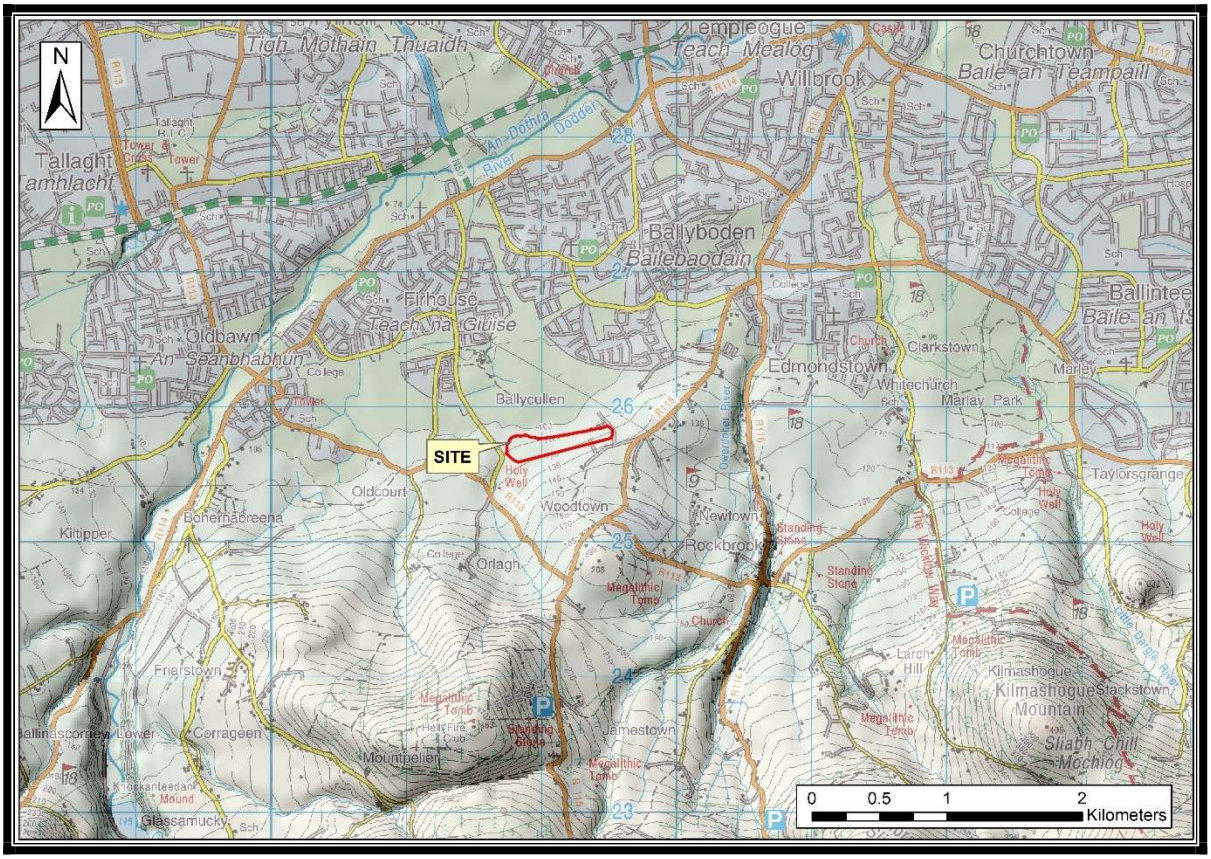


***Figure 7.1 Geological Study Area, Application Site Area and Surrounding Features. Grid squares are 1 km distance (O.S. Licence EN 057925).***

The Ordnance Survey Ireland 1:50,000 Discovery Series Map shows a multi-contoured topography in and around the site (**Figure 7.1**) and though no streams or other watercourses are shown as flowing through or adjacent to the site on this map, it is noted that a number of small, unnamed, potentially ephemeral streams seem to flow northwards through the centre of the site, as well as along it's eastern boundary, on the six inch to one mile map sheets of the locality, from the 1840's.

The proposed LRD Site itself is situated on the northern lower backslope of a high, unnamed, dome-shaped ridge feature at Woodtown, which itself is a spur-ridge off the northeastern side of Mountpelier Hill. The dome-shaped ridge on which the site is located rises to 208 m elevation AOD approximately 850 m southeast of the site, with Mountpelier Hill rising to 383 mAOD 2 kilometres south-southwest of the site (**Figure 7.1**).

The overall form / geometry of the site itself is of a ridge or 'bank' type feature along the lower backslopes of much higher, bedrock-cored ridges, undulating with gentle to moderate slopes. Currently (January 2025) the site itself is comprised completely of agricultural pasture, with a narrow band of broadleaf forestry running north to south through the central portion of the site and bounding the two component fields, and a mature hedgerow / treeline along the eastern boundary. Both of these belts of trees and shrubs are incised by shallow stream channels. Pockets of scrub vegetation also occur at the northeastern extreme of the site, and the site is bounded by fences and walls elsewhere. To the north, west and east, the land in the housing estates has a concrete, tarmacadam or hardstand cover, and to the south and in a narrow area at the north centre of the site, pasture

also occurs. There are currently no buildings across any locality within the site confines. The northwestern edge of the site comprises a relatively high, cliffed slope at the edge of Abbott's Grove, generally 4 m – 5m high.

***Plate 7.1 View of the western field on the site, from the west***

*Plate 7.2 View of the eastern field on the site, also from the west*

*Plate 7.3 The cliffed edge of the northwestern end of the site at the edge of Abbot's Grove (at the proposed road entrance)*

### 7.3.2 Land and Land Use

As would be expected given the above description, based on the Corine 2018 land cover mapping, the proposed LRD Site comprises agricultural pastures. A narrow strip of broadleaf forestry also runs through the central portion of the site, from north to south.

### 7.3.3 Soils Geology (Topsoil)

According to the An Foras Taluintais General Soils Map of Ireland (Gardiner and Radford, 1980) the region containing the subject site has a relatively homogeneous and uniform soils geology.

The site locality itself is shown as being characterised by soils of Soil Association 38. This association includes soils which are dominated by grey brown podzolic soils (75% of the land area of this category). These are deep, well drained, alkaline mineral soils. Within this association, the limestone-dominated subsoil is moderately permeable, and leaching of clay to the 'B' horizon has taken place.

The remainder of the area of this soils association is mapped as being underlain gley soils (25% of the area). Gleys are poorly drained mineral soils, which are generally of clay loam texture and are imperfectly to poorly

drained, owing to the fact that they are in either low portions of the landscape or are hosted within pcokets of subsoil with low permeability. These soils are usually no more than 0.7m deep.

The site is also specifically mapped as being underlain by deep, well drained mineral soils derived mainly from acidic parent materials (Teagasc/EPA, 2006a).

The majority of the soils within this subject proposed LRD Site are therefore expected to be well drained mineral soils. From this, any subsoil on the site is likely to be of moderate permeability, with a moderate to low likelihood of surface water runoff and/or impeded vertical drainage (particularly given the slope gradients on the sitealso, see **Plates 1 and 2**). This supports the assertion above that surface water will flow through any topsoil and permeable subsoil to the bedrock and water table beneath the site, throughout the year.

A walkover survey of the site and examination of the cuttings in the banks of the streams channels on and at the edge of the site noted that deep, well drained, acidic topsoil is present throughout the site area.

### 7.3.4 Subsoils Geology (Quaternary Geology)

The Quaternary period extended from 1.6 million years ago to the present day. During this period great Ice Ages took hold in Ireland, the last of these extending from 73,000 years before present (BP) until 10,000 years BP.

General information concerning the Subsoil (Quaternary) Geology is contained in the GSI publication "Geology of Kildare-Wicklow" (1994). There were several phases of ice flow affecting south County Dublin. Within these phases, ice flowed from a number of different centres. The ice from the northwest would have been the last ice to cross over the site as the existing glacial landforms indicate that ice flow direction during the Last Glacial Maximum was approximately southeasterly across south County Dublin. Following this there was a period of deglaciation, when waterlain glaciofluvial sediments were deposited. Since deglaciation ended, a period of post-glacial geological processes has continued until the present day, where natural landscape processes in Ireland are dominated by the action of water.

Glacial deposits in this area around Woodtown are often relatively shallow, with tracts of much older bedrock poking through the glacially-derived subsoils. Thus, on the higher ground south and southwest of the proposed LRD Site itself, bedrock is mapped as being at or within 1 metre of the surface across some wide belts of land.

Where glacial debris is found on top of the bedrock, it generally consists of tills (boulder clays), which were deposited at the base of the moving ice. All of the subject site is mapped as having deep till as the subsoil, above bedrock at a deeper level, in a such a fashion (**Figure 7.2**).

