5 Land, Soils and Geology

5.1 Introduction

This Chapter of the remedial Environmental Impact Assessment Report (rEIAR) considers and assesses any potential impacts resulting from quarrying related activities that have been carried out at the project site, a disused quarry located in the townland of Coolsickin or Quinsborough, Monasterevin, Co. Kildare (the 'Site'), on the surrounding land, soils and geology.

It is noted that activity at the Site involved the extraction of sand, gravel and rock through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling (the 'Project').

The following assessment was prepared by Lisa Cleary (B.A. (mod), PIEMA) and Dr Rhian Llewellyn (MGeol, PhD, PIEMA). Lisa is an environmental scientist with over 2 years' experience, and Rhian is a geologist and environmental specialist with over 15 years' experience.

5.1.1 Technical Scope

The technical scope of this assessment is to consider the potential impacts and effects on soils, land and geology that could have resulted because of the quarrying related activities carried out at the Site. This assessment considers the potential sources of change resulting from Project activities detailed in the project description (Chapter 2 of this rEIAR).

The loss of agricultural soils will be considered, as will the potential geotechnical risks, impact on geologically important sites and land quality. Associated secondary potential impacts from changes to land quality on human health are also considered. It should be noted that this assessment does not, however, constitute a contaminated land risk assessment, a geotechnical/geohazard risk assessment, or detailed quantitative human health risk assessment.

The potential effects associated with hydrogeological and hydrological receptors are considered in Chapter 6 (Water), with reference to water quality in relation to land quality in this chapter. The effects of the Project on population and human health are addressed in Chapter 3 (Population & Human Health). Any secondary (i.e. indirect) effects on ecology or biodiversity due to changes in land quality or habitat removal are considered in Chapter 4 (Ecology and Biodiversity).

5.1.2 Geographical and Temporal Scope

Historical arial mapping and documentation held by Kildare Country Council indicates extraction of aggregates within the Application Site is estimated to have commenced within 2000 and the operation had ceased within 2006. Accordingly, the baseline for this rEIAR

has been set to 01 January 2000, and the rEIAR process has assessed environmental impacts from that date to 31 December 2006 (see Chapter 2 Project Description for detail).

The geographical study area for the assessment covers the EIA boundary (identified on Figure 5-1) and with a study area extending 1 km around the EIA Site boundary, because most potential effects to geological and soil receptors are anticipated to occur within the Project footprint or immediately adjacent to it. In the context of this rEIAR, the Substitute Consent Application Site boundary[1] is located entirely within the EIA Boundary and contains lands which form the historical extraction area and quarry working areas (i.e. the historical stockpile areas) associated with the Project.

