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Acronyms and Abbreviations

C&D	Construction and Demolition
CGS	County Geological Sites
EC	European Community
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EU	European Union
GSI	Geological Survey Ireland
HGV	Heavy Goods Vehicle
HSA	Health and Safety Authority
IFS	Irish Forestry Soils
IGH	Irish Geological Heritage
IGI	Institute of Geologists of Ireland
ISIS	The Irish Soil Information System
ITM	Irish Transverse Mercator
m AOD	meters Above Ordnance Datum
m bgl	meters below ground level
SID	Strategic Infrastructure Development
WCC	Wicklow County Council

INTRODUCTION

Background

6.1 This Chapter of the Environmental Impact Assessment Report (EIAR) addresses the potential effects on land, soils and geology of the proposed establishment and operation of a materials recovery / recycling facility and inert landfill at Ballinclare Quarry, Kilbride, Co. Wicklow which comprises three key elements

- a soil washing plant to win aggregate from imported soil and stone;
- a construction and demolition (C&D) waste recycling facility to produce aggregate from construction and demolition waste (principally concrete); and
- an engineered (i.e. lined) landfill to facilitate backfilling and restoration of the existing quarry void with inert waste (principally soil and stone).

6.2 In essence, the development provides for the importation, re-use, recovery and/or disposal of a range of inert wastes generated by construction and development projects in Counties Wicklow, Dublin and Wexford as well as the re-use of excess, non-waste by-product materials (principally uncontaminated soil and stone). On completion of backfilling / landfilling at the former quarry, the final landform will be restored to a native woodland habitat.

6.3 The key elements of the proposed development relevant to the Land, Soil and Geology topic are as follows:

- Annual intake to the proposed development will be a maximum of 600,000 tonnes per annum, comprising 550,000 tonnes of inert (principally) soil and stone waste and/or by-product materials and 50,000 tonnes of construction and demolition (C&D) waste;
- Over the life of the project, the total volume of soil and stone materials (waste and by-product) intake to be placed / deposited at the inert landfill facility will be c. 6.5 million tonnes;
- A new weighbridge will be installed along the inbound lane of the existing internal access road and two lanes provided to facilitate internal queueing of HGV traffic at peak times;
- An additional wheelwash facility will be provided on the eastern side of the former concrete / asphalt yard to immediately remove soil and mud carried on wheels or HGV / truck underbodies when they egress from the backfill / landfill area within the quarry void (rather than carry it through the site);
- Re-alignment, upgrading and ongoing maintenance of internal haul routes across the application site with a defined one-way traffic routing system to be implemented though the quarry / landfill / waste recovery areas;
- Temporary stockpiling of topsoil pending re-use as cover material for final restoration of the inert landfill / backfilled quarry void;
- Implementation of a series of measures to enhance local biodiversity including the retention of habitats and features of biodiversity value (e.g. settlement ponds, buildings), quarry face retention for nesting peregrine falcon, establishment of habitats for breeding / roosting birds and bats and longer-term establishment of native woodland in defined areas;
- Upgrading and improvement works along local access road (L1157), specifically strengthening of the existing road pavement and widening of the road to 6m;
- Groundwater well survey at surrounding properties and evaluation of potential development impacts thereon; and

6.4 Further detail about the proposed development (infrastructure, operations, environmental management systems / controls etc.) are provided in Chapter 2 of this EIAR.

Scope of Work / EIA Scoping

6.5 This EIAR Chapter is based on a geological desk study of the application site and surrounding lands undertaken using published geological data, previous field investigations including groundwater and geological borehole logs and information obtained from previous site inspections by SLR personnel, including assessments of quarry face exposures.

Consultations / Consultees

6.6 As this development constitutes Strategic Infrastructure Development (SID), a formal pre-application consultation exercise was undertaken with a number of prescribed bodies on the advice / directions of An Bord Pleanála, including the Geological Survey of Ireland, the Eastern and Midland Waste Regional Authority, the Environmental Protection Agency and Wicklow County Council. Consultations with Wicklow County Council were principally with officials from the Environment and Roads Departments.

6.7 The Geological Survey of Ireland (GSI) Irish Geological Heritage (IGH) Programme (www.gsi.ie) was consulted to identify what geological heritage sites are present locally around the application site.

6.8 Separate consultations were also held with local residents and members of the general public in August and September 2024. Details of these consultations and the feedback obtained therefrom is provided in a separate report submitted in support of the SID application to An Bord Pleanála. Any specific feedback provided in respect of soil and geology has been considered and addressed as appropriate in drafting this EIAR Chapter

6.9 Following a review of available information, it was considered that there was no requirement for any further formal external consultations to be carried out in respect of land, soil and geology for the purposes of this assessment. There was consultation with other specialist contributors, most notably hydrogeologists preparing the water chapter of this EIAR (Chapter 7).

Author

6.10 This EIAR Chapter in respect of Land, Soils and Geology was prepared by Dr. Peter Glanville, a Professional Geologist (EurGeol. PGeo.) and a Technical / Project Director in SLR Consulting Ireland's Water (Hydrology and Hydrogeology) team in Dublin.

6.11 Peter has over twenty years' experience in environmental consulting, principally across the fields of hydrology, geomorphology and geology. His specialist expertise is in the field of water assessments, hydrological monitoring (hydrology and hydrogeology) and hydromorphology. He has overseen the design and implementation of many scientific / field monitoring programmes, supported the management, analysis and interpretation of the data collected, and written and reviewed the resultant technical reports.

6.12 Peter has worked on a wide range of projects in the minerals and mining, power, commercial and infrastructure sectors. He leads as project manager on multi-disciplinary projects and also acts as project director for multi-disciplinary teams.

Limitations / Difficulties Encountered

6.13 This EIAR has been prepared based on available desktop information, inspection of the existing quarry faces, groundwater and geology borehole logs and professional experience. No specific limitations or difficulties were encountered in the preparation of this section.

REGULATORY BACKGROUND

EU Directives

6.14 The following European Union (EU) Directives and/or national transposing regulations relate to Land, Soils and Geology at the application site and are considered in this EIAR:

- Environmental Impact Assessment Directive (2014/52/EU);
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. 296 of 2018);
- Waste Framework Directive (2008/98/EC); and
- Environmental Liability Directive (2004/35/EC).

6.15 The EU EIA Directive regulates the environmental impact assessment process and type of information and assessment to be provided in this EIAR Chapter. The Waste Framework Directive and the Environmental Liability Directive will regulate the Materials Recovery and Recycling activities and the Inert Waste Landfill operations at the application site.

Planning Policy and Development Control

6.16 The Planning Policy and Development Control relating to Land, Soils and Geology at the application site is governed by the current Wicklow County Development Plan 2022-2028. The plan sets out conservation objectives in relation to natural heritage and landscape, including geology within the County. It also recognises the importance of the extractive industry to the economy of the county and that extraction activities are a tied or resource-based land use.

6.17 The County Development Plan sets out the following objectives in respect of geology:

- Objective CPO 17.27: Geological and soil mapping where available shall be considered in planning decisions relating to settlement, excavation, flooding, food production value and carbon sequestration, to identify prime agricultural lands (for food production), degraded / contaminated lands (which may have implications for water quality, health, fauna), lands with unstable soils / geology or at risk of landslides, and those which are essential for habitat protection, or have geological significance.
- Objective CPO 17.28: Protect and enhance ‘County Geological Sites’ from inappropriate development at or in the vicinity of a site, such that would adversely affect their existence, or value.
- Objective CPO 17.29: To consult with the Geological Survey of Ireland as is deemed necessary, when dealing with any proposals for major developments, which will entail ‘significant’ ground excavation, such as quarrying, road cuttings, tunnels, major drainage works, and foundations for industrial or large buildings and complexes.
- Objective CPO 17.30: To facilitate public access to County Geological Heritage Sites, on the principle of “agreed access” subject to appropriate measures being put in place to ensure public health and safety and subject to the requirements of Article 6 of the Habitats Directive.
- Objective CPO 17.31: To facilitate the Geological Survey of Ireland, and other interested bodies with the interpretation of geological heritage in Wicklow, and to facilitate the development of a “Wicklow Rock Trail”, Geopark or other similar geo-tourism initiatives.

6.18 The County Development Plan states that soils are protected against a risk of possible contamination under the EU Waste Directives (various) and the EU Integrated Pollution Prevention and Control Directive (Directive 96/61/EC). The plan also recognises that soil is an important medium in the landscape and performs vital functions for the environment and human activities. Specifically, the Plan states that:

Soil is a complex, variable and living medium and performs many vital functions including food and other biomass production, storage, filtration and transformation of many substances including water, carbon and nitrogen. Soil has a role as a habitat and gene pool, serves as a platform for human activities, landscape and heritage and acts as a provider of raw materials. Such functions of soil are worthy of protection because of their socio-economic as well as environmental importance.

Guidelines

6.19 This Land, Soils and Geology section of this EIAR has been prepared with regard to the following guidelines:

- Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. May 2022;
- European Commission, Environmental Impact Assessment of Projects - Guidance on the Preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU), Publications Office, 2017;
- Department of Environment, Heritage and Local Government, 2004 : Quarries and Ancillary Activities, Guidelines for Planning Authorities.
- Environmental Protection Agency, 2006. Environmental Management in the Extractive Industry: Non-Scheduled Minerals.
- Geological Survey of Ireland - Irish Concrete Federation, 2008. Geological Heritage Guidelines for the Extractive Industry.
- Institute of Geologists of Ireland (2013) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- Geological Survey of Ireland, Irish Concrete Federation (2008) Geological Heritage Guidelines for the Extractive Industry;
- National Roads Authority (2008) Environmental Impact Assessment of National Road Schemes - A Practical Guide;
- National Roads Authority (2008) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Good Practice Guide for Handling of Soils (UK Ministry of Agriculture, Fisheries and Food, 2000); and
- Transport Infrastructure Ireland (March 2013). Specification for Road Works Series 600 –Earthworks.

RECEIVING ENVIRONMENT

Study Area

6.20 The Institute of Geologists of Ireland's (IGI) Guidelines (2013) suggests that the study area for the purposes of a soil / geology impact assessment should extend a minimum distance of 2 km beyond the application site. It also states that this this area should be reviewed having regard to the local geological environment and scale of proposed development and, if required, should be increased to reflect the sensitivity of the sub-surface.

6.21 For this assessment, having regard to the factors identified above, the study area is taken to comprise the application site and the surrounding local area within a 2km radius.