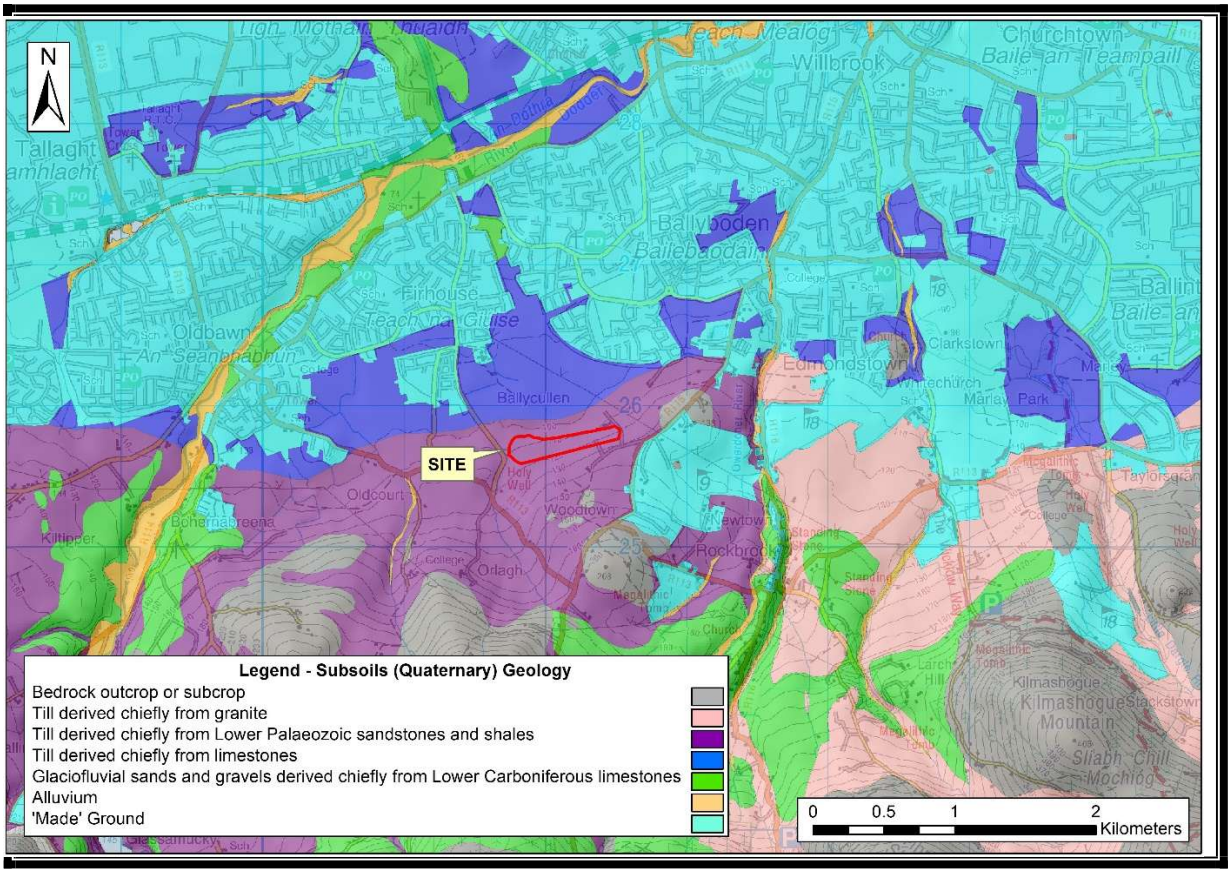


***Figure 7.2 Subsoils geology of the site and its environs (O.S. Licence EN 057925).***

The powerful glacial activity has therefore moulded and sculpted the macro-scale landscape character in this area. Ice moved across southern Dublin, flowing southeastwards towards Wicklow and the Irish Sea, while sculpting and planing the underlying bedrock. During the advancement of the glaciers, the weight and pressure of the ice broke the bedrock upon which the glaciers moved and ground it down to particle sizes ranging from boulders to clay. This material was bulldozed off and smeared by the advancing ice on the pre-existing bedrock. This material is therefore unsorted, cohesive and consolidated reflecting its crushing, smearing depositional process at the base of the ice. In many areas this bedrock was scraped clean of overburden, whereas in others thousands of tonnes of sandstone or limestone rock material was crushed, bulldozed and redeposited as till (boulder clay). Thick till debris overlying the bedrock is common in the lowlands of central Dublin, but generally shallows moving up the mountains, such as around Woodtown (**Figure 7.2**).

***Plate 7.4 Gently undulating till ridge at the western end of the site, viewed from it's western edge.***

The proposed LRD Site therefore lies in a transitional area between relatively deep glacial sediments to the north around Firhouse – Ballyboden, where a till plain is in evidence, and sandstone or granite bedrock outcrop to the south, around Mountpelier Hill, the southern portion of Woodtown Townland, and Kilmashogue Mountain.

According to the GSI Quaternary sediments (subsoil) map (Geological Survey Ireland, 2025, **Figure 7.2**), the tills at the proposed LRD Site are comprised of till derived chiefly from Lower Palaeozoic sandstone and shales (TLPSsS). This subsoil will generally have a SAND to CLAY texture, as the sandstone, when crushed mechanically by glacial ice, breaks down to a SAND texture, with CLAY also being derived from shale bands in the bedrock around the area. Consequently, the permeability of this material is generally moderate. On and around the proposed LRD Site itself much of the land surface has had significant depths of subsoil deposited across it, and bedrock is below the surface.

During deglaciation, when the ice covering Ireland melted, huge amounts of meltwater were released. At this time the wide valleys hosting the River Dodder at the west of the site (around Bohernebreena), and the Owerdoher River to the east of the site (around Rockbrook) were wide, deglacial rivers. In these wide valley settings glaciofluvial sands and gravels were deposited by the deglacial meltwaters. In the base of these modern valleys, where the Rivers Dodder and Owerdoher now flow, alluvium has been deposited over the millennia by the present day rivers across the lower, flatter floodplain strips flanking the watercourses. Much of the land

around the proposed LRD Site itself, having been sealed by concrete and/or hardstand in recent years, is mapped on the subsoil map as 'Made' ground (see **Figure 7.2**).

On a regional basis, in general it would be interpreted that depths of subsoil in the area of the Site are of relatively deep depth in the majority (>3m, South Dublin County Council Groundwater Protection Scheme Map), and are projected to be at least 5 m deep in places, where significant piles of till subsoil debris has been interpreted as being left by previous glacial activity along the western edge of the proposed LRD Site.

The walkover survey of the site noted that subsoil is present across the entirety of the site area, with no bedrock seen to outcrop at surface. This is particularly the case along the stream conduits incising into the till subsoil, which run through the site from south to north, and have cut channels up to 2.3 m deep in places.

***Plate 7.5 Till subsoil exposed along the banks of the stream channel along the eastern boundary of the site; note the complete absence of bedrock outcrop along the stream channel sides and in the stream base.***

#### 7.3.4.1 Site Investigations (Drilling and Trial Pitting)

In order to determine the full geological profile (soil, subsoil and bedrock) at the proposed LRD Site, extensive ground investigations were carried out in September 2006 and February 2024 to determine the geological and hydrogeological setting of the proposed LRD Site.

A total of 26 no. deep trial pits excavated inside the proposed LRD Site boundary, and 2 no. excavated just outside of it at the southeast, to determine the thickness and geomorphology of mineral subsoils overlying the Site. Of these, 20 no. trial pits were dug in 2006, with a further 8 no. in 2024.


*Figure 7.3 Location of trial pits excavated across the proposed LRD Site area.*

Trial pit logs are attached as Appendix 7-1, and the locations of the investigation points are shown on **Figures 7.3** and **7.4**. Refer to **Table 7.5** for a summary of the investigation trial pitting.

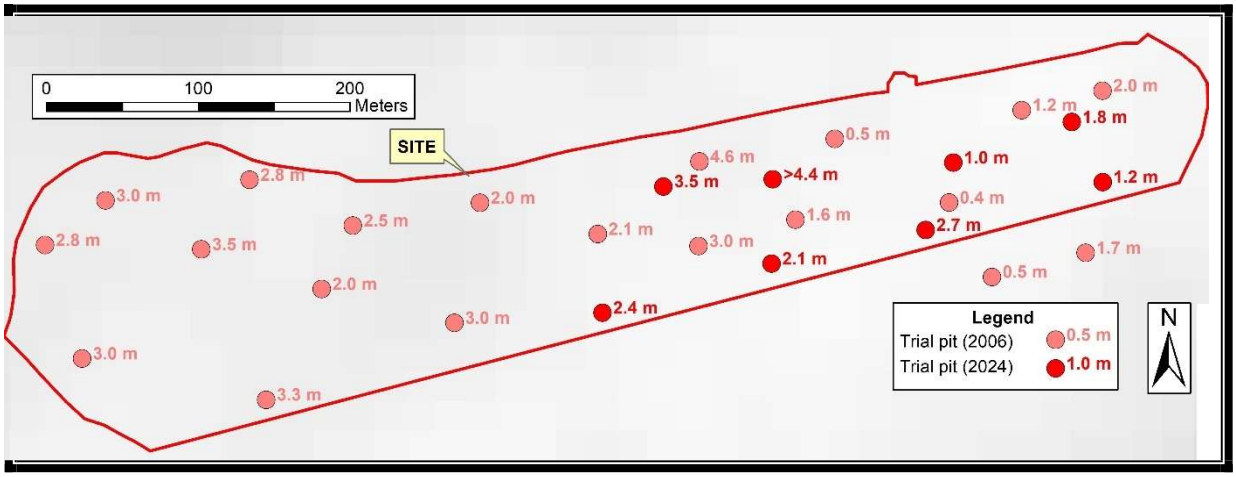


*Figure 7.4 Point depths to bedrock at trial pit localities excavated across the proposed LRD Site area.*

Bedrock was confirmed in 27 of the 28 trial pits excavated on the site.

The depths to bedrock across the proposed LRD Site as a whole were found to be relatively deep, being a minimum of 0.4 m deep but a maximum of >4.4 m deep. The individual depths to bedrock at the trial pit point localities are shown in **Figure 7.4**.

Across the majority of the site, the till subsoil was found to be directly underlain by bedrock described as either schist or shale in the Site Investigation reports. In one trial pit (TP20, 2006) interbedded layers of SAND and GRAVEL were encountered at depth, between 1.3 m and 4.0 m below ground (and just above bedrock).