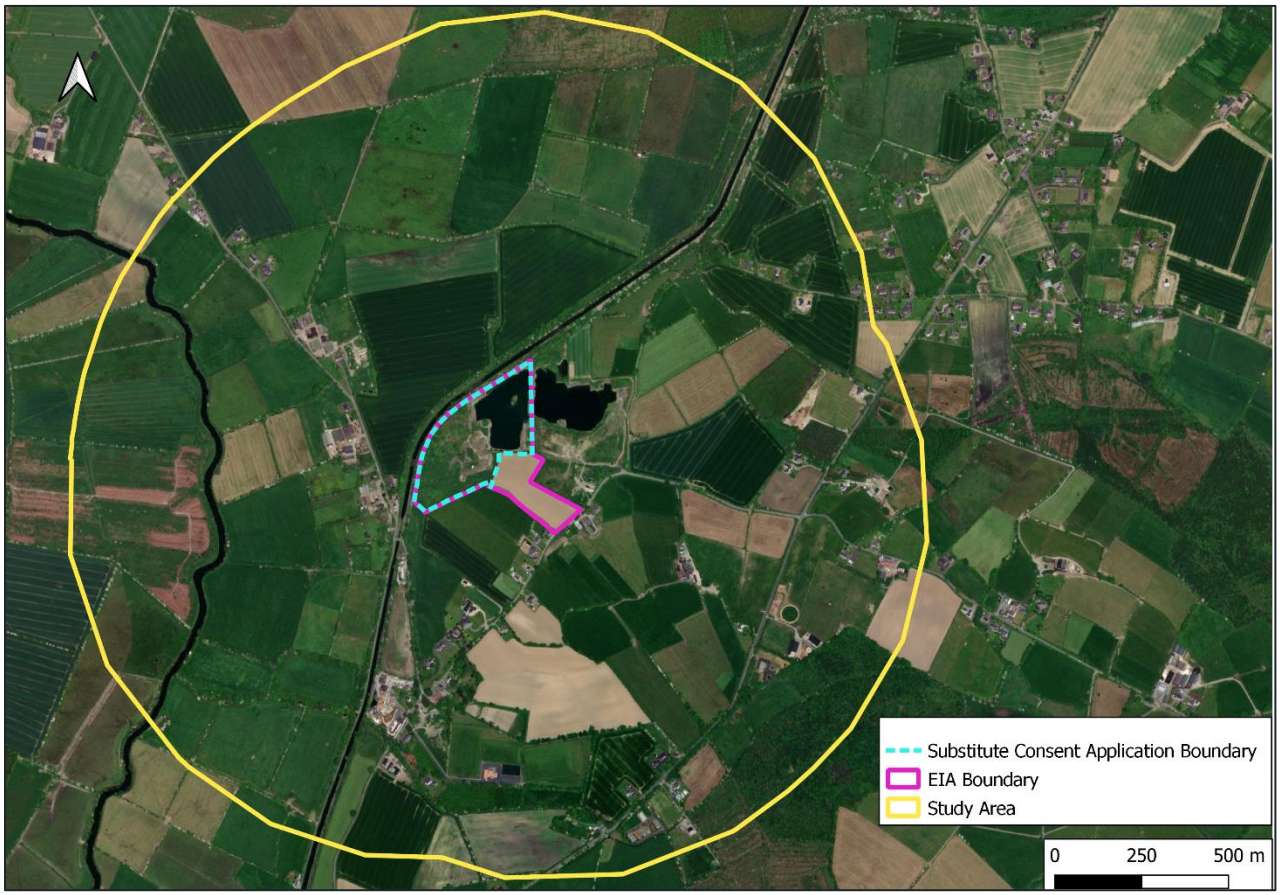

Figure 5-1 - Location of the Application Site, EIA Boundary, and the 1 km Study Area

5.1.3 Project Description Summary

The Project seeking substitute consent consists of extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with

[1] The term 'Application Site' refers to lands within the Substitute Consent Application Site boundary.

aggregate processing and stockpiling. The Project was operational between the years 2000-2006.

A full project description is presented in Chapter 2 (Project Description).

5.2 Legislative and Policy Context

This section addresses the legislation and guidance that has been considered when preparing this chapter, and key policy context relevant to soils, land and geology that has guided the focus of the assessment. The overarching EIA legislation under which this assessment is required is addressed separately in Chapter 1 (Introduction, Scope and Methodology).

5.2.1 Legislation

This assessment has been made with cognisance to relevant legislation, including but not limited to:

- European Union Directive 2011/92/EU as amended by Directive 2014/52/EU – these Directives required that certain private and public projects which are likely to have significant resultant environmental impacts are subject to a formalised Environmental Impact Assessment prior to their consent.
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018) which amended the Planning and Development Act, 2000, and the Planning and Development Regulations, 2001. The 2014/52/EU Directive was transposed into Irish law through this Directive.
- The European Communities (Environmental Liability) Regulations 2008 (as amended) - These Regulations (SI 547/2008) transpose EU Directive 2004/35/CE on environmental liability with regard to the prevention and remedying of environmental damage. The purpose of these Regulations is to establish a framework of environmental liability based on the 'polluter-pays' principle, to prevent and remedy environmental damage. The Environmental Protection Agency (EPA) is designated as the competent authority for all aspects of these Regulations.
- The Environmental Protection Agency Act 1992 and the Protection of the Environment Act 2003 – which detail the requirements associated with general pollution control and activities that come under integrated pollution prevention and control.

5.2.2 Relevant Policies and Plans

- The Kildare County Development Plan (CDP) 1999 is the strategy document for County Kildare which covers most of the temporal scope of this assessment period. The key policies and objectives of this plan are listed in Section 2.5.1 of the Project Description (Chapter 2).
- The Kildare CDP 2005-2011 was adopted on 18 May 2005 and covers the temporal scope from this date to 31 December 2006. The key policies and objectives of this current plan are listed in Section 2.5.2 of the Project Description (Chapter 2).

5.2.3 Relevant Guidance

This assessment has been made cognisant of relevant guidance and advice, including but not limited to:

- Relevant European Commission guidance – Guidance on the Preparation of the Environmental Impact Assessment Report (2017).
- The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (May 2022) – which presents key topics of interest, high-level information on the interactions that should be considered in relation to EIA legislation, and overviews on the recommended approach to describing the baseline environment, completing impact assessments, describing effects, and addressing mitigation and monitoring.
- Department of Housing, Planning and Local Government. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018).
- The National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (2008) in relation to aspects to be considered and assessment approach (including relative receptor importance and cross discipline interactions).
- Institute of Geologists of Ireland. Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (April 2013).
- The National Roads Authority Guidelines for the Creation, Implementation and Maintenance of an Environmental Monitoring Plan (undated) in relation to impact mitigation.
- CIRIA C741: Environmental Good Practice on Site (2015, Fourth Edition) in relation to source of impact and mitigation.
- The EPA guidelines on Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (2006), for a more environmentally sustainable quarry & pit industrial sector, greater protection for the environment and human health.
- The CIRIA guidance Publication C532 Control of water pollution from construction sites: guidance for consultants and contractors (2001), which provides advice on environmental good practice for the control of water pollution arising from construction activities.