6.22 The IGI Guidelines also state that maps should be sourced to allow for the review of the geological and hydrogeological conditions that exist within a minimum of 2km of the site boundary (from the outer limit of the planning and/or licence area) and presented at a scale of 1:25,000.

6.23 The baseline maps produced in this EIAR are at a scale of 1:25,000 and include an area extending up to c. 3.5 km from the lands under the control of the Applicant, although the proposed study area extends up to 2 km as stated above.

Baseline Study Methodology

6.24 The baseline study undertaken for Land, Soils and Geology, presented herein involves a review of published literature and information, borehole information, geophysical survey and the findings from a walkover survey / inspection of the application site and the surrounding geological / landscape / environmental context.

6.25 This baseline study describes the receiving environment at and in the immediate vicinity of the application site using the available baseline information gathered, specifically the:

- **Context** of the receiving environment – location / magnitude / spatial extent and trends of the environmental factors;
- **Character** of the receiving environment - distinguishing aspects of the environment being considered here;
- **Significance** of the receiving environment - the quality, value or designation is assigned to the existing environment; and
- **Sensitivity** of the receiving environment - how sensitive is the aspect of the environment to change.

6.26 The baseline study is a qualitative assessment of the available information based on professional experience and interpretation of the available data.

Sources of Information

6.27 The following sources of information were consulted in the preparation of the receiving environment baseline study for Land, Soils and Geology:

- Geological Survey of Ireland (www.gsi.ie);
- Teagasc soil and subsoil mapping for Irish Forestry Soils Project (www.epa.ie) ;
- Irish Soils Information System (www.teagasc.ie);
- Irish Geological Heritage Programme (www.gsi.ie); and
- Ordnance Survey of Ireland (www.osi.ie).

6.28 Five investigative boreholes were drilled at the application site in October 2014. Of these 3 No. were drilled to establish groundwater levels around the quarry and 2 No. were drilled to provide more detailed information on bedrock geology beneath the quarry floor at the time. The findings on underlying geology and groundwater conditions obtained by these investigations are presented and used to inform this assessment.

6.29 When the quarry was operational previously, it was visited several times by SLR geological staff when undertaking geotechnical and/or resource assessments. It was also visited subsequently following suspension of extraction activities to assist in appraisal of long-term land use / restoration options. The work undertaken included inspections of existing pit / face exposures around the quarry and validation of published information in respect of local quaternary geology.

Land Baseline

6.30 Within the EIA EU Directive (2014/52/EU) Land is recognised as a 'natural resource' and the Directive also refers to the importance of the sustainable use of soil and the need to address the unsustainable increase in settlement areas over time ('land take'). Therefore, the issues of land as both a natural resource and land take must be considered by way of an assessment.

6.31 The introduction section to the EU Directive (2014/52/EU) notes that the:

'final document of the United Nations Conference on Sustainable Development held in Rio de Janeiro on 20-22 June 2012,….. recognises the economic and social significance of good land management, including soil, and the need for urgent action to reverse land degradation. Public and private projects should therefore consider and limit their impact on land, particularly as regards land take, and on soil, including as regards organic matter, erosion, compaction and sealing; appropriate land use plans and policies at national, regional and local level are also relevant in this regard'.

6.32 Land can be considered to be a resource with a beneficial use to society, for example agricultural land use, extractive industry land use or urban residential land use. Excess or unnecessary land take may therefore result in the loss or sterilisation of key land resources. This in turn has the potential to have adverse social and economic consequences for society.

6.33 The application site principally comprises an existing quarry where soil cover and the underlying subsoil have previously been stripped and removed over a significant proportion of the area to facilitate the extraction of the underlying rock and its use in the production of construction materials.

6.34 The proposed Materials Recovery and Recycling Facility and Inert Landfill at the application site will be substantially confined within the existing development footprint. The proposed Integrated Constructed Wetland (ICW) area which will be developed to treat surface water run-off in contact with inert wastes at the landfill or recovery / recycling facilities will be located in an area in the south-western corner of the application site which currently hosts a number of settlement ponds and an adjoining area of wet and/or improved agricultural grassland.

6.35 In the long term, once the former quarry has been backfilled with inert waste and the wider site restored to its original (pre-extraction) ground level, it will be restored to native woodland in accordance with the long-term site restoration plan.

Land Cover

6.36 The Corine land cover mapping is a standardised inventory of land cover across Europe which is split into 44 different land cover classes. The latest 2018 Corine land cover mapping for Ireland is a based on the interpretation of satellite imagery and national in-situ vector data. Land cover is mapped to the standard CORINE classification system and data specifications.

6.13 The Corine land cover mapping (www.epa.ie) reflects land use at the time of survey and in this instance, the latest available land cover data for Ireland dates from 2018. The available mapping, reproduced in Figure 6-1, indicates there is a mix of land cover types in the vicinity of the application site which includes the following Corine (Level 1) land cover types:

- Heterogeneous agricultural areas;
- Forest and semi-natural areas;
- Agricultural Areas (arable land); and
- Agricultural Areas (Pastures).

Soils Baseline

6.37 Soil is defined as the top layer of the earth's crust and is formed by mineral particles, organic matter, water, air and living organisms. Soil is an extremely complex, variable and living medium and its characteristics are a function of parent subsoil or bedrock materials, climate, relief and the actions of living organisms over time.

6.38 Soil formation is an extremely slow process and can take thousands of years to evolve; soil can be considered essentially as a non-renewable resource.

6.39 As the interface between the earth, the air and the water, soil performs many vital functions; it supports food and other biomass production (forestry, biofuels etc.) by providing anchorage for vegetation and storing water and nutrients long enough for plants to absorb them. Soil also stores, filters and transforms other substances, including carbon and nitrogen, and has a role supporting habitats serving as a platform for human activity.

National Soils Mapping

6.40 The Irish Soil Information System (ISIS) project which was jointly undertaken by the EPA and Teagasc between 2008 and 2014, gathered together pre-existing information and data from soil survey work in Ireland and augmented it with new field data, to produce a new national soil map of Ireland at a scale of 1:250,000 (www.teagasc.ie/soils).

6.41 The ISIS project identified a number of Soil Associations across Ireland, which are each comprised of a range of soil types (or '*Series*'), each of them different in properties, with different environmental and agronomic responses. Properties for each soil type are recorded in a database maintained by Teagasc.

6.42 The soil association at the application site is identified as the Clonroche Soil Association (ISIS Code 1100a), described as a fine, loamy drift with siliceous stones. The Clonroche Soil Association is indicated to comprise Brown Earths with some Brown Podzolics on upper slopes and Gleys in depressions[1]. The Brown Earths will generally have better drainage characteristics than other soils in this series and are considered to be free draining.

6.43 The Clonroche series is defined as loamy drift with sandstones, which means that these soils are naturally moderately draining, and are considered to have good agricultural potential being friable deep soils with plentiful, well-developed roots, a high base saturation with good nutrient retention (Creamer et. al., 2018).

Teagasc Soils Mapping

6.44 The Teagasc soil mapping for the Irish Forestry Soils (IFS) mapping project, reproduced in Figure 6-2, indicates that the soils which previously occurred around the application site comprised

- Acid Brown Earths and Brown Podzolics around the existing settlement ponds / grassland area - these are shallow well drained soils, largely derived from siliceous parent material (e.g. diorite and sandstone);
- Lithosols and Regosols, around the quarry / development footprint - these are partly weathered rock fragments and/or poorly developed soils which are generally deep, well-drained and derived from parent rocks; and
- Surface Water and Groundwater Gleys along the eastern site boundary - these are shallow, poorly drained soils derived from bedrock at or close to surface.

[1] EPA Report No. 130 (2014), Irish Soil Information System: Synthesis Report

6.45 Acid Brown Earths support a wide range of agricultural uses including high quality grassland and tillage. Podzolics are generally lower in fertility and productivity, but where improved (continually fertilised) can support grassland. Gley soils are of somewhat limited agricultural value and, where improved, can be used for rough grazing or seasonal grassland.

6.46 Lithosols are typically described as thin stony soils which typically comprise weathered rock fragments overlying bedrock and generally lack an underlying subsoil. Regosols are described as weakly developed mineral soil in unconsolidated materials. The presence of these soils typically suggests rock occurs at or close to the ground surface.

6.47 The soils identified above formed in a river valley in the foothills of the Wicklow mountains, generally on well drained glacial till subsoils. Most of the soils at the application site have previously been stripped to facilitate the extraction of the underlying bedrock resource and are no longer in place over the quarry footprint or across former concrete / asphalt production area in the south-eastern corner or at the concrete paved area to west of the site access road. It is likely that any soils along many of the existing haul roads around the site were also removed prior to their construction.

6.48 Although soils have been removed across much of the application site and former development footprint, some are likely to remain in place around the south-western corner of the site, in grassland areas adjoining the existing settlement ponds. Some of the stripped soils are also likely to have been used to create the perimeter screening berms around the application site. Any pre-existing berms around the western or southern site boundaries will remain in place for the duration of the proposed development and will not be excavated for incorporation into the final restored landform at the inert landfill.

Subsoils Baseline

Regional Subsoils

6.49 Quaternary (subsoil) deposits were laid down during the last 2 million years, and essentially comprise the unconsolidated materials overlying bedrock. The two predominant types of quaternary subsoils in Ireland are glacial till, deposited at the base of ice sheets, and sand and gravel deposits, associated with the melting of the ice sheets and generally termed ‘glaciofluvial outwash sands and gravels’. Other extensive Quaternary subsoils in Ireland include peat, river alluvium and coastal process deposits. Most Quaternary subsoils in Ireland were deposited after the maximum of the last glaciation, the Midlandian, which occurred approximately 17,000 years ago.

6.50 The subsoils across Ireland have been mapped on a national basis by Teagasc as part of the EPA Soil and Subsoil Mapping Project for the Irish Forestry Soils (IFS) project. The subsoil mapping was undertaken at a national basis using existing Quaternary Geology maps, publications, remote sensing and field mapping and sampling.

6.51 The published subsoil map for the area around the application site, reproduced in Figure 6-3, indicates that shallow bedrock occurs over much of the northern and eastern area and that the south-western area of the site is underlain by till derived from lower Palaeozoic sandstone and shale. As with soils, subsoils have previously been removed across the existing quarry development footprint to facilitate the extraction and processing of rock.

6.52 Till generally occurs in the lower lying areas beyond the application site, while rock outcrops at or close to the surface on locally higher ground. Mapping indicates that areas of alluvial soil occur along the Potters River approximately 200m to the north and west of the application site and approximately 300m to the south and east of it, refer to Figure 6-3.