The till deposits are typically comprised of slightly sandy gravelly CLAY, with some cobbles and boulders (**Table 7.5**).

The confirmed depth of glacial tills in grassland areas on the proposed LRD Site are therefore between 0.4 m (TP5, 2006) and > 4.4 m deep (TP6, 2024). In contouring the depths to bedrock, the subsoil depths deepen generally westwards across the proposed LRD Site, and there does seem to be a bedrock 'high'

where bedrock is generally close to the surface in the east central portion of the site (**Figure 7.5**). This bedrock deepens rapidly to deep depth of over 4 m in the east central portion of the site (**Figure 7.5**).

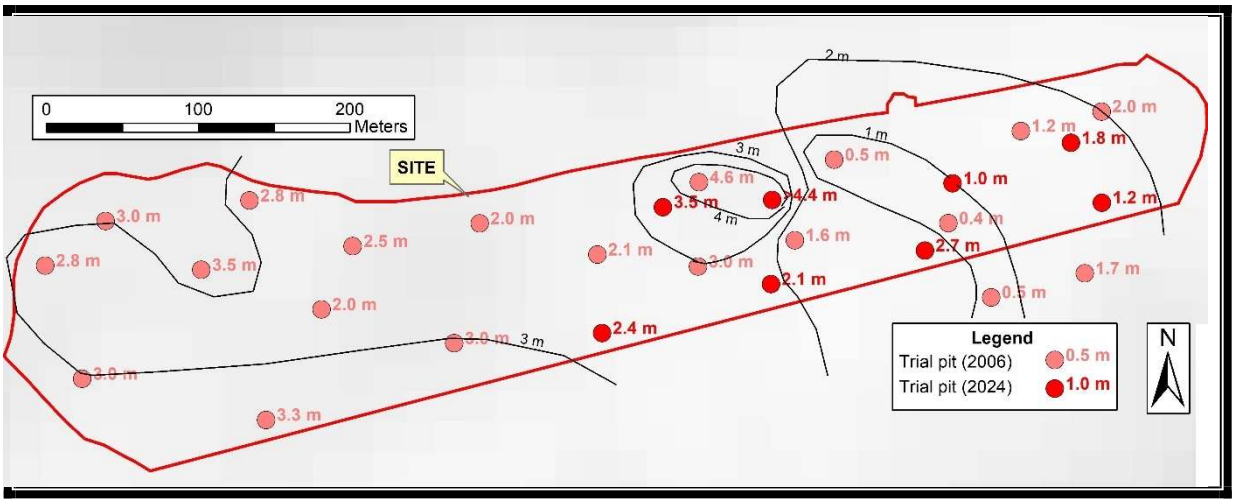


*Figure 7.5 Interpreted depth to bedrock contour map across the proposed LRD Site area.*

| Location | Date excavated | Depth of trial pit (m) | Depth to bedrock (m) | Glacial till thickness (m) | Glacial till description |
|---|---|---|---|---|---|
| TP1 | 21st September 2006 | 2.20 | 2.00 | 2.00 | slightly sandy silty gravelly CLAY |
| TP2 | 21st September 2006 | 2.00 | 1.70 | 1.70 | slightly sandy silty gravelly CLAY |
| TP3 | 21st September 2006 | 1.90 | 1.20 | 1.20 | slightly sandy gravelly CLAY |
| TP4 | 21st September 2006 | 1.50 | 0.50 | 0.50 | slightly sandy gravelly CLAY/SILT |
| TP5 | 21st September 2006 | 0.90 | 0.40 | 0.40 | sandy gravelly SILT |
| TP6 | 21st September 2006 | 1.40 | 0.50 | 0.50 | sandy CLAY |
| TP7 | 21st September 2006 | 2.00 | 1.60 | 1.60 | sandy gravelly CLAY |
| TP8 | 21st September 2006 | 3.90 | 3.00 | 3.00 | slightly sandy silty gravelly CLAY |
| TP9 | 21st September 2006 | 4.90 | 4.60 | 4.60 | slightly sandy silty gravelly CLAY |
| TP10 | 21st September 2006 | 3.30 | 2.10 | 2.10 | slightly sandy gravelly CLAY |
| TP11 | 21st September 2006 | 3.70 | 2.00 | 2.00 | sandy gravelly CLAY |
| TP12 | 21st September 2006 | 3.40 | 3.00 | 3.00 | slightly sandy gravelly CLAY |
| TP13 | 21st September 2006 | 3.80 | 2.50 | 2.50 | sandy gravelly CLAY |
| TP14 | 21st September 2006 | 3.00 | 2.00 | 2.00 | slightly sandy gravelly CLAY |
| TP15 | 21st September 2006 | 3.80 | 3.30 | 3.30 | sandy gravelly CLAY |
| TP16 | 21st September 2006 | 3.80 | 3.50 | 3.50 | slightly sandy gravelly CLAY |
| TP17 | 21st September 2006 | 3.50 | 2.80 | 2.80 | sandy gravelly CLAY |
| TP18 | 21st September 2006 | 3.50 | 3.00 | 3.00 | sandy gravelly CLAY |
| TP19 | 21st September 2006 | 3.50 | 3.00 | 3.00 | slightly sandy slightly gravelly CLAY |
| TP20 | 21st September 2006 | 4.00 | 2.80 | 1.30 | sandy gravelly CLAY over SAND/GRAVEL |
| TP1 ('24) | 16th February 2024 | 3.60 | 1.20 | 1.20 | No description given |
| TP2 ('24) | 16th February 2024 | 2.00 | 1.80 | 1.80 | No description given |
| TP3 ('24) | 16th February 2024 | 1.10 | 1.00 | 1.00 | No description given |
| TP4 ('24) | 16th February 2024 | 3.10 | 2.70 | 2.70 | No description given |
| TP5 ('24) | 16th February 2024 | 2.60 | 2.10 | 2.10 | No description given |
| TP6 ('24) | 16th February 2024 | 4.40 | >4.40 | >4.40 | No description given |
| TP7 ('24) | 16th February 2024 | 3.80 | 3.50 | 3.50 | No description given |
| TP8 ('24) | 16th February 2024 | 2.80 | 2.40 | 2.40 | No description given |

*Table 5 Summary depth to bedrock and subsoil data from trial pitting across the proposed LRD Site*

As the proposed LRD Site is entirely underlain by mineral subsoil, no peat probing to determine peat thickness or morphology / composition was required to be carried out across the site.

All depths to bedrock have been considered in the proposed finished floor levels, and associated cut and fill element for site preparation, across the site, and the deepest areas of cut, in the east central, north central and southwestern portions of the site (4.846 m bgl, 3.148 m bgl and 2.198 m bgl) have all

been sited in the localities with the deepest soil and subsoil above bedrock (see **Figure 7.6** following, and detail in both accompanying sheets of Cut and Fill Analysis by Waterman Moylan). Thus, it is envisaged that minimal elements of excavation to and into the bedrock substrate will be completed during construction works on the site.

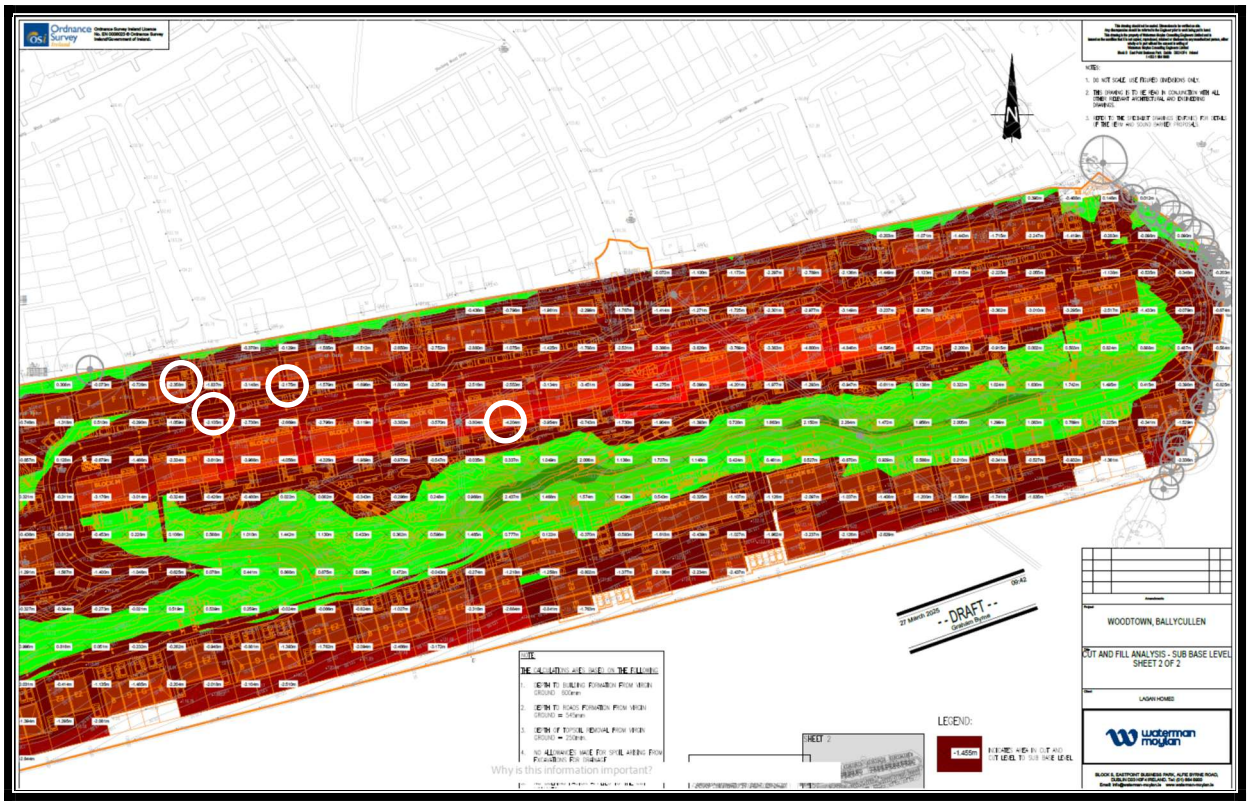


***Figure 7.6 Cut and fill areas across the eastern portion of the site, with the deepest cut localities (white circles) corresponding to the deepest depth to bedrock across the proposed LRD Site area.***