5.3 Assessment Methodology and Significance Criteria

This section presents the method used to assess the impacts and effects of the Project on soils, land and geology, and to secondary associated human health receptors. It establishes the stages of the assessment, and the qualitative criteria used to assess impact magnitude and determine the level of effect significance.

5.3.1 Qualitative Assessment Method

The assessment of potential effects has been undertaken using the qualitative assessment method outlined below, and is supported by the baseline condition information, desk-based

information on land, soils and geology available from the Geological Survey of Ireland (GSI), the EPA and previous ground investigations carried out onsite. The assessment follows a staged approach, which is summarised below:

1. Confirm baseline conditions – determine baseline and develop conceptual site model by consideration of available records and data sets, site reports and published information.
2. Confirm the key receptors and their value/importance, this may vary over time as new receptors are added (e.g. addition of residential housing).
3. Qualitatively characterise the magnitude of impacts on the receptors – describe what potential changes could have occurred to each receptor because of the Project, identify source-pathway receptor linkages, and assign the magnitudes of impact. This stage considers embedded design mitigation, historical and existing site practices including good practice in construction environment management and pollution prevention.
4. Determine the effect significance of each potential impact on each sensitive receptor.
5. Consider the need for remedial measures if it is considered necessary to reduce the magnitude of any impact and associated effect. If remedial measures are considered necessary, a timeline will be presented in which the measures would be implemented.
6. Assess the residual impact magnitude and residual effect significance after all mitigation is carried out.
7. Identify any monitoring that may be required to measure the success of the remedial measures.

Stages 1 and 2 have been completed using published literature, guidance and available information specific to the Project, which is presented in Chapter 2 of this rEIAR. For the identification of receptor value/importance that completes Stage 2, and for the description of impact magnitude (Stage 3), a common framework of assessment criteria and terminology has been used based on the EPA's Guidelines on the Information to be Contained in EIARs (EPA, 2022), with some modifications made to increase clarity. The descriptions for sensitivity of receptors are provided in Table 5-1 and the descriptions for magnitude of impact are provided in Table 5-2.

The potential for an impact to have occurred at a receptor has been determined using the understanding of the baseline environment and its properties and consideration of whether there is a feasible linkage between a source of impact and each receptor.

Evaluation of sensitivity of Soils, Land, Geology requires a considerable degree of judgement, based on defined characteristics and values and applying professional experience, which is accordingly applied during this assessment.

Table 5-1 – Environmental value (sensitivity) and descriptions

Value (sensitivity) of receptor / resource	Typical description
High	High importance and rarity, national scale, and limited potential for substitution. For example: ■ Global/European/National designation ■ Large volumes of nationally or locally important peat ■ Well drained and highly fertile soils ■ Proven economically extractable mineral resource ■ Areas of regionally important economic mineral deposits. ■ Human health.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution. For example: ■ Regionally important sites ■ Moderately drained and/or moderate fertility soils. ■ Areas of locally important economic mineral deposits.
Low	Low or medium importance and rarity, local scale. For example: ■ Locally designated sites ■ Poorly drained and/or low fertility soils.
Negligible	Very low importance and rarity, local scale.

Table 5-2 - Magnitude of impact and descriptions

Magnitude of impact (change)		Typical description
High	Adverse	Major or total loss of a geological site or mineral deposit, where the value of the site will be severely affected. Major or total loss of soils or where the value of the site will be severely affected. Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. Harm to human health – death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements. Partial loss of a geological site or mineral deposit, with a major change to the settings, or where the value of the site will be affected. Partial loss of soils or where the value of the site will be affected.

Magnitude of impact (change)		Typical description
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Small loss to a geological site or mineral deposit, such that the value of the site will not be affected. Small loss of soils or where soils will be disturbed but the value not affected. Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Minimal or no change to a geological site or mineral deposit. Minimal or no change to soils. Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

The assessment of magnitude of impact considers whether the change that causes the impact is positive or negative, and whether the impact is direct or indirect, short, medium or long-term, temporary or permanent, and if it is reversible.

For the purposes of this assessment, a direct impact is one that occurred as a direct result of the Project and was likely to have occurred at or near the Project itself. Indirect impacts (or secondary/tertiary impacts) are those where a direct impact on one receptor has another knock-on impact on one or more other related receptor(s) (e.g. the Project results in a change in land quality, which then has an indirect impact on human health). Indirect impacts can occur within the study area or away from the Project.

For the purposes of this assessment, the following definitions of duration have been used:

- Temporary – effect likely to last less than 1 year without intervention;
- Short term – effect likely to last 1 to 7 years without intervention;
- Medium term – effect likely to last 7 to 15 years without intervention;
- Long term – effect likely to last 15 to 60 years without intervention; and
- Permanent – effect likely to