Bedrock Geology

Regional Setting

6.53 The Geological Survey of Ireland (GSI) 1:100,000 regional bedrock map, reproduced in Figure 6-4, indicates that the quarry at Ballinclare is developed within Silurian Intrusive Diorite. The diorite body in which the quarry is developed is identified as the Carrigmore Diorite and is described as massive, uniform dark grey-green, fresh, very strong diorite.

6.54 The diorite is indicated by the GSI as occurring at the centre of a volcanic intrusion, grading outwards to a quartz-diorite at the intrusion margins, although diorite is also recorded at the south eastern part of the intrusion and granodiorite at the south-western part. The diorite is recorded as being composed of augite, plagioclase and biotite, with minor amounts of quartz and K-feldspar and rare hypersthene and olivine. The intrusion extends approximately 1.9 km from west to east and 2.1 km from north to south.

6.55 The GSI notes that the diorite has been deformed by regional deformation in the area and chlorite coated jointing or slickensides and breccia zones are recorded. It is noted that veining of fibrous amphiboles, sparry calcite and quartz may be present.

6.56 The south-western corner of the application site is underlain by the Kilmacrea Formation, described as a dark grey slate, with minor pale sandstone. The GSI 1:100,000 scale regional bedrock map reproduced in Figure 6-4 indicates that there is faulting at the contact between the Kilmacrea Formation and the Diorite.

Local Detail

6.57 Examination of the exposed quarry faces at Ballinclare confirms that the quarry is entirely developed within massive Silurian Diorite. One thin zone of sheared and weaker rock with associated quartz veining was identified within the existing quarry, but this zone is thin and does not materially affect the resource present.

6.58 Extraction activity at the quarry was suspended after a thin vein of naturally occurring asbestos was exposed within the diorite at the quarry. This vein exposure has been contained and the associated risks to human health have been deemed by the Health and Safety Authority (HSA) to be acceptably low. Subsequent detailed visual assessment of fibrous coated discontinuities within the exposed diorite indicated that they were typically very thin (<5mm), with the quantity of fibrous material present within them described as rare / very rare.

6.59 There is currently no risk to public health posed by naturally occurring asbestos, as it tightly bound within the host rock formations at Ballinclare. The proposed development will provide for an engineered (natural clay) liner at the base and sides and the backfilling of the quarry void using imported soil and stone. This should provide further reassurance to the general public and remove any cause for concern in respect of the long-term health risk associated with the naturally occurring asbestos within existing rock exposures.

6.60 Boreholes logs produced on foot of investigative fieldworks undertaken in October 2014 and groundwater well drilling records indicate that diorite at the application site extends to a depth of at least c. 65m below the surface (corresponding to a reduced level of between -9m AOD and -10m AOD). Borehole and well installation details are summarised in Table 6-1 below while their location within the quarry is shown in Figure 6-5. Copies of borehole logs are presented in Appendix 6-A.

Table 6-1
Borehole and Well Installation

Borehole ID	Easting (ITM)	Northing (ITM)	Elevation (m AOD)	Depth to bedrock (m)	Bedrock Description	Final Depth (m)
14-BH1	725596	688908	37.9	0	Diorite with quartz veins	40.1
14-BH2	725294	689129	39.0	0	Diorite with quartz veins	40.1
GW1	725161	688982	61.0	1.8	Diorite	68
GW2	725441	688736	51.9	7.0	Diorite	61
GW3	724982	689247	55.4	6.0	Diorite	65

Structure

6.61 The diorite has been affected by regional deformation and veining, and fault gouge associated with the deformation is observed in the quarry faces.

Karstification

6.62 Karstification does not occur in diorites, nonetheless, a review of the GSI Karst database was carried out. The review confirmed that there is no karst development in the area.

Geological Heritage Baseline

6.63 An audit of County Geological Sites in County Wicklow was completed by the Geological Survey of Ireland (GSI) Irish Geological Heritage (IGH) Programme in 2014. The GSI Geological Heritage map viewer (at https://www.gsi.ie/en-ie/data-and-maps/Pages/Geoheritage) was reviewed to establish if any geological heritage sites or features were present at the application site or in the immediate vicinity thereof.

6.64 The GSI database indicates that Kilmacurra Quarry, a quarry which is no longer active or operational and located approximately 500m south of the application site, on the opposite side of the L1157 Local Road, is a designated County Geological Site (Ref. No. WW038). The quarry location is shown on Figure 6-4.

6.65 Kilmacurra Quarry has been recommended as a County Geological Site under IGH Theme No. 11, Igneous Intrusions. The IGH summary notes that diorite is an important minor igneous rock in Wicklow and that the quarry provides good exposure of diorite on quarry faces and in loose blocks.

6.66 Further detail in respect of the geological heritage interest at Kilmacurra Quarry is presented in the GSI Geological Heritage Site Report reproduced in Appendix 6-B of this EIAR. There are no other designated County Geological Sites located in the vicinity of the application site.

6.67 There will be no new excavations or exposures resulting from the proposed development. The Applicant has a long-standing, positive relationship with GSI and provides access to its locations and facilities by prior arrangement on an ongoing basis when GSI personnel wish to undertake site visits or quarry face inspections.

Sensitive Receptors

6.68 In terms of land, soils and geology baseline considered above, the principal sensitive receptor is the County Geological Heritage Site at Kilmacurra Quarry (Ref. No. WW038).

6.69 This site and any geological heritage features therein will not be impacted by the proposed development at Ballinclare Quarry.

IMPACT ASSESSMENT

Evaluation Methodology

6.70 The evaluation of impacts of the proposed development is based on a methodology similar to that outlined in the IGI Guidelines (2013) for the preparation of soils, geology and hydrogeology chapters of Environmental Impact Statements.

Evaluation of Impacts

6.71 This assessment will focus on the potential impact of the proposed Materials Recovery and Recycling Facility and Inert Landfill on land, soils and geology at the application site and surrounding local area. Full details of the proposed development, which provides for the ultimate backfilling of the quarry void to former ground level using imported soil and stone (which is managed both as waste and as non-waste by-product) and its subsequent restoration to native woodland in defined areas are provided in Chapter 2 of this EIAR.

6.72 The status and importance of existing land, soil and geology attributes identified at the application site is assessed in Table 6-2 below.

Table 6-2
Status and Importance Land, Soil and Geology Attributes

Attribute	Status / Occurrence	Importance
Land	The land at the application site comprises a large quarry void and adjoining areas previously used for processing activities. It also includes a grassland area in the south-western corner with water settlement ponds.	As the application site is located in a rural area and has been significantly impacted by quarry related development and as the previously undeveloped area in the south western corner comprises marginal grassland, the lands are unlikely to be suitable for many land uses and are therefore considered to be of low value and importance.
Soils	The soils across much of the application site have previously been stripped to facilitate rock extraction and associated production activities.	There are no productive or useable soils remaining across much of the application site. The area of undisturbed soils in the south western corner comprises marginal grassland. In light of this, soils at the application site are considered to be of low importance.
Subsoils	The bulk of the mineral subsoils across the application site have previously been excavated / stripped.	Any subsoils remaining in-situ in the south-western corner or in perimeter screening berms are of no economic value and in their present condition are considered to be of low importance.

Attribute	Status / Occurrence	Importance
Bedrock Geology	Rock at the site was previously extracted and used to produce aggregate. Extraction was suspended following identification of rare, fibrous, naturally occurring asbestos within the diorite rock	Further bedrock extraction at the quarry is not considered feasible or viable given the presence of naturally occurring asbestos and effectively renders the bedrock of low value and importance
Geological Heritage	The rock exposures in diorite at Kilmacurra Quarry, located c. 500m to the south are classed as being of geological heritage value	The diorite exposures are of high heritage importance at a local level and provide an opportunity to examine the rock *in situ*. The exposures at Kilmacurra Quarry (County Geological Site WW038) are classified as being of high importance on a local scale.

Construction Stage

6.73 In the context of the proposed Materials Recovery and Recycling Facility and Inert Landfill at Ballinclare Quarry, the construction stage is taken to comprise advance, site preparation works. These works involve installation of some site infrastructure, structures and processing plant, removal of vegetation, construction of the ICW area, installing and connecting site services, upgrading internal access roads and establishing environmental control and monitoring infrastructure at the site.

6.74 During the construction / site preparation stage, the only direct impact on land and soils will be the disturbance and loss of any existing soil cover across the planned ICW area in the south-western corner of the application site. Much of the stripped soil will be re-used to create the ICW area and re-integrate it into the surrounding landform. Any excess soil materials will be temporarily stockpiled pending their re-use in the restoration of the landfilled landform.

6.75 There will be no other direct or indirect impacts on the existing land, soil or geology resources at the application site.

Operational Stage

6.76 During the operational stage, inert waste materials (principally comprising soil and stone), will be imported to the quarry for landfilling and/or recovery purposes, with non-waste by-product materials (principally soil and stone) being imported for use in landfill liner construction or for processing to win construction grade aggregates.

6.77 On completion of landfilling activities at the existing quarry void, the final landform will be topsoiled and will be restored to native woodland in accordance with the long-term site restoration plan.

6.78 The magnitude of the construction and operational stage impacts on the land, soils and geology attributes identified previously is assessed in Table 6-3 below (in the absence of any mitigation).

Table 6-3
Magnitude of Potential Impacts on Land, Soil and Geology (No Mitigation)

Attribute	Impact of Proposal on Land, Soil and Geology	Magnitude of Potential Impact (with No Mitigation)
Construction Stage		
Land	Development / change of land use in SW corner of application site	Given the limited productive capacity and range of potential future land-use options, the scale of the change on local land use potential is considered small and negative.
Soil	Loss of existing soil resource in area of marginal grassland in SW corner of application site	Small negative impact on the local productive soil resource.
Operational Stage		
Land	Restoration of excavated / disturbed land around former quarry and return to long-term grassland / scrub	Minor positive over medium to long term at a local level as the disturbed landform is restored. This will present some limited future land use potential involving the establishment of new habitat of native woodland in accordance with the long-term site restoration plan.
Soils	Reinstatement of soil cover over the former quarry /development footprint	Moderate positive impact over medium to long term due to the progressive re-establishment of soil as a growth medium and carbon sink and the restoration of its environmental functions on site
Subsoils	HGV traffic movements and earthworks plant introduce risk of potential subsoil contamination by way of fuel leaks and/or oil spills	Moderate negative impact over medium to long term.
Bedrock Geology	HGV traffic movements and earthworks plant introduce risk of potential bedrock contamination by way of fuel leaks and/or oil spills Inhibits potential future extraction / exploitation of bedrock resource at application site	Moderate contamination impact over the medium to long term given that there is little existing protective soil cover to exposed bedrock. Small impact in restricting future extraction of bedrock. Although backfilling of quarry with inert wastes would render any future physical rock extraction excessively difficult, such extraction is already commercially unviable at present due to presence of naturally occurring asbestos.
Geohazards	Elimination of localised erosion at existing rock slopes and/or stockpiles.	Small negative short-term / small positive long-term *(Refer to 'Unplanned Events' below)*
Geological Heritage	Closest designated geological heritage site is located 0.5 km from application site	No impact.