### 7.3.5 Bedrock Geology

The bedrock geology underlying the proposed LRD Site is discussed in the GSI publication "Geology of Kildare-Wicklow" (1994), as well as on Geological Survey Ireland's web viewer (www.gsi.ie). The 1:100,000 scale bedrock geology map of the area (Sheet 16) indicates that the subject site is underlain entirely by rocks of the Butter Mountain Formation (OABUTT). These were deposited during the Ordovician Period (485 to 444 million years ago). The bedrock geology of the area around the proposed LRD Site is shown in **Figure 7.7**.

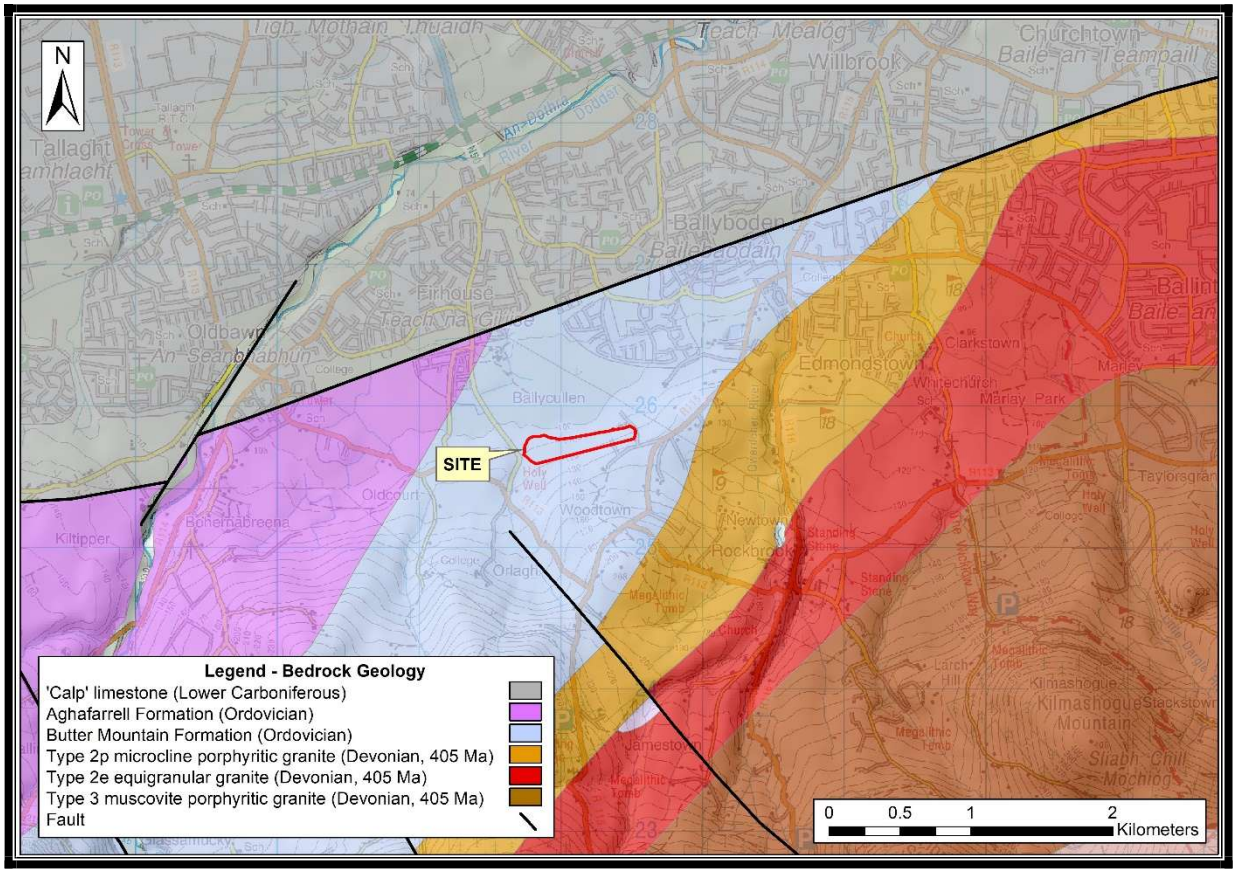


*Figure 7.7 Bedrock geology of the proposed LRD Site and its environs (after www.gsi.ie)*

The Butter Mountain Formation is a metamorphic rock and comprises fine-grained metasediments, which are in the majority dark blue to grey slates, which become schistose towards the granite of the Dublin – Wicklow Mountains, with thin, interbedded quartzites seen in the rock unit in places (McConnell and Philcox, 1994). The quartzite beds may be up to 200 mm thick, and usually interbedded with purplish, tourmaline-bearing pelites (McConnell and Philcox, 1994). In summary on the GSI Rock Unit Group map the Butter Mountain Formation is synthesised as an 'Ordovician Metasedment' of grey and grey-green, dark slate – schists, quartzites and coticules, and the formation is also classified overall in a hydrostratigraphic sense as 'Ordovician Metasediments'.

To the southeast of the site, various types of granite bedrock underlie the higher ground on Kilmashogue Mountain (**Figure 7**). On the lower ground to the north, 'Calp' limestone bedrock occurs. To the west, on the slightly lower ground of the Dodder Valley, Ordovician bedrock of the Aghafarrell Formation occurs. Many of the changes in bedrock type are marked by faults (**Figure 7.7**), but there are no faults mapped within 500 m of the proposed LRD Site.

As Ordovician Metasediments such as the Butter Mountain Formation are acidic rocks, they are not subject to dissolution and karstification.

Bedrock is not mapped as cropping out at or just below surface anywhere on the subject proposed LRD Site, on the GSI manuscript maps (1871, see **Figure 7.8**), with the closest outcrop approx. 375 m to the east where 'slaty rock' is mapped adjacent to 'granite', along the roadside along Stocking Lane.

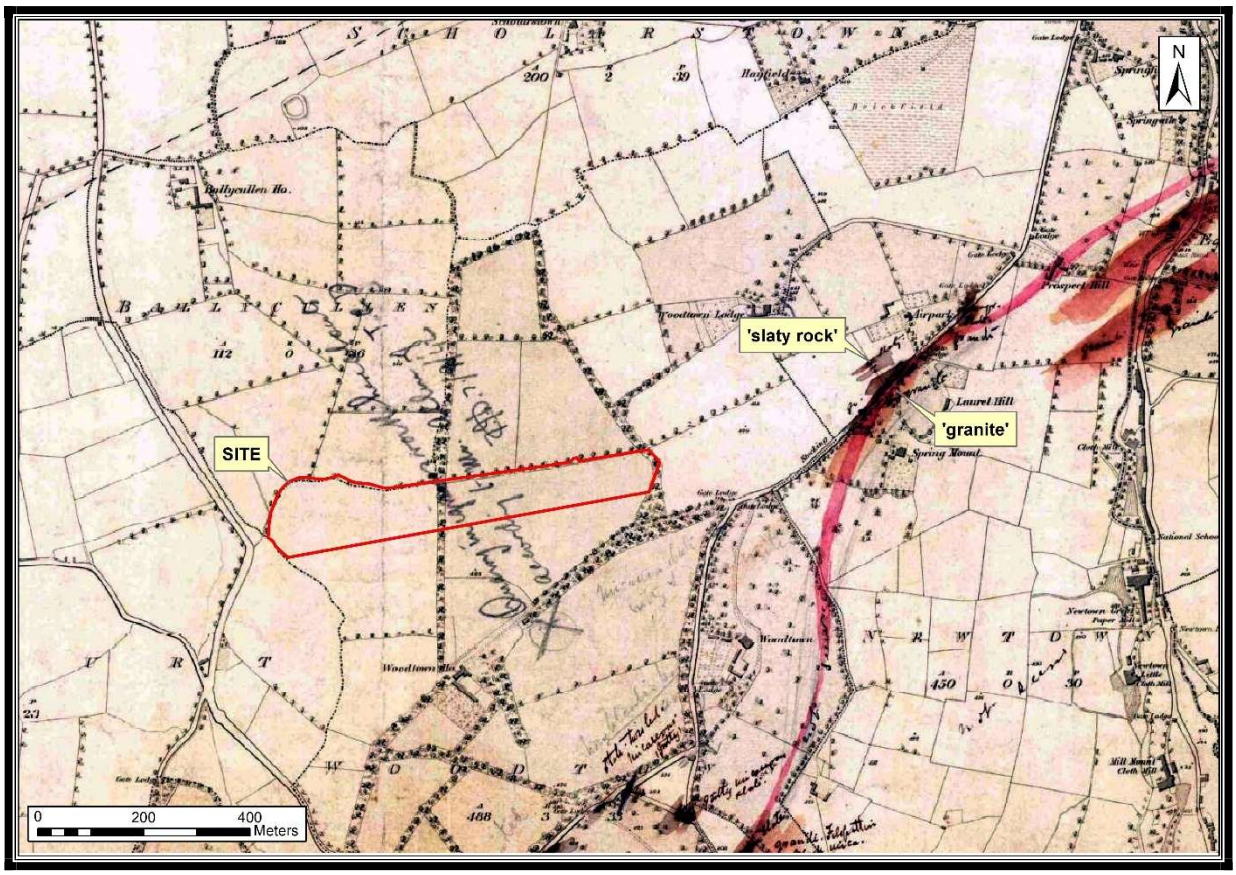


***Figure 7.8 GSI six inch bedrock geology manuscript map of the proposed LRD Site and its environs (after www.gsi.ie)***

### 7.3.6 Geological Resource Importance

The metasediment bedrock at the proposed LRD Site is classified as being of "Low" importance. The bedrock could be used on a "sub-economic" local scale for construction purposes only. Furthermore, the bedrock in the locality is poorly exposed due to the coverage of deep till subsoils.

The till subsoil deposits at the proposed LRD Site can also be classified as "Low" importance as the till is not designated as being a resource in this area and is also locally abundant in the general region.

### 7.3.7 Designated Sites

Under the Irish legal framework specified habitats and species, and areas which contribute surface water or groundwater resources to drinking water, are given various levels of protection to maintain both healthy and sustainable ecosystems and drinking water.

Protected areas or conservation areas are therefore locations which receive protection because of their recognized natural, ecological or cultural values. There are several kinds of protected areas in Ireland, which vary by level of protection depending on enabling laws or the regulations of the international organizations involved.

Natura 2000 is a network of protected areas established by the European Union across all Member States. It is made up of Special Areas of Conservation (SACs) and Special protection Areas (SPAs) designated respectively under the Habitats Directive and the Birds Directive. In Ireland, 7,155 $km^2$ are designated as terrestrial SAC sites, and 5,700 $km^2$ as SPA sites. SPAs and SACs aim to maintain or restore the favourable conservation status of habitats and species of community interest.

SPAs are designated based on the EU Birds Directive (2009/147/EC) which aims to protect all wild bird species which naturally occur in the European Union. Each of Ireland's 154 SPA sites has been protected by individual Statutory Instruments. SAC sites are designated based on the EU Habitats Directive (92/43/EEC) which was transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). The Habitats Directive ensures the conservation of a wide range of rare, threatened, or endemic animal and plant species.

Some rare and characteristic habitat types are also targeted for conservation in their own right, as Natural Heritage Areas (NHAs). The designation includes areas considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. Geological/geomorphological sites, such as karst pavement or early fossil sites, are also afforded protection through the NHA designation. In addition to NHAs, there are a number of proposed NHAs (pNHAs), which were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated as full NHAs. These sites are of significance for wildlife and habitats. Prior to statutory designation, pNHA sites are subject to limited protection.

The closest designated site to the proposed LRD Site is the Wicklow Mountains SPA which is just under 4 kilometres southeast of the site, and on higher ground there.

An Natura Impact Statement (NIS) accompanies this planning application under separate cover.

The Proposed Natural Heritage Areas of the Dodder Valley and the Glenasmole Valley occur just over 1.75 kilometres northwest and 3 kilometres west-southwest of the proposed LRD Site respectively.

### 7.3.8 Geological Heritage Sites

The Irish Geological Heritage (IGH) Programme in GSI complements other nature conservation efforts of the last decade, by assessing Ireland's geodiversity. Geodiversity is the foundation of the biodiversity addressed under European Directives on habitats and species by the designations of SAC and more recently on a national scale by the introduction of NHAs as the national nature conservation method. As a targeted conservation measure to protect the very best of Irish geology and geomorphology the IGH Programme fills a void which has existed since the abandonment of the Areas of Scientific Interest scheme, listed by An Foras Forbartha in 1981.

The IGH Programme does this by identifying and selecting the most important geological sites nationally for designation as NHAs. It looks at the entire spectrum within Irish geology and geomorphology under 16 different themes:

**IGH THEMES**

1. Karst
2. Precambrian to Devonian Palaeontology
3. Carboniferous to Pliocene Palaeontology
4. Cambrian-Silurian
5. Precambrian
6. Mineralogy
7. Quaternary
8. Lower Carboniferous
9. Upper Carboniferous and Permian
10. Devonian
11. Igneous intrusions
12. Mesozoic and Cenozoic
13. Coastal geomorphology
14. Fluvial and lacustrine geomorphology
15. Economic geology
16. Hydrogeology

A fundamental approach is that only the minimum number of sites necessary to demonstrate the particular geological theme is selected. This means that the first criterion is to identify the best national representative example of each feature or major sequence, and the second is to identify any unique or exceptional sites. The third criterion, identifying any sites of International importance, is nearly always covered by the other two.

Designation of geological NHAs will be by the GSI's partners in the Programme, the National Parks and Wildlife Service (NPWS). Once designated, any geological NHAs will be subject to normal statutory process within South Dublin County Council's Planning Departments and other relevant divisions. However, compared to many ecological sites, management issues for geological sites are generally fewer and somewhat different in nature.

From a national perspective, as a result of extensive comparison of similar sites to establish the best among them, there is now a good knowledge of many other sites, which are not the chosen best example, but which may still be of national importance. Others may be of more local importance or of particular value as educational sites or as a public amenity. All these various important sites are proposed for County Geological Site (CGS) listing in the County Development Plan.

Currently, in 2025, a Master List of candidate CGS and NHA sites is being used in GSI, originally compiled with the help of Expert Panels for all the 16 IGH themes, for the majority of counties. For several themes, the entire

process has been largely completed and detailed site reports and boundary surveys have been completed along with a Theme Report.

But in 2014, ten County Geological Sites were formally identified in South County Dublin. None are considered to be of national importance, whereby the sites would be put forward as a potential Geological Natural Heritage Areas (NHAs). This follows the comprehensive Irish Geological Heritage Audit of the county (Hennessy et al., 2015).

The terraces of the River Dodder at Bohernabreena, approximately 1.95 kilometres west-southwest of the proposed LRD Site, have been designated as a County Geological Site as part of this Irish Geological Heritage (IGH) Programme by the GSI. This is the closest County Geological Site.

Any potential hydrological/hydrogeological effects on the Dodder Terraces at Glenasmole are discussed in Chapter 8 (Hydrology, Hydrogeology and Drainage).

All designated sites and geological heritage sites are screened out for further assessment with regard land, soils and geology due to lack of potential direct effects. Indirect hydrological and hydrogeological effects are assessed in Chapter 8 (Hydrology, Hydrogeology and Drainage).

### 7.3.9 Soil Contamination

There are no known areas of soil contamination on the proposed LRD Site. During the site walkovers or investigations, no areas of contamination concern were identified. This was also confirmed by a visual appraisal of the water quality in the streams running through the site (refer Hydrology, Hydrogeology and Drainage Chapter 8).

According to the EPA online mapping (http://gis.epa.ie/Envision), there are no licensed waste facilities on or within the immediate environs of the proposed LRD Site.

There are no historic mines at or in the immediate vicinity of the proposed LRD Site that could potentially have contaminated tailings.

### 7.3.10 Economic Geology

The GSI online Aggregate Potential Mapping Database shows that the proposed LRD Site is located within an area mapped as being typically Low to Moderate in terms of crushed rock aggregate potential and with no potential for granular aggregate potential (i.e. potential for gravel reserves).

### 7.3.11 Geohazards

The GSI Landslide database (www.gsi.ie) does not record any historic landslides in the vicinity of the proposed LRD Site or in the surrounding lands.

The GSI Landslide Susceptibility Map (www.gsi.ie) classifies the probability of a landslide occurring at a given location. The probability of a landslide occurring at the proposed LRD Site is mapped as being mainly Low, with a very small area of Moderately Low in the extreme southeastern corner of the site.

As the proposed LRD Site is entirely underlain by mineral subsoil, and as there is no peat of any thickness, a site-specific, site scale Peat Stability Risk Assessment was not required on the site.

## 7.4 CHARACTERISTICS OF THE PROPOSED PROJECT

The proposed LRD Project construction will mainly involve removal of mineral soils and mineral subsoils for access roads, underground cabling and pipework, hardstanding areas, house, duplex and simplex foundations, a construction compound and drainage works. Some crushed rock for construction purposes will be sourced off-site from nearby commercial quarries.

Approximately 27,665 $m^3$ of material will be required as fill for the proposed LRD Site footprint with all of this to be provided by the movement of granular soils and subsoils won on-site. There will be no requirement for the importation of any soil or subsoil / landscaping material from licenced quarries or gravel pits.

Generally during house construction, gravity foundations depths are expected to be between 0.3 m and 0.6 m deep, depending on ground conditions at each house locality.

All house hardstands will be founded on a suitable bearing material requiring the excavation of any encountered 'soft' ground materials, if present.

The total volume of spoil (soil and subsoil superficial deposits) requiring placement/reinstatement within the proposed LRD Project Site is consequently estimated at 27,665 $m^3$ (refer to **Table 6** below).