6.79 The inert landfilling and restoration of the existing extractive void at Ballinclare Quarry will restore the ground surface to a final ground level of approximately 80 m AOD and re-establish the site topography to a degree which will substantially re-integrate it into the surrounding rural landscape. It is considered that

- the progressive return of much if the site to native woodland habitat;
- the progressive re-establishment of soil as a growth medium and carbon sink; and
- the restoration of environmental soil functions across the application site,

all constitute moderate-to-long-term improvements on soil attributes of low importance. The significance of these impacts is assessed as slight and positive.

6.80 Without mitigation, the generation of on-site traffic and handling of imported wastes could increase the risk of a leak or spillage of fuels and/or oils at the application site. Without mitigation there is also a risk that contaminated, non-inert waste materials could be imported to the facility, thereby introducing potential risk to existing mineral subsoils and bedrock at the application site. The potential impact of imported contaminated (i.e. non-inert) waste soils or hydrocarbon spills, were they to occur, would be localised and long-term.

6.81 Assuming the materials recovery and recycling activities and inert landfilling operations are undertaken and managed in accordance with established waste management practices at EPA licensed facilities, the scale of risk associated with potential introduction of ground contamination through importation, handling or placement of soils / subsoils and other materials for recovery / recycling is assessed as moderate negative.

6.82 Given that the risk of contaminating existing subsoil and/or bedrock of low importance is moderate, the significance of this potential impact is assessed as slight and negative. Given the potential for interactions with, and implications for, the underlying groundwater resource however, it is considered that mitigation measures are required to manage / limit potential impacts. These potential interactions are discussed in greater detail in Chapter 7 (Water) of this EIAR.

6.83 There will be no indirect impacts on land, soils or geology arising from the materials recovery / recycling activities and inert landfilling operations at the application site.

Unplanned Events

6.84 Unplanned events within the application site have the potential to impact on the land, soils and geology adjoining the site. Ground instability, particularly of any existing near vertical quarry faces, could have the potential to arise over the extended long-term as the exposed rock weathers. Backfilling of the quarry by way of inert landfill will safeguard against any future (long-term) instability of existing quarry faces.

6.85 Unplanned events in relation to the proposed development could potentially arise from instability caused by over-steep placement or stockpiling of imported soils / materials (whether classified as waste or by-product) at the application site. Any short-term instability in the imported materials, were it ever to arise, is likely to be localised at small areas within the application site.

6.86 The risk of such instability will be minimised by site management procedures which limit the height and gradient of slopes developed in them, by adhering to the Health and Safety Authority (HSA) Safe Quarry Guidelines and implementing the Safety Health and Welfare at Work (Quarries) Regulations 2008. Specifically, risks arising from potential instability will be mitigated by annual geotechnical assessments of slope stability at active landfill areas (and stockpiles) and rock face stability at any exposed quarry faces.

6.87 In light of the above, it is considered unlikely that material instability will have any adverse impact on land, soils and geology at the application site.

6.88 From a land, soils and geology perspective, any potential impacts on human health from recovery / recycling activities and inert landfilling operations at the application site would be unlikely to occur via soil or geology pathways and more likely to occur via other pathways such as air (principally dust) and water (principally groundwater). These are addressed in detail in the relevant Chapters of this EIAR.

Cumulative Impacts

6.89 Cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions, together with those generated by the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

6.90 A review of Wicklow County Council's online planning portal and An Bord Pleanála case files identifies six prospective development projects within a 5km radius of the application site which have either applied for or have been granted planning permission. Of these one (a sand and gravel pit) is for substitute consent and another (for land raising) is for an extension of time which means that development impacts associated with them are already extant and would therefore be reflected in baseline environmental surveys.

6.91 Of the remaining projects, one (WCC Planning Ref. 23/60497) is located 2 km south-east of the application site and relates to a land raising project, which envisages importation of a maximum of 24,000 tonnes of soil per annum for a maximum of two years. In light of the limited time duration and the fact that it is unlikely to involve the use of the same local roads as the Ballinclare Quarry, it is not considered that there is no potential for cumulative effects with this project.

6.92 The remaining three projects are all considered either too small in scale or too distant from the application site to generate any potential adverse cumulative effects for land, soils or geology.

6.93 Planning permission for Ballynagran landfill was extended to 2026 (by way of Planning Ref. 20/21), but in this instance all associated environmental impacts are already well established and will remain in existence, with no further change likely to arise in the local environment.

6.94 In light of the above, it is considered that there is no potential for any other planned or permitted development to create significant adverse cumulative impacts for land, soils or geology within the local area.

Interaction with Other Impacts

6.95 The introduction or handling of potentially contaminated (non-inert) wastes through recovery / recycling activities at the soil wash plant and/or C&D waste recovery facility or landfilling operations could have implications for groundwater quality, were infiltrating rainfall to leach any contamination out of the inert waste materials to the underlying groundwater aquifer. This aspect is discussed in detail in Chapter 7 of this EIAR (Water).

6.96 When successfully completed, the proposed landfilling and restoration works across the former quarry footprint will provide an increased thickness of soil and subsoil cover above the groundwater table, thereby reducing the potential risk of any future groundwater contamination from activities at the surface.

6.97 During the inert landfilling and waste recovery activities, the presence of wider areas of exposed, unvegetated soil surfaces could give rise to dust blows during dry windy weather. The impacts from landfilling activities will however be mitigated by progressive establishment of native woodland in line with the long-term site restoration plan. These issues are discussed in detail in Chapter 8 of this EIAR (Air Quality).

‘Do-nothing Scenario’

6.98 Under a ‘do-nothing scenario’, the recovery and recycling activities and the landfilling / restoration of the former quarry would not proceed at the application site and the bare, disturbed landform which currently exists across much of the existing site would remain unchanged, with only very slow and gradual recolonization of natural vegetation occurring over time, given the absence of any soil medium or nutrients to support plant growth.

6.99 In dry periods, in the absence of any site management practices, dust emissions would be likely to arise from the site on an ongoing basis and surface water bodies / groundwater would be vulnerable to impacts from any future human activities within and/or around the former quarry footprint.

MITIGATION MEASURES

6.100 Mitigation measures outlined below will be implemented during the proposed materials recovery and recycling activities and inert landfilling operations at Ballinclare Quarry in order to mitigate against any potential adverse impacts on the receiving soil, subsoil and bedrock environment during either the construction or operational phase.

6.101 Soils excavated in grassland areas in the south-western corner of the application site will be re-used where possible in the ICW area construction, with any excess soil stockpiled pending its re-use in restoration / landscaping works.

6.102 The mitigation proposals include the following measures to deal with potential fuel / oil spills:

- Routine servicing of plant and machinery (and HGVs and lorries on occasion) will take place over a sealed concrete pavement which drains via a hydrocarbon interceptor to a saway area;
- Drip trays will be used for all other refuelling activities;
- Oils, greases and hydraulic fluids will be stored under cover, over fuel spill trays / bunded containers within the existing site workshop / garage;
- Good site management practices will be implemented to reduce risks of spills, including regular monitoring and inspection of storage vessels and regular maintenance and servicing of construction plant and equipment;
- The construction and installation of an engineered (natural clay) liner at the base and sides of the proposed landfill will afford protection to the ground and geological elements which would otherwise be in direct contact with it with the waste materials;
- The Applicant will ensure that such plant and resources as are necessary to ensure that the landfilling and recovery activities will be managed and operated in accordance with best waste management practice and that activities comply fully with environmental management systems, planning consents and waste licence conditions; and
- Contingency plans / procedures will be developed to deal with potential leaks and spills. An emergency spill response kit will be held on site.

6.103 In order to minimise the risk of importing and introducing non-inert contaminated soil / subsoil / stone / C&D waste to the application site, management systems will be introduced to establish the source of imported materials in advance and to confirm that they are inert. Once received at the intake site at Ballinclare Quarry, a multiple level soil / C&D waste testing regime is envisaged which will test the material for compliance, in line with established EPA waste licence methodologies. These include:

- comprehensive on-site verification, comprising visual inspection and record of imported wastes end-tipped / unloaded at the site;

- basic characterisation testing covering a range of parameters to determine the leaching behaviour of the inert wastes imported to site;
- frequent, compliance testing covering a limited range of key waste parameters.

6.104 Temporary side slopes in landfilled soils / waste will generally be graded at an angle no steeper than 35° (approximately 1v:1.5h) and often much shallower, sufficient to ensure no large-scale instability arises over the short-term. Ongoing assessment of stability will be undertaken at the application site as landfilling progresses and recycled materials are stockpiled. Where necessary, slopes developed in these materials will be graded having due regard to safe systems of work.

6.105 During inert landfilling activities, all temporary surfaces will to be graded to facilitate overground run-off and capture in surface water ponds developed in closed depressions at low points within the landfilled waste body, thereby minimising the volume of rainfall percolating through the landfilled materials. This helps to reduce the residual risk of potential contaminants being leached into the underlying soil and bedrock (or groundwater).

6.106 In order to confirm that there are no residual risks to in-situ soil and geology, provision is made for regular, continued monitoring of the on-site groundwater wells for the duration of the proposed materials recovery / recycling activities and inert landfilling operations and for a short aftercare period thereafter.

6.107 Regular groundwater monitoring will also be re-established at pre-existing groundwater wells around the application site to ensure there is no adverse impact on groundwater quality.

6.108 In order to reduce the risk of localised erosion (and potential dust emissions) during the recovery, recycling, landfilling and restoration operations, areas of bare or exposed soils / wastes will be kept to a minimum, insofar as practicable, by ongoing progressive restoration of the restored landform and the establishment of native woodland in line with the proposed long-term restoration plan. Where required, consideration can also be given to establishing temporary vegetation cover over any stockpiled soils (pending re-use) or exposed surfaces (pending further backfilling to final ground level).