Any remaining spoil from 'cut' (57,116.5 $m^3$) will be exported to a licenced waste facility.

| Comment | Spoil Reinstatement Volume ($m^3$) |
|---|---|
| 25% reinstatement of total volume | 27,665 |
| Spoil Stockpile Areas | 57,116.5 |
| Total | 79,101.5 |

***Table 6 Summary of soil reinstatement volumes for the proposed LRD Project***

## 7.5 LIKELY AND SIGNIFICANT IMPACTS ON LAND, SOILS AND GEOLOGY

### 7.5.1 Do Nothing Scenario

If the proposed development does not go ahead, there would be no potential impacts on the soil, subsoil and bedrock geology underlying the subject site (as well as on the hydrology, hydrogeology and drainage).

The area of the site, including the fields and hedgerows within, would continue as is on the site, with rainfall infiltrating to ground and surface water running into the stream watercourses, and the hedgerows would not be encroached upon. Agricultural practices would continue. This would have no impact on the underlying substrate, and there would be no change to the environmental profile of the site in relating to Land, Soils, Geology, Hydrology, Hydrogeology and Drainage.

### 7.5.2 Potential Impacts and Mitigation Measures – Construction Phase

The proposed development will include the following accommodation; 4 no. Type A1 dwelling houses (three-bedroomed, semi-detached), 10 no. Type A2 dwelling houses (three-bedroomed, end of terrace), 6 no. Type B1 dwelling houses (three-bedroomed, semi-detached), 36 no. Type B2 dwelling houses (three-bedroomed, end of terrace), 16 no. Type C1 dwelling houses (four-bedroomed, semi-detached), 8 no. Type C2 dwelling houses (four-bedroomed, semi-detached), 1 no. Type C3 dwelling house (four-bedroomed, detached), 19 no. Type D dwelling houses (two-bedroomed, mid-terrace), 9 no. Type E1 dwelling houses (four-bedroomed, detached), 28 no. Type E2 dwelling houses (four-bedroomed, semi-detached), 30 no. Type F dwelling houses (three-bedroomed, semi-detached), 30 no. Type G dwelling houses (3-bedroomed, mid-terrace), 108 no. Type 1 Apartments (one-bedroomed), 63 no. Type2 Apartments (two-bedroomed), 88 no. Type 3 Apartments (two-bedroomed), and 46 no. Type 4 Apartments (three-bedroomed), as well as all ancillary site works.

The site is located on the northern lower backslope of a high, unnamed, dome-shaped ridge feature at Woodtown, which itself is a spur-ridge off the northeastern side of Mountpelier Hill, from which views of the surrounding countryside at the northwest, north and northeast are attained.

The site will be accessed via the entrance to the proposed LRD site which is proposed from the existing road to the east of Abbott's Grove, at the northwest, into the (current) western field of the two-field landholding that forms the site and a second entrance via Stocking Wood housing development. There will be no basements in any of the houses on the site, and the foundation levels will be set just below existing ground levels, largely on the pre-existing, *in situ* subsoil.

Detailed desk study review of available soils, subsoils and bedrock geological maps for the site show the presence of deep soil and subsoil beneath the majority of the site, with bedrock close to (within 1 metre of) the surface in the central eastern portion of the site. The construction activity at the site will comprise the extraction and movement of relatively small portions of soil and subsoil material. It is envisaged that only minimal amounts of rock-breaking will be required across portions of the site area during construction, as the proposed alteration of site levels where required will require removal of glacial till material for the most part, as ensured by the design of the geometry of the proposed cut and fill and the related proposed floor levels for the site.

As the proposed development will not involve major excavations as no subterranean car parks or basements are proposed, the construction works will not impact on groundwater resources locally, and as there is no observed or visible geological connection between the impure metasediments (slates) bedrock beneath the site and either

the Wicklow Mountains SPA or the Proposed Natural Heritage Areas of the Dodder Valley and the Glenasmole Valley pNHAs to the south-southeast and northwest / west-southwest respectively.

A significant amount of the extracted topsoil will be retained on the site for use in landscaping and remediation of the site following completion of the construction phase. This is described in more detail in the enclosed Construction and Environmental Management Plan.

In the course of the works it is estimated that there will be an approximate 5% loss of the usable topsoil, subsoil and rock material due to the nature of handling such material.

In extraction, any existing topsoil layer (approx. 300 mm - 500 mm) will be removed from phased working areas. Any subsoil material from the phased working areas will then be removed from the ground using a mechanical excavator, as will bedrock, where possible. No blasting shall be employed in the removal of topsoil, subsoil or bedrock and should any rock be required to be removed following breaking, this shall only be removed using a mechanical excavator.

Any topsoil, subsoil or rock stockpiles will likely only store a maximum of 300m$^3$ of topsoil at any one time (depending on the exact sequence of works).

The maximum dimensions of any stockpiles shall be 3m in height, approximately 10m deep and approx. 10m long. On this basis, it is estimated that there should be no more than 2 No. stockpiles of topsoil.

The stockpiles will be formed so that they do not hold ponds of water on the surface and the stock piles will be rolled or tamped smooth such that the upper layer will resist water ingress into the material below. Where the spoil is wet, it may be spread to allow air drying during periods of dry weather.

All works will be carried out under the supervision of suitably experienced and competent overseers. All personnel on site will be informed of all ground conditions to be expected on site and made aware of any mitigation measure necessary to successfully complete the construction of the project.

During the initial site preparation and construction stage, there will be a significant volume of machinery and equipment at the subject site, including trucks, excavators and screeners. There will be potential for leakage of fuel and oil from these vehicles into the surrounding groundmass, particularly during refuelling operations. The storage of large quantities of fuel or oils on site is not anticipated.

A Construction Management Programme will be implemented by the Principal Contractor for the duration of the construction phase, which will also cover associated and related environmental issues. This will require all potentially polluting material *e.g.* fuel and oil, be stored in appropriate, bunded containment; that all spills are cleaned promptly; and spill cleanup waste disposed of appropriately, and that all spills are notified to the site manager. Given the site topography, with a gently sloping gradient down-hill towards existing houses, and given the results from trial pitting on the site, it is not expected that any significant volumes of shallow, 'perched' groundwater will be encountered during excavation work. Surface water, which may collect in shallow excavations, has the potential to be contaminated with silt or other contaminants and would not be considered

suitable for the discharge to any local surface water bodies without appropriate treatment. Hence, surface water will be discharged to soakaways constructed at localities across the site.

Though the above outlines a significant work package to be carried out on-site, there will be little impact to the site as the bedrock substrate and any associated landscaping of soil and subsoil will not be over-compacted when restoring the site.

#### 7.5.2.1 Effects on Land and Land Use of the proposed LRD Site Construction

There will be loss of land as a result of the proposed LRD Site (Proposed Project).

The loss of agricultural land amounts to 10.1 ha and there is no loss of forestry as it is proposed to retain the central woodland and hedgerow to the east of the site.

There will be no effects on the lands adjoining the proposed LRD Site. Agriculture will continue during the construction of the proposed LRD Project.

**Pathway**: Land take

**Receptor**: Land and Landuse (i.e. the land upon which the proposed LRD Project will occur)

**Potential Pre-mitigation Impact**: Negative, slight, direct, likely, permanent impact on land and land use.

**Impact Assessment**: The loss of agricultural land resulting from the proposed LRD Project on a local or regional scale is minimal and therefore the effects of actual agricultural land loss is imperceptible.

**Mitigation Measures**: No mitigation is proposed with regard agricultural or forestry loss of land.

**Residual Impact**: Due to the small footprint of the proposed LRD Project on a local scale the residual effect is negative, direct, slight, likely, permanent impact on land and land use.

**Significance of Effects**: For the reasons outlined above, no significant effects on land or land use will occur as a result of the proposed LRD Project.

#### 7.5.2.2 Effects on Soil, Subsoil and Bedrock Excavation of the proposed LRD Site Construction

There will be excavations required for the proposed LRD Site (Proposed Project).

Excavation of soil, subsoil and bedrock will be required. for construction of works and for the installation of access roads, site drainage network, as well as all ancillary site works.

This will result in a permanent removal and relocation of in-situ soil and subsoil at most excavation locations. Estimated volumes of spoil to be relocated are summarised above in **Table 2**. There is proposed to be no a net loss of soil and subsoil, but much of the removed soil and subsoil will be relocated within the Site.

**Pathway**: Extraction/excavation.

**Receptor**: Soil, subsoil and bedrock.

**Potential Pre-Mitigation Potential Effect**: Negative, slight/moderate, direct, likely, permanent effect on soil, subsoil and bedrock due to excavation, relocation within the proposed LRD Project Site, and exportation off-site.**Proposed Mitigation Measures by Design**:

- As much of te soil, subsoil and bedrock as possible which will be removed during the construction phase will be localised to the proposed LRD Site infrastructure, compounds and access roads;
- The proposed LRD Project has been designed to avoid, insofar as possible, sensitive habitats within the Site; and,
- Construction of settlement ponds will be volume neutral, and all excess material will be used locally to form pond bunds and surrounding landscaping.

**Residual Impact Assessment**: The mineral soil and subsoil at the Site can be classified as of "Low" importance and the bedrock of "Low" importance.

The design measures incorporated into the proposed LRD Project as described above in particular the practice of avoidance areas of bedrock subcrop as much as possible combined with the 'low' importance of the deposits means that the residual effect will be negative, slight, direct, likely, permanent effect on soil, subsoil and bedrock due to disturbance and relocation within the Site.

**Significance of Effects**: For the reasons outlined above, no significant effects on soils, subsoils and bedrock will occur as a result of the proposed LRD Project.

#### 7.5.2.3 Contamination of Soil, Subsoil and Bedrock by Leakages and Spillages of Hydrocarbons or Chemicals in the proposed LRD Site Construction

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a pollution risk at the proposed LRD Project Site and therefore both are assessed herein.

The accumulation of small spills of fuels and lubricants during routine plant use can also be a significant pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects (i.e. contamination of soils and subsoils and pollution of the underlying bedrock aquifer) on the geological and water environment.

**Pathway**: Soil and subsoil and underlying bedrock pore spaces.

**Receptor**: Soil and subsoil, bedrock.

**Pre-Mitigation Potential Effect**: Negative, slight, direct, short-term, unlikely effect on soil, subsoils and bedrock.

**Proposed Mitigation Measures**:

- On-site re-fuelling will be undertaken using a double skinned bowser with spill kits kept on site for accidental leakages or spillages;
- Only designated trained operatives will be authorised to refuel plant on-site;
- Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system;
- All fuel storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area;

- Fuel, oil and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- The electrical control building will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose;
- Safety data sheets for all chemicals used will be kept on-site; and,
- An emergency response plan for the construction phase to deal with accidental spillages is contained within the Construction and Environmental Management Plan.

**Residual Effect Assessment**: The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect for the proposed LRD Project will be negative, imperceptible, direct, short-term, unlikely effect on soil, subsoils and bedrock.

**Significance of Effects**: For the reasons outlined above, and with the implementation of the listed mitigation, no significant effects on soil, subsoils and bedrock will occur as a result of the proposed LRD Project.

#### 7.5.2.4 Erosion of Exposed Soils and Subsoils during the proposed LRD Site Construction

Soils and subsoils are at risk of erosion at the proposed LRD Project Site during the construction phase. There is a high likelihood of erosion of spoil during its excavation and during landscaping works at the Proposed Project site. The main impacts associated with this aspect is to the water environment, and therefore this aspect is further assessed in detail in Chapter 8. The potential impacts on air are exp;lored in Chapter 9.

**Pathway**: Vehicle movement, surface water and wind action.

**Receptor**: Soil and subsoil.

**Pre-Mitigation Potential Effect**: Negative, slight, direct, short-term, likely effect on soils and subsoils by erosion and wind action.

**Proposed Mitigation Measures**:

- The upper vegetative layer (where still present) of excavated soil will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the soil within the spoil repository areas;
- Re-seeding and spreading/planting will also be carried out in these areas;
- Brash mats will be put in place to support vehicles on soft ground, reducing mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur.

**Residual Effect Assessment**: Soils and spoil can be eroded by vehicle movements, wind action and by water movement. To prevent this all excavation works will be completed in accordance with a detailed

Spoil Management Plan, material will remain within the proposed LRD Project Site and reseeding and planting will be completed to bind landscaped spoil. Following implementation of these measures the residual effects will be negative, slight, direct, short-term, likely effect on soils and subsoils by erosion and wind action.

**Significance of Effects**: For the reasons outlined above, no significant effects on soils, subsoils or bedrock will occur as a result of the proposed LRD Project..

### 7.5.3 Potential Impacts and Mitigation Measures – Operational Phase

There are very few potential direct impacts are envisaged during the operational phase of the proposed LRD Project.

No potential impacts will be significant, as they would be small scale and also of an intermittent nature.

Mitigation measures for land, soils and geology during the operational phase include the use of aggregate from authorised quarries for use in road and hardstand maintenance. Hydrocarbons from vehicles within the site confines will be captured by petrol and oil interceptors within the proposed surface water drainage network.

These mitigation measures are considered sufficient to eliminate potential risks to ground/soils and subsoils, and groundwater and surface water quality.

### 7.5.4 Risk of Major Accidents and Disasters

Due to the nature of the proposed LRD Project site, i.e. absence of soft peat deposits, there is no risk of peat movement occurring. As well as this, all excavations are relatively shallow and will be completed using the Mitigation Methodologies outlined above e.g. in dry weather, etc.

The residual effect of a landslide occurring is therefore determined to be imperceptible.

### 7.5.5 Human Health Effects

Potential health effects arise mainly through the potential for soil and ground contamination. The proposed LRD Project is not a recognized source of pollution (e.g. it's not a waste management site, or a chemical plant), and so the potential for effects during the operational phase is very low.

Hydrocarbons will be used onsite during construction; however, the volumes will be small in the context of the scale of the proposed LRD Project and will be handled and stored in accordance with best practice mitigation measures. The potential residual effects associated with soil or ground contamination and subsequent health effects are imperceptible.

### 7.5.6 Cumulative Effects

The potential for impact between the proposed LRD Project, and other relevant developments has been carried out with the purpose of identifying what influence the proposed LRD Project will have on the surrounding environment when considered cumulatively and in combination with relevant existing permitted or proposed projects and plans in the vicinity of the Site, as set out in Chapter 2 of this EIAR.

Please see Section 2.4.2 of Chapter 2 for cumulative assessment methodology.

### 7.9.1 Construction Phase

The nature of the construction works within the proposed LRD Project Site mean that the effects on the land, soils and geology environment are restricted to the immediate areas of the construction works.

The only cumulative effect of the proposed LRD Project with respect to the lands, soils and geology will be due to the potential removal and transport of material to a licensed waste facility, if required.

The environmental effects of the placement of material within the licenced waste facility will have been previously assessed during the licensing process of this facility.

There will be no further cumulative effects on the land, soils and geology environment during the construction phase of the proposed LRD Project.

### 7.9.2 Operational Phase

During the operational phase of the proposed LRD Project all aspects of the land, soils and geology environment will remain constant, with no alteration of any aspect of this environment.

As a result, there will be no cumulative effects during the operational phase due to the proposed LRD Project.

## 7.5.7 Post Construction Monitoring

Due to the nature of the proposed LRD Project site, there will be no requirements for any monitoring of the site post construction.

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**APPENDIX 7.1**

**TRIAL PIT LOGS (2006)**

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP1**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Firm brown slightly sandy slightly gravelly CLAY | | 0.20 | | | | | | |
| | | 1 | | | | | | |
| Firm to stiff brown slightly sandy slightly gravelly CLAY | | 1.20 | | | | | | |
| | | 2.00 | | | | | | |
| Grey-green SCHIST recovered as angular gravel and cobbles. | | 2.20 | | | | | | |
| End of Trial pit at 2.20 m | | | | | | | | |
| | | 3 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion, refusal at 2.20mBGL.

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 2.20
0.00

GROUND INVESTIGATIONS IRELAND
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# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP2**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Firm brown slightly sandy slightly gravelly CLAY | | 0.25 | | | | | | |
| Firm to stiff brown slightly sandy slightly gravelly CLAY | | 1.00 | | | | | | |
| Grey-green SCHIST recovered as angular gravel and cobbles. | | 1.70 | | | | | | |
| End of Trial pit at 2.00 m | | 2.00 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion, refusal at 2.00mBGL.

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 2.00
0.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP3**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level (mOD) | Samples / tests: Type | Depth | Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Firm to stiff brown slightly sandy gravelly CLAY | | 1 | | | | | | |
| Weathered grey-green SCHIST recovered as angular gravel and cobbles | | 1.20 | | | | | | |
| End of Trial pit at 1.90 m | | 1.90 | | | | | | |
| | | 2 | | | | | | |
| | | 3 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion, refusal at 1.90mBGL

KEY
B Bulk disturbed sample
D Small disturbed sample
U Undisturbed sample

Dimensions
Depth: 1.90
0.00

GROUND INVESTIGATIONS IRELAND

## TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP4**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Firm brown slightly sandy gravelly CLAY/SILT | | 0.50 | | | | | | |
| Weathered grey-green SCHIST recovered as angular gravel and cobbles | | 1 | | | | | | |
| End of Trial pit at 1.90 m | | 1.90 | | | | | | |
| | | 2 | | | | | | |
| | | 3 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion, refusal at 1.90mBGL

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 1.90
0.00

GROUND INVESTIGATIONS IRELAND

## TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP5**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Firm brown sandy gravelly SILT | | 0.40 | | | | | | |
| Grey-green SCHIST recovered as angular gravel and cobbles. | | 0.90 | | | | | | |
| End of Trial pit at 0.90 m | | 1 | | | | | | |
| | | 2 | | | | | | |
| | | 3 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion, refusal at .90mBGL.