6.109 All aspects of the proposed landfilling / operation phase works will be undertaken in accordance with relevant best practice environmental guidance published by the Environmental Protection Agency and other regulatory agencies. All activities will be undertaken in accordance with the provisions in the Waste Management Acts and Regulations.

6.110 In order to maximise the future potential of the restored landform, a minimum 150mm thick layer of topsoil will be placed over the landfilled materials. The final landform will also be graded so as to facilitate long-term overground run-off off-site, toward local surface watercourses and the Potters River.

RESIDUAL IMPACT ASSESSMENT

6.111 The residual impacts on land, soil and geology receptors are those impacts which remain following the implementation of the mitigation measures outlined above.

Construction Stage

6.112 There will be a slight short-term negative impact associated with the construction stage of the proposed development, principally associated with the disturbance / loss of marginal grassland and existing soil cover at the proposed wetland area in the south-western corner of the application site. This residual impact is not considered to be significant.

Operational Stage

6.113 The potential longer-term impacts of the proposed development upon land, soil and geology have been identified and assessed, and where appropriate, mitigation measures have been identified which will significantly mitigate any potential environmental impacts arising from the proposed recovery, recycling, landfilling and restoration activities at the application site.

6.114 With the implementation of the proposed mitigation measures, it is considered that the potential risks of fuel spill and introduction of contaminated soil / subsoils and the associated short-term impact on land, soils and geology, will reduce to 'small' and negative. This residual impact is not considered to be significant.

6.115 Given that the risk of contamination of land, soil / subsoil and bedrock of low value and importance will be reduced to 'small', the significance of any mitigated, residual impacts on them arising from the proposed development is assessed as imperceptible. This residual impact is not considered to be significant.

Post-Operational Phase

6.116 Following completion of the final restoration works and the return of much of the application site to a native oodland habitat, the residual long-term impact of the proposed development will be moderately positive for land and soils at a local scale. This residual impact is not considered to be significant.

MONITORING

6.117 As was identified in the earlier section on mitigation measures, it is envisaged that a multiple level testing regime will be established to test soils / wastes imported to the proposed waste facility to ensure compliance with agreed inert waste intake parameters (as per established EPA methodologies for licensed waste facilities).

6.118 Provision will also be made for continued and extended monitoring of groundwater for the duration of the waste recovery / recycling activities and landfilling operations and for a short aftercare period to confirm that there are no residual risks to in-situ soil and geology arising from the proposed development.

REFERENCES

Creamer, R. and O'Sullivan, L., (2018) The Soils of Ireland

EPA Report No. 130 (2014), Irish Soil Information System Synthesis Report.

EPA (2008), Irish Soil Information System Final Technical Report 10.

Geological Survey of Ireland (2007), 1:100,000 Bedrock Geology of Ireland (Digital-Map).

Geological Survey of Ireland Bedrock Geology Sheet 16 (1:100,000), Geology of Kildare and Wicklow, and accompanying geological memoir (1995).

Institute of Geologists of Ireland (2013) 'Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'.

National Roads Authority (2006) A Guide to Landscape Treatments for National Road Schemes in Ireland

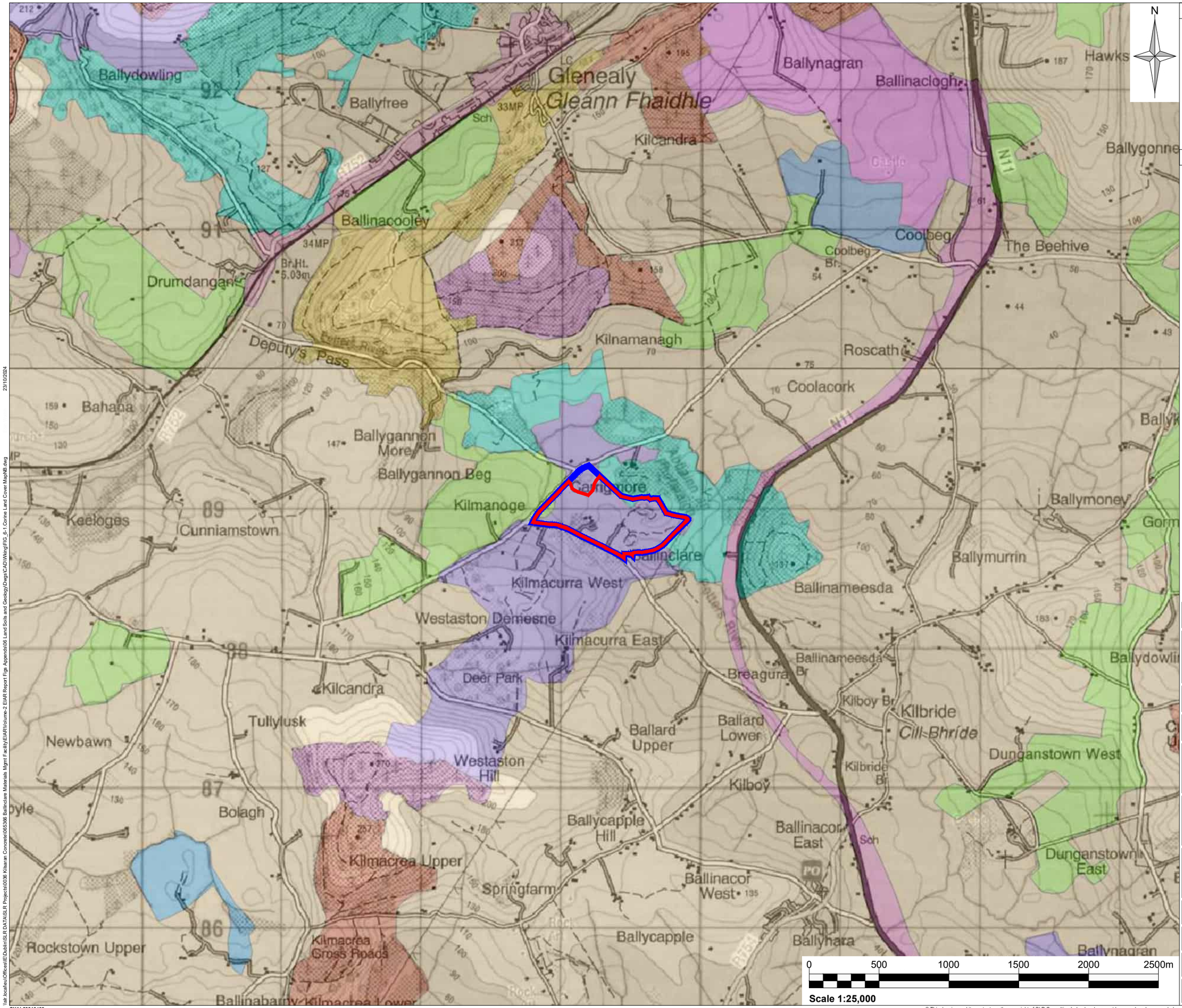
Teagasc, 2004, Ireland Subsoil Parent Materials Map (digital version).

Teagasc, 2007, Ireland Soils Map (digital version).

Transport Infrastructure Ireland (March 2013). Specification for Road Works Series 600 -Earthworks

Wicklow County Development Plan 2022 - 2028.

FIGURES



Notes:

1. EXTRACT FROM 1:50,000 O.S DISCOVERY SERIES MAP **NO. 56 & NO.62.**

2. EXTRACT FROM EPA CORINE LAND COVER MAPPING.

Legend:

- LAND INTEREST BOUNDARY (c. 36.0 HA)
- PLANNING APPLICATION AREA (c. 32.6 HA)

CORINE LAND COVER CLASSIFICATION:

- LAND PRINCIPALLY OCCUPIED BY AGRICULTURE, WITH SIGNIFICANT AREAS OF NATURAL VEGETATION
- MIXED FOREST
- PASTURES
- NON-IRRIGATED ARABLE LAND
- TRANSITIONAL WOODLAND-SHRUB
- COMPLEX CULTIVATION PATTERNS
- ROAD AND RAIL NETWORKS AND ASSOCIATED LAND
- CONIFEROUS FOREST
- BROAD-LEAVED FOREST
- MINERAL EXTRACTION SITES

Rev	Amendments	Date	By	Chk	Auth

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Drawing Status & Suitability Code: **FINAL**

Client: KILSARAN CONCRETE
Ballinclare Quarry, Kilbride, Co. Wicklow.

Project: Environmental Impact Assessment Report
Materials Recovery / Recycling Facility
and Inert Landfill

Drawing Title: CORINE LAND COVER MAP

Scale	SLR Project No.
1:25,000 @ A3	065366.00001

Designed	Drawn	Checked	Authorised
NB	NB	DL	DL
Date: 10/24	Date: 10/24	Date: 10/24	Date: 10/24

Drawing Number: **FIGURE 6-1** Rev.: **1**

23/10/2024

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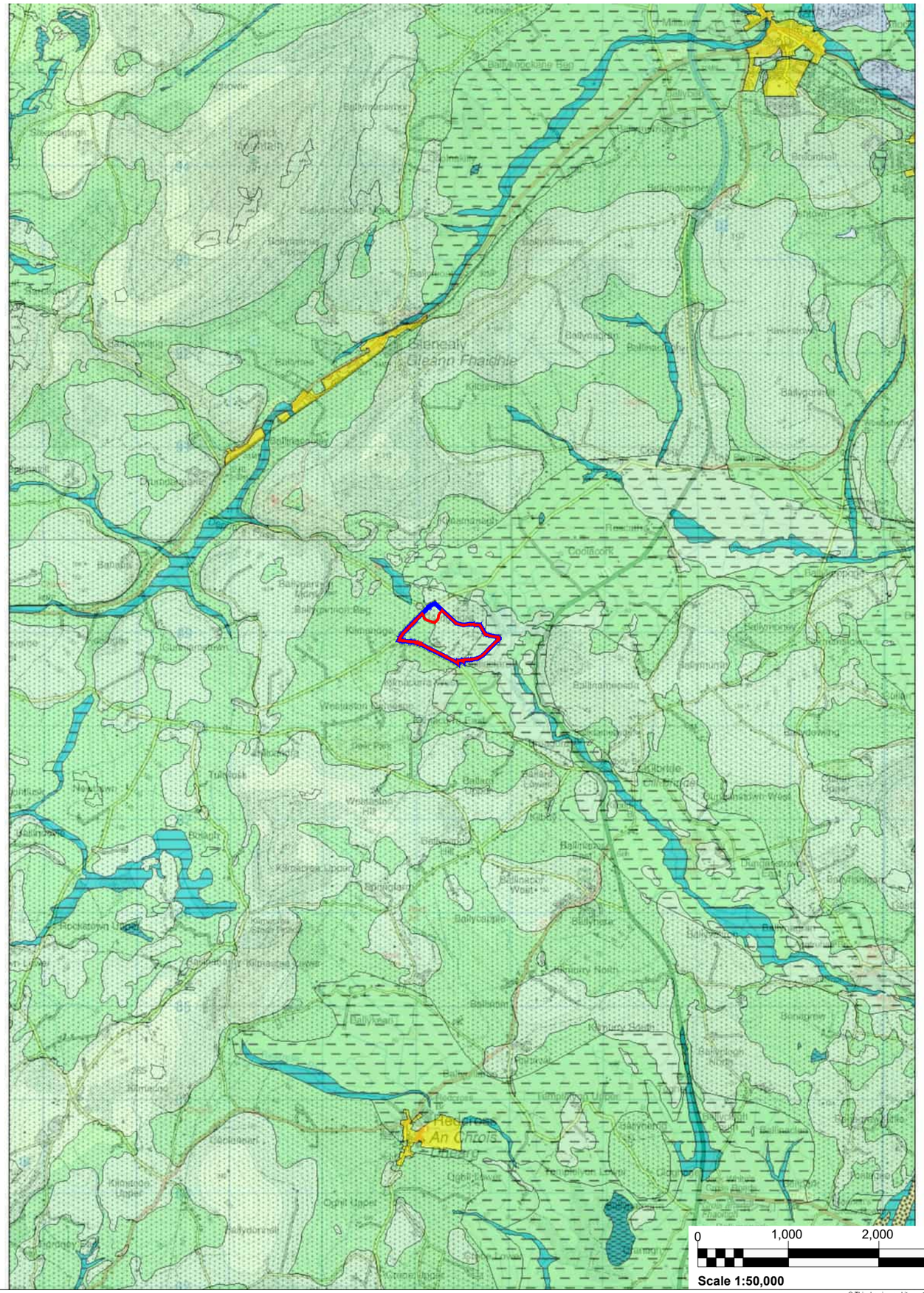

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0 1,000 2,000 3,000 4,000 5,000m

Scale 1:50,000

Notes:

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

2. EXTRACT FROM TEAGASC / EPA SOIL MAPPING.

Legend:

LAND INTEREST BOUNDARY (c. 36.0 HA)

PLANNING APPLICATION AREA (c. 32.6 HA)

TEAGASC/EPA SOIL MAPPING
IFS SOIL TYPE

- Alluvium - Mineral
- Acid Brown Earths and Brown Podzolics
- SW & GW Gleys (deep poorly drained) derived from non-calcareous
- SW & GW Gleys (shallow poorly drained) derived from non-calcareous parent
- Lithosols and Regosols
- Made Ground

Rev	Amendments	Date	By	Chk	Auth

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Client: KILSARAN CONCRETE
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Project: Environmental Impact Assessment Report
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Drawing Title: REGIONAL SOILS MAP

Scale	SLR Project No.
1:50,000 @ A3	065366.00001

Designed	Drawn	Checked	Authorised
EW	EW	DL	DL
Date 10/24	Date 10/24	Date 10/24	Date 10/24

Drawing Number: **FIGURE 6-2**

Rev.: **1**

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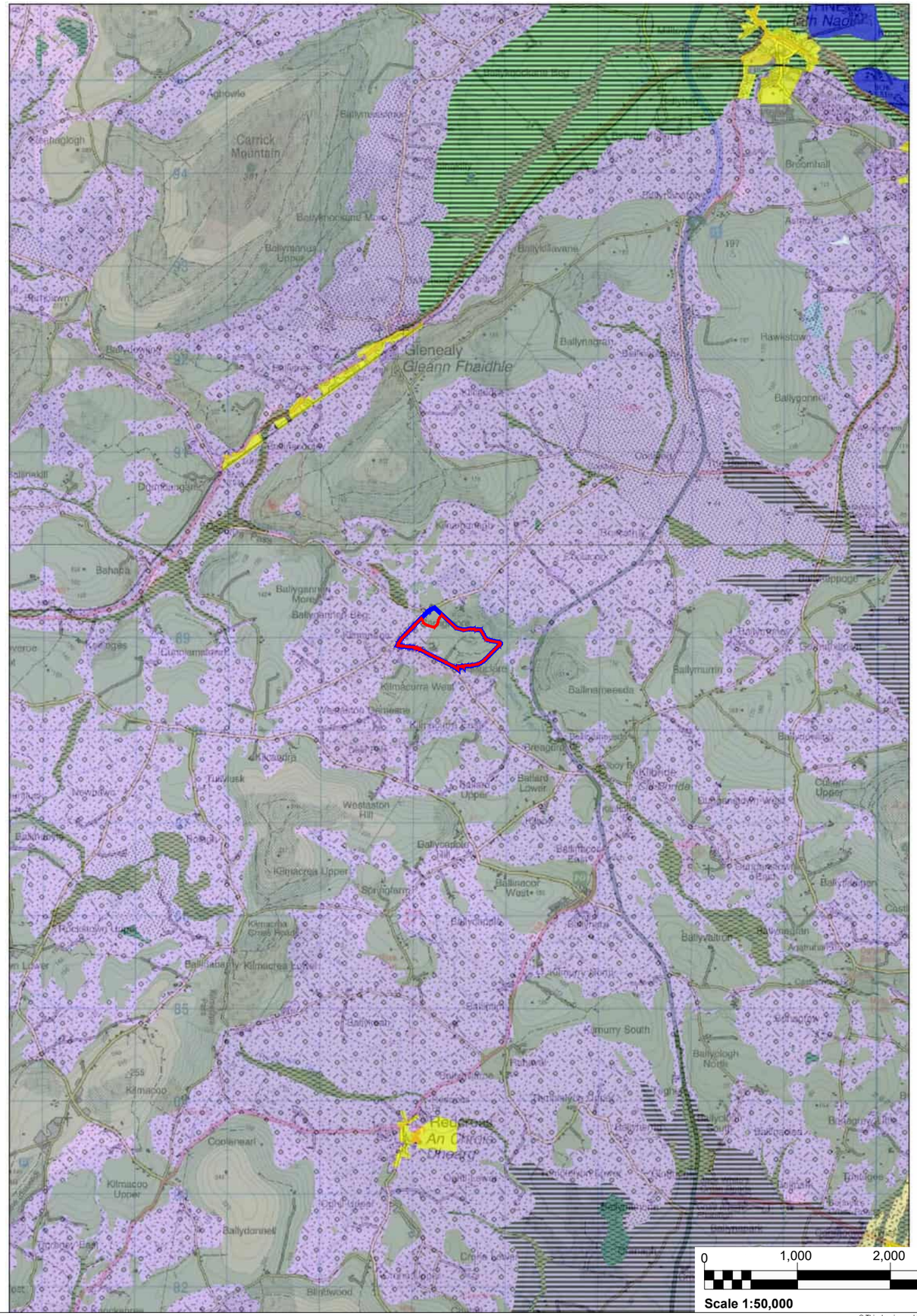

Notes:

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

2. EXTRACT FROM TEAGASC / EPA SOIL MAPPING.

Legend:

🟦	LAND INTEREST BOUNDARY (c. 36.0 HA)
🟥	PLANNING APPLICATION AREA (c. 32.6 HA)

IRELAND SUBSOILS
PARENT MATERIAL TYPE

▨	Alluvium
▨	Sand and Gravel - Lower Palaeozoic Sandstones and Shales
🟨	Made Ground
⬛	Outcrop & Subcrop
▨	Till - Lower Palaeozoic Sandstones

Rev	Amendments	Date	By	Chk	Auth

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Drawing Status & Suitability Code
FINAL

Client
KILSARAN CONCRETE
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Project
Environmental Impact Assessment Report
Materials Recovery / Recycling Facility
and Inert Landfill

Drawing Title
REGIONAL SUBSOILS MAP

Scale
1:50,000 @ A3

SLR Project No.
065366.00001

Designed	Drawn	Checked	Authorised
EW	EW	DL	DL
Date 10/24	Date 10/24	Date 10/24	Date 10/24

Drawing Number
FIGURE 6-3

Rev.
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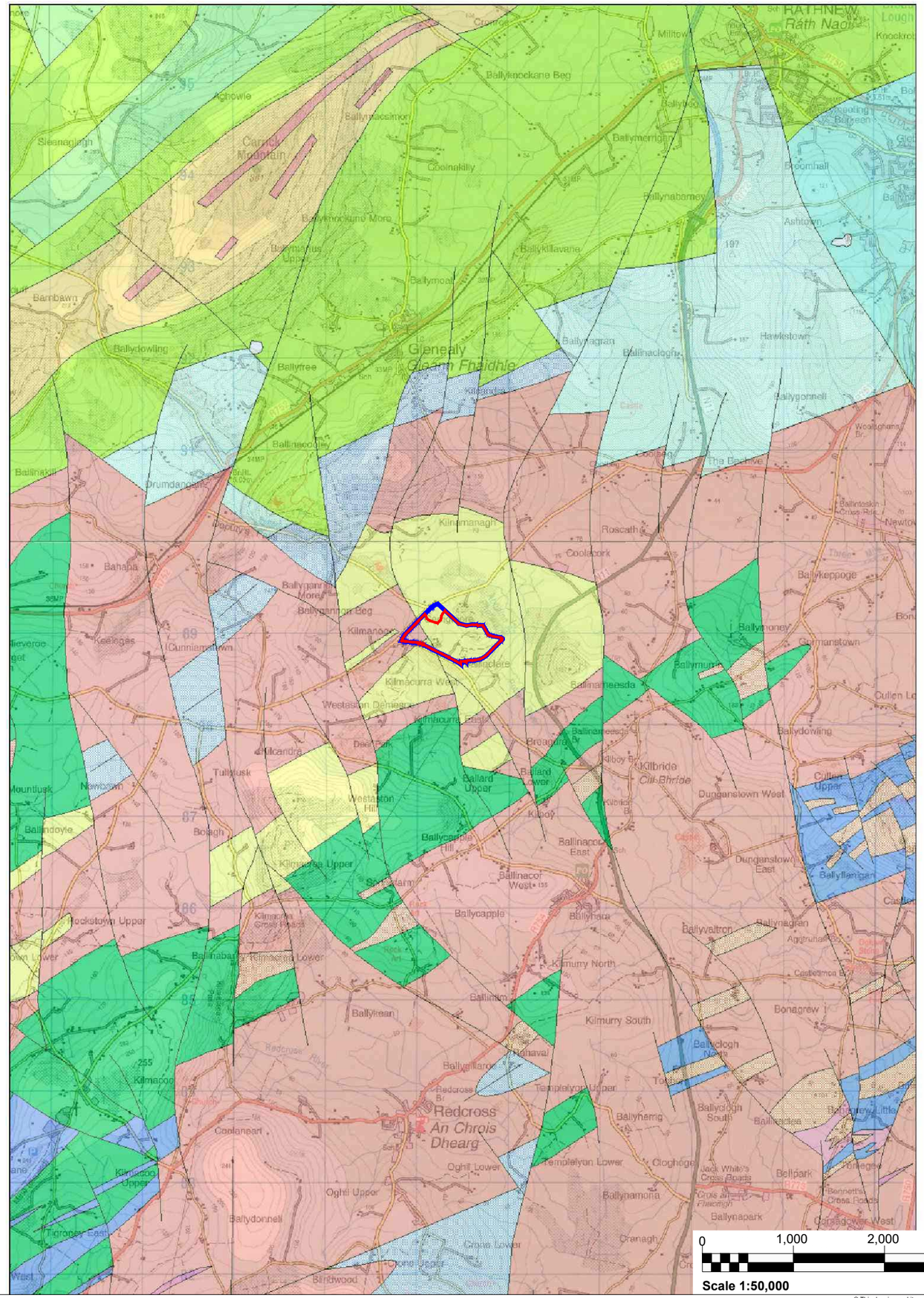
© Ordnance Survey Ireland/Government of Ireland.



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Notes:

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

2. EXTRACT FROM TEAGASC / EPA SOIL MAPPING.

Legend:

LAND INTEREST BOUNDARY (c. 36.0 HA)

PLANNING APPLICATION AREA (c. 32.6 HA)

Solid Geology
GSI Digital Map (1:100,000)

- Avoca Formation
- Ballylane Formation
- Clonite
- Kilmacrea Formation
- Maulin Formation
- Oaklands Formation

Rev	Amendments	Date	By	Chk	Auth

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Client
KILSARAN CONCRETE
Ballinclare Quarry, Kilbride, Co. Wicklow.

Project
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Materials Recovery / Recycling Facility
and Inert Landfill

Drawing Title
GEOLOGY MAP

Scale		SLR Project No.	
1:50,000	@ A3	065366.00001	
Designed	**Drawn**	**Checked**	**Authorised**
EW	EW	DL	DL
Date	**Date**	**Date**	**Date**
10/24	10/24	10/24	10/24

Drawing Number
FIGURE 6-4

Rev.
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ARRIGMORE

GW03
WCC COMPOUND
WATER SUPPLY WELL
SCREENING BERM
EXISTING DISCHARGE CHANNEL TO BALLINCLARE STREAM
SETTLEMENT LAGOONS
FORMER SETTLEMENT LAGOONS
TREATED WATER TO SETTLEMENT PONDS
WATER TREATMENT PLANT
GW01
BH02
10m wide Reservation strip
Stockpiling of Topsoils and Subsoils
EXISTING FLOOR LEVEL C. 37mOD
QUARRY SUMP
SCREENING BERM
CONCRETE YARD
WORKSHOP
CANTEEN
BUNDED FUEL TANKS
TOILETS
PUMPING CHAMBER
WEIGHBRIDGE
SITE OFFICE
WHEELWASH
DISTRIBUTION ROOM & CONTROL SWITCH GEAR (AGGREGATE PLANT)
TERTIARY TREATMENT UNIT (2 MODULE PURAFLO)
ESB SUBSTATION & SWITCHROOM
AERATION TREATMENT UNIT
CAR PARKING AREA
LABORATORY
TOILETS
1 INTERNAL TO LAB
1 EXTERNAL ACCESS
SAND STORAGE SHED
GW02
BH01
DISCHARGE WATER FROM QUARRY SUMP

N

0 50 100 150 200 250m

Scale 1:2,500

Notes:

1. EXTRACT FROM ORDNANCE SURVEY 1:2,500 / 1:5,000 MAP SERIES: 4137-B & 4137-D.

2. EXISTING SITE SURVEY (MAY 2016) PROVIDED BY KILSARAN CONCRETE.

Legend:

- LAND INTEREST BOUNDARY (c. 36.0 HA)
- PLANNING APPLICATION AREA (c. 32.6 HA)
- EXISTING CONTOURS
- INTERNAL ACCESS ROADS
- BH02 — BOREHOLE LOCATION
- GW02 — GROUNDWATER WELL LOCATION
- INFERRED GEOLOGICAL CONTENT

Rev	Amendments	Date	By	Chk	Auth
2	Title block	06.24	AB	DL	DL
1	Title block	05.24	AB	DL	DL
0		01.24	EW	DL	DL

SLR

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Drawing Status & Suitability Code: **FINAL**

Client: KILSARAN CONCRETE
Ballinclare Quarry, Kilbride, Co. Wicklow.

Project: Environmental Impact Assessment Report
Materials Recovery / Recycling Facility
and Inert Landfill

Drawing Title: BOREHOLE LOCATIONS

Scale	SLR Project No.
1:2,500 @ A3	065366.00001

Designed	Drawn	Checked	Authorised
EW	EW	DL	DL
Date 10/24	Date 10/24	Date 10/24	Date 10/24

Drawing Number: **FIGURE 6-5** Rev. **2**

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23/10/2024

CYAL50316488

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APPENDICES

APPENDIX 6-A
Borehole Logs

SLR Consulting Ireland
7 Dundrum Business Park,
Windy Arbour, Dublin 14
Tel. + 353 1 2964667 Fax. + 353 1 2964676
www.slrconsulting.com

Borehole No
14 - BH1

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325673E - 188872N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 37.89 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 08/10/2014-13/10/2014	Logged By TM / SL

Piezo		Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
		Drill Tag	TCR	SCR	RQD	FI				
		0.00								DIORITE
			56	19	16	12	1			Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
		1.60								
			55	33	24	4	2			
		2.60								
			100	80	70	13	3			
		4.10								
			100	100	100	4	4			
		5.60								Subtle darkening of the groundmass to 11.71m
			100	77	51	11	5			
		7.10								
			100	84	69	10	6			
		8.60								
			100	100	87	10	7			
							8			
							9			

Continued next sheet

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Windy Arbour, Dublin 14
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Borehole No
14 - BH1

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325673E - 188872N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 37.89 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 08/10/2014-13/10/2014	Logged By TM / SL

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	10.10								DIORITE
						10.20	27.69		
						10.30	27.59		QUARTZ VEIN Pale QUARTZ vein with slightly anastomising veinlets
		100	80	72	10	11			DIORITE Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
	11.60								Becoming paler grey-green to 13.15m
		100	92	92	3	12			
	13.10					13			
		100	58	58	6	14			
	14.60								
		100	93	93	3	15			
	16.10					16			
		100	100	100	2	17			
	17.60								
		100	88	81	8	18			
	19.10					19			
		100	43	33	12				

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Borehole No
14 - BH1

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325673E - 188872N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 37.89 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 08/10/2014-13/10/2014	Logged By TM / SL

Piezo		Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
		Drill Tag	TCR	SCR	RQD	FI				
										DIORITE
		20.60								
			100	82	75	6	21			
		22.10					22			
			100	89	75	10	23			
		23.60								
			100	62	62	13	24			
		25.10					25			Becoming slightly lighter coloured to 26.34
			100	89	89	5	26			Becoming slightly darker to 38.52m
		26.60								
			100	37	17	17	27			
		28.10					28			
			100	95	85	9	29			
		29.60								

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Borehole No
14 - BH1

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325673E - 188872N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 37.89 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 08/10/2014-13/10/2014	Logged By TM / SL

Piezo		Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
		Drill Tag	TCR	SCR	RQD	FI				
			100	79	72	12				DIORITE
		31.10					31			
			100	97	88	8	31.85	6.04		QUARTZ VEIN
							31.95	5.94		Pale QUARTZ - CARBONATE vein with minor clasts of host rock
		32.60								DIORITE
			100	58	53	10	33			Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
		34.10					34			
			100	89	65	8	35			
		35.60								
			100	83	67	7	36			
		37.10					37			
			100	82	48	9	38			
		38.60					38.52	-0.63		TRACHYTE
							39			Strong to very strong, massive, medium grey, fine to medium grained (coarsening with depth) TRACHYTE
			100	100	100	4	39.29	-1.40		VEIN
							39.30	-1.41		Fracture filled with soft, fibrous, dark green, slight lustre, possible silicate mineral

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Borehole No
14 - BH1

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325673E - 188872N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 37.89 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 08/10/2014-13/10/2014	Logged By TM / SL

Piezo		Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
		Drill Tag	TCR	SCR	RQD	FI				
							40.10	-2.21		TRACHYTE Detail 39.30m - 40.10m : Strong to very strong, massive, medium grey, fine to medium grained (coarsening with depth) TRACHYTE End of Borehole at 40.10 m

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Borehole No
14 - BH2

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325371E - 189093N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 39.01 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 13/10/2014-15/10/2014	Logged By TM / SL

Piezo	Core Geotechnical Data: Drill Tag	TCR	SCR	RQD	FI	Depth (m)	Level (m OD)	Litho	Stratum Description
	0.00								DIORITE Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
		50	14	0	10	1 2			
	2.60								
		100	48	23	8	3 4			
	4.10								
		87	65	65	3	5			
	5.60								
		100	77	49	8	6 7			
	7.10								
		100	100	79	7	8			
	8.60								
		100	100	100	1	9			

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Borehole No
14 - BH2

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325371E - 189093N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 39.01 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 13/10/2014-15/10/2014	Logged By TM / SL

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
	10.10								DIORITE
		100	90	90	3	11			
	11.60								
		100	100	100	3	12			
	13.10					13			
						13.55	25.46		QUARTZ VEIN
		100	100	95	5	13.80	25.21		Pale QUARTZ - CARBONATE vein with minor clasts of host rock
						14			DIORITE
	14.60								Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
		100	93	80	4	15			
	16.10					16			
		100	60	60	4	17			
	17.60								
		100	43	20	10	18			
	19.10					19			
		100	80	70	9				

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Location: Ballinclare, Co. Wicklow		Level: 39.01 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 13/10/2014-15/10/2014	Logged By TM / SL

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
									DIORITE
	20.60								
		100	63	41	11	21			
	22.10					22			
		100	90	87	5	23			
	23.60								
		100	87	87	2	24			
	25.10					25			
		100	87	87	5	26			
	26.60								
		100	90	79	6	27			
						27.78	11.23		QUARTZ VEIN
						27.94	11.07		Quartz Vein
	28.10					28			DIORITE
		100	91	81	10	29			Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
	29.60								

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Borehole No
14 - BH2

Project Name: Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325371E - 189093N	Hole Type Rotary
Location: Ballinclare, Co. Wicklow		Level: 39.01 m AOD	Scale 1:50,000
Client: Kilsaran Concrete		Dates: 13/10/2014-15/10/2014	Logged By TM / SL

Piezo	Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
	Drill Tag	TCR	SCR	RQD	FI				
		100	100	91	4				DIORITE
						30.72	8.29		
						31			DIORITE Strong to very strong, massive, dark grey, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Marked change in mineralogy, laths of pale yellowish minerals possibly micas
	31.10								
		100	100	100	2				
						32			
	32.60					32.50	6.51		DIORITE Strong to very strong, massive, dark grey, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Increase in sulphide content, trace visible pyrite content.
		100	100	93	3	33			
						33.52	5.49		DIORITE Strong to very strong, massive, dark grey, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Return to similar mineralogy as above 30.72m
						34			
	34.10								
		100	100	97	5				
						35			
	35.60								
		100	100	99	3	36			
						37			
	37.10					37.04	1.97		FAULT GOUGE FAULT - Weak fault gouge
						37.14	1.87		
						37.33	1.68		DIORITE Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
		100	63	50	13	37.57	1.44		
						37.99	1.02		QUARTZ VEIN Quartz Vein
	38.60								FAULT GOUGE FAULT - Weak fault gouge
						39			DIORITE Strong to very strong, massive, dark grey to green, crystalline, medium to coarse grained DIORITE, fresh with no signs of weathering. Abundant augite, biotite and plagioclase. Rare scattered pyrite present.
		100	100	100	2				Calcite vein with fizz cleavage

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Borehole No
14 - BH2

Project Name:	Ballinclare EIS	Project No. 501.00036.00030	Co-ords: 325371E - 189093N
Location:	Ballinclare, Co. Wicklow		Level: 39.01 m AOD
Client:	Kilsaran Concrete		Dates: 13/10/2014-15/10/2014

Hole Type: Rotary
Scale: 1:50,000
Logged By: TM / SL

Piezo		Core Geotechnical Data					Depth (m)	Level (m OD)	Litho	Stratum Description
		Drill Tag	TCR	SCR	RQD	FI				
							40.10	-1.09		DIORITE
										End of Borehole at 40.10 m
							41			
							42			
							43			
							44			
							45			
							46			
							47			
							48			
							49			

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APPENDIX 6-B
Geological Heritage Site Report - Ballinclare Quarry

WICKLOW - COUNTY GEOLOGICAL SITE REPORT

NAME OF SITE	**Kilmacurra Quarry**
Other names used for site	
IGH THEME	**IGH11 Igneous Intrusions**
TOWNLAND(S)	**Kilmacurra West**
NEAREST TOWN/VILLAGE	**Rathdrum**
SIX INCH MAP NUMBER	**30**
NATIONAL GRID REFERENCE	**724682E 688471N (centre of quarry)**
1:50,000 O.S. SHEET NUMBER	**62 GSI Bedrock 1:100,000 Sheet No. 16**

Outline Site Description
Kilmacurra Quarry is a large, partly flooded quarry developed in a diorite intrusion. It is now abandoned.

Geological System/Age and Primary Rock Type
The bedrock is diorite, part of the Caledonian Carrigmore Diorite suite of intrusions in east Wicklow. The suite has been dated at 410 Ma, slightly older than the Leinster Granite. Wallrocks are slates of the Ordovician Kilmacrea Formation.

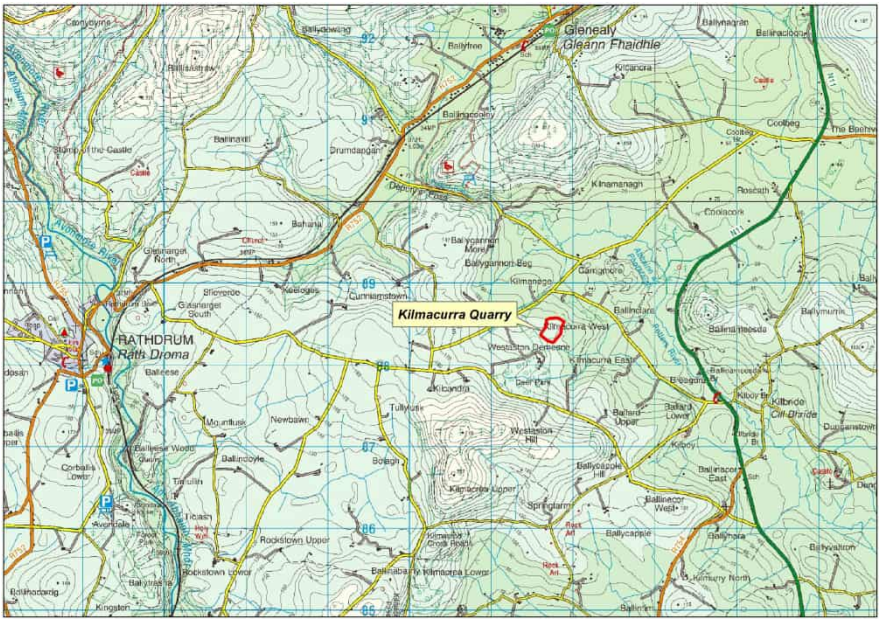
Main Geological or Geomorphological Interest
The Carrigmore Diorite suite comprises a series of igneous intrusions of intermediate composition, i.e. a chemical and mineralogical composition intermediate between granite and gabbro. Diorite intrusions occur widely in Ireland but the Carrigmore suite is unusual for the size and internal complexity of the intrusions. Diorite is a relatively hard rock, suitable for aggregate and concrete manufacture, and several quarries have been developed in the Carrigmore suite, including those at nearby Ballinclare and Parnell Quarry near Rathdrum.

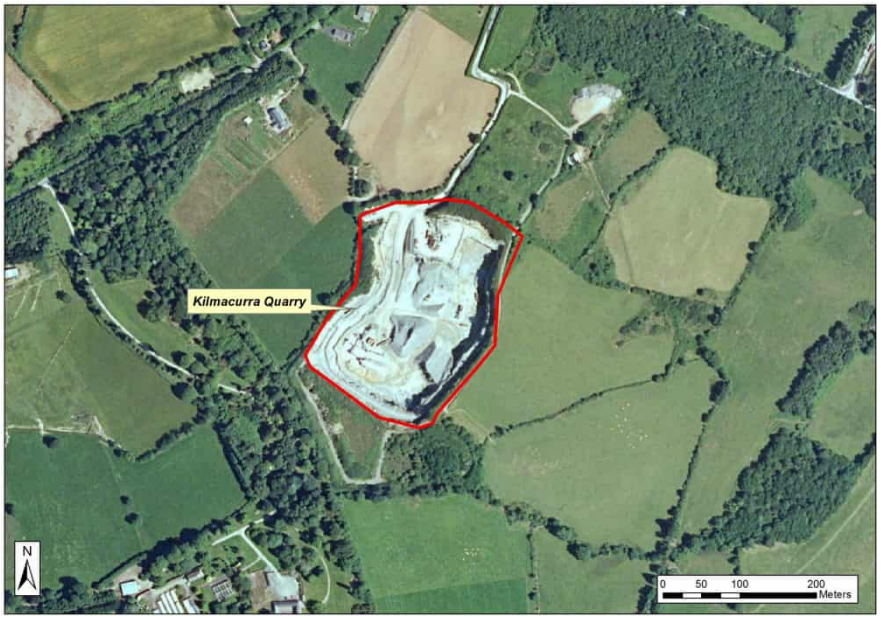
Site Importance – County Geological Site
Diorite is an important minor igneous rock type in Wicklow. The Kilmacurra Quarry provides good exposure on quarry faces and in loose blocks. The other quarries developed in the Carrigmore suite are apparently still operational so this site provides an opportunity to examine the diorite in situ.

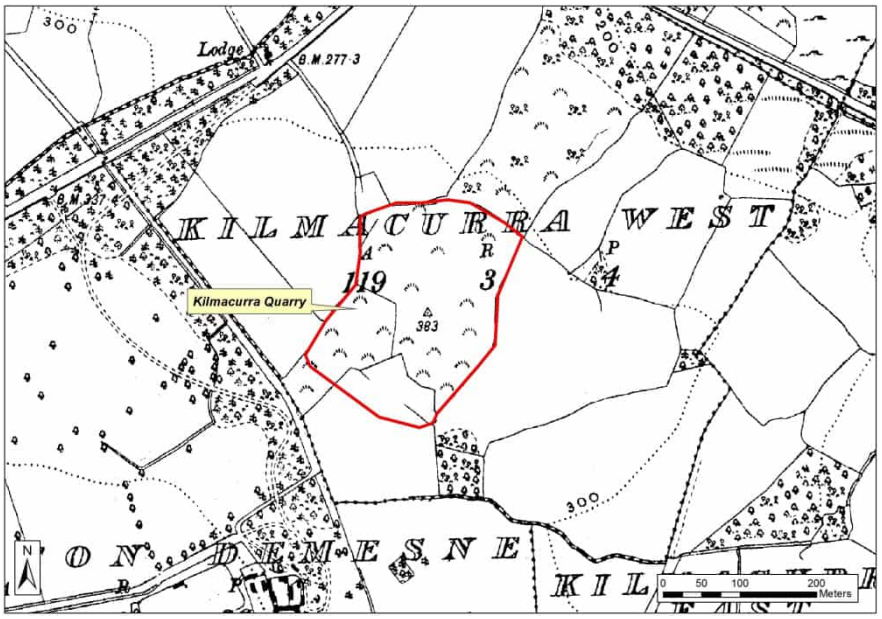
Management/promotion issues
The quarry is abandoned and partly flooded, with deep water and high vertical quarry faces. It is of interest mainly to geologists and is not suitable for promotion to the general public.

View southwards of western side of quarry, showing vertical faces and flooded quarry floor. Upper faces to right are readily accessible.

Medium-grained grey-green diorite, typical of rock exposed in the quarry.


Kilmacurra Quarry
RATHDRUM
Rath Droma
Glenealy
Gleann Fhaidhle


Kilmacurra Quarry
N
0 50 100 200
Meters


Kilmacurra Quarry
KILMACURRA WEST
Lodge
B.M.277·3
B.M.337
300
N
0 50 100 200
Meters