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions: -
Depth: 0.90 0.00

GROUND INVESTIGATIONS IRELAND
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# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP6**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Soft grey-brown sandy CLAY | | 0.50 | | | | | | |
| Grey- green SHALE recovered as angular gravel | | 1.00 | | | | | | |
| Grey SCHIST recovered as gravel and cobbles | | 1.40 | | | | | | |
| End of Trial pit at 1.40 m | | 2 | | | | | | |
| | | 3 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion, refusal at 1.40mBGL

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth
1.40
0.00

GROUND INVESTIGATIONS IRELAND
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TRIAL PIT RECORD

Project Name: Site at Woodstown , Ballycullen — Hole ID: TP7

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Depth | Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Soft to firm brown sandy gravelly CLAY | | 0.20 | | | | | | |
| Weathered grey SCHIST recovered as angular gravel and cobbles | | 1.60 | | | | | | |
| End of Trial pit at 2.00 m | | 2.00 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion, refusal at 2.00mBGL

KEY
B Bulk disturbed sample
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 2.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP8**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level (mOD) | Samples / tests: Type | Depth | Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Firm brown slightly sandy slightly gravelly CLAY | | 1.20 | | | | | | |
| Firm to stiff brown slightly sandy slightly gravelly CLAY with occasional cobbles | | 3.00 | | | | | | |
| Weathered grey SCHIST recovered as angular gravel and cobbles | | 3.90 | | | | | | |
| End of Trial pit at 3.90 m | | | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.90

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP9**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Depth | Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Firm brown slightly sandy slightly gravelly CLAY | | 1.00 | | | | | | |
| Firm to stiff brown slightly sandy slightly gravelly CLAY with some cobbles and occasional boulders | | 2 | | | | | | |
| | | 3 | | | | | | |
| | | 4 | | | | | | |
| Weathered grey SCHIST recovered as angular gravel and cobbles | | 4.60 | | | | | | |
| End of Trial pit at 4.90 m | | 4.90 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 4.90
0.00

GROUND INVESTIGATIONS IRELAND
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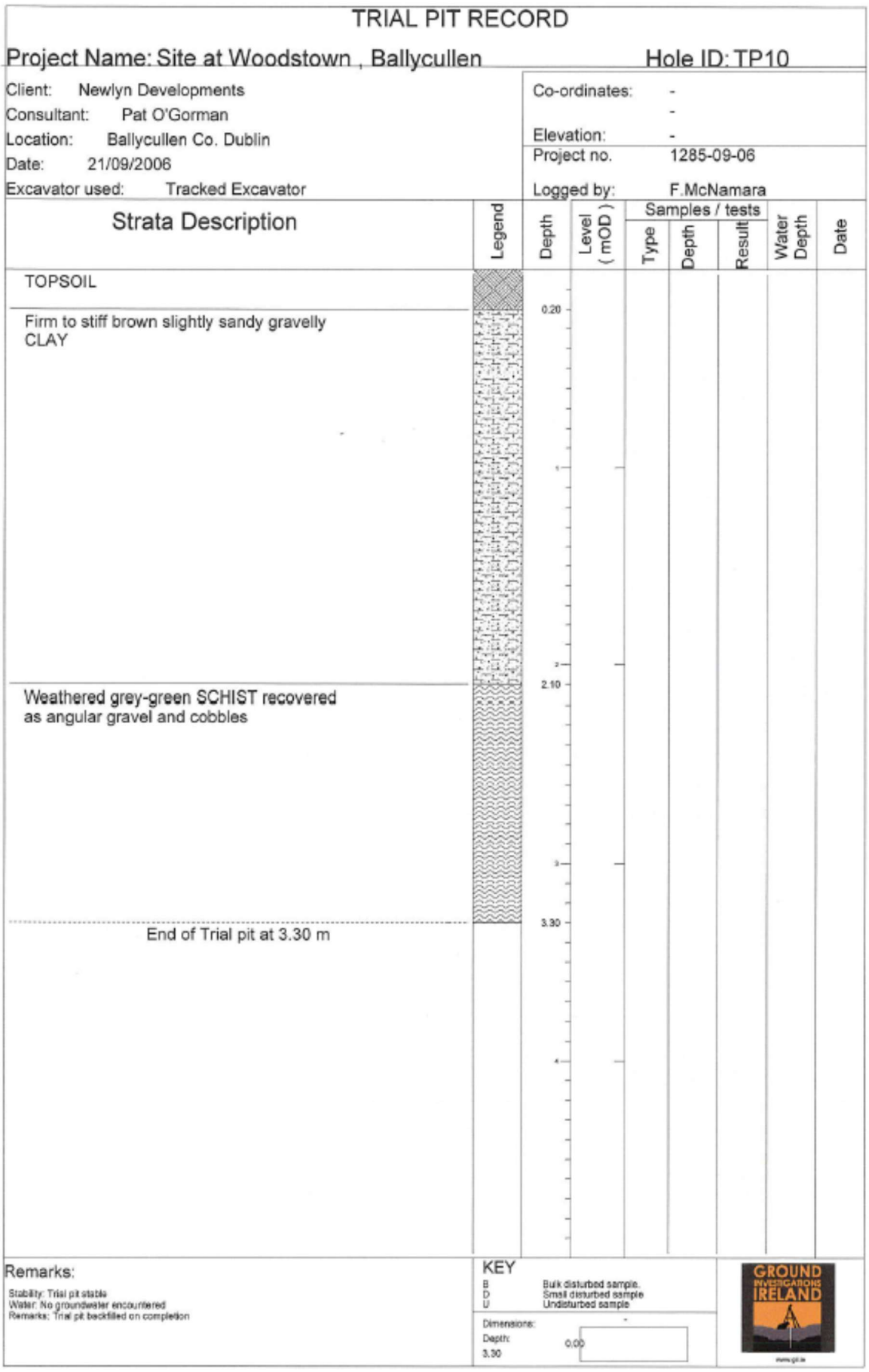

TRIAL PIT RECORD

Project Name: Site at Woodstown , Ballycullen — Hole ID: TP10

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level (mOD) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Firm to stiff brown slightly sandy gravelly CLAY | | 1 | | | | | | |
| | | 2 | | | | | | |
| Weathered grey-green SCHIST recovered as angular gravel and cobbles | | 2.10 | | | | | | |
| | | 3 | | | | | | |
| End of Trial pit at 3.30 m | | 3.30 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.30
0.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP11**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Soft to firm brown sandy CLAY | | 0.25 | | | | | | |
| Firm to stiff dark brown sandy gravelly CLAY | | 0.90<br>1 | | | | | | |
| Very stiff brown sandy gravelly CLAY with some cobbles and occasional boulders | | 2.00<br>3 | | | | | | |
| End of Trial pit at 3.70 m | | 3.70<br>4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions: -
Depth: 3.70 0.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP12**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Soft yellowish brown sandy SILT | | 0.25 | | | | | | |
| Firm to stiff brown slightly sandy gravelly CLAY with some cobbles and occasional boulders | | 0.50<br>1<br>2 | | | | | | |
| Very stiff black sandy gravelly CLAY with some cobbles and boulders. | | 3.00 | | | | | | |
| End of Trial pit at 3.40 m | | 3.40<br>4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.40
0.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP13**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level (mOD) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Stiff brown sandy gravelly CLAY with occasional boulders | | 0.25 | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| Very stiff brown sandy gravelly CLAY with some cobbles and boulders | | 2.50 | | | | | | |
| | | 3 | | | | | | |
| End of Trial pit at 3.80 m | | 3.80 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.80
0.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP14**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Firm brown slightly sandy slightly gravelly CLAY | | 0.25 | | | | | | |
| | | 1 | | | | | | |
| stiff brown slightly sandy gravelly CLAY with some cobbles and boulders | | 2.00 | | | | | | |
| End of Trial pit at 3.00 m | | 3.00 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.00
0.00

GROUND INVESTIGATIONS IRELAND
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# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP15**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Stiff brown sandy gravelly CLAY with some cobbles | | 1 | | | | | | |
| | | 3 | | | | | | |
| Very stiff black sandy gravelly CLAY with some cobbles and boulders | | 3.30 | | | | | | |
| End of Trial pit at 3.80 m | | 3.80 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.80
0.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP16**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | 0.20 | | | | | | |
| Stiff brown slightly sandy gravelly CLAY with some cobbles | | 1 | | | | | | |
| | | 2 | | | | | | |
| | | 3 | | | | | | |
| Very stiff black sandy gravelly CLAY with some cobbles and boulders | | 3.50 | | | | | | |
| End of Trial pit at 3.80 m | | 3.80 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.80
0.00

GROUND INVESTIGATIONS IRELAND
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# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP17**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Depth | Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Firm brown sandy gravelly CLAY | | 0.25 | | | | | | |
| Stiff brown sandy gravelly CLAY with some cobbles and boulders | | 0.60 | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| Very stiff grey sandy gravelly CLAY with some cobbles and boulders | | 2.80 | | | | | | |
| | | 3 | | | | | | |
| End of Trial pit at 3.50 m | | 3.50 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.50 0.00

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP18**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Firm brown sandy CLAY | | 0.25 | | | | | | |
| Stiff brown sandy gravelly CLAY with some cobbles and boulders | | 0.50 | | | | | | |
| | | 1 | | | | | | |
| | | 2 | | | | | | |
| Very stiff grey sandy gravelly CLAY with some cobbles and boulders | | 3.00 | | | | | | |
| End of Trial pit at 3.50 m | | 3.50 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions: -
Depth: 0.00
3.50

GROUND INVESTIGATIONS IRELAND

# TRIAL PIT RECORD

**Project Name: Site at Woodstown , Ballycullen** **Hole ID: TP19**

Client: Newlyn Developments
Consultant: Pat O'Gorman
Location: Ballycullen Co. Dublin
Date: 21/09/2006
Excavator used: Tracked Excavator

Co-ordinates: -
-
Elevation: -
Project no. 1285-09-06
Logged by: F.McNamara

| Strata Description | Legend | Depth | Level ( mOD ) | Samples / tests: Type | Samples / tests: Depth | Samples / tests: Result | Water Depth | Date |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL | | | | | | | | |
| Firm to stiff brown slightly sandy gravelly CLAY | | 0.20 | | | | | | |
| Stiff brown slightly sandy slightly gravelly CLAY with cobbles | | 1.00 | | | | | | |
| | | 2 | | | | | | |
| Very stiff black sandy gravelly CLAY with some cobbles and boulders | | 3.00 | | | | | | |
| End of Trial pit at 3.50 m | | 3.50 | | | | | | |
| | | 4 | | | | | | |

Remarks:
Stability: Trial pit stable
Water: No groundwater encountered
Remarks: Trial pit backfilled on completion

KEY
B Bulk disturbed sample.
D Small disturbed sample
U Undisturbed sample

Dimensions:
Depth: 3.50
0.00

GROUND INVESTIGATIONS IRELAND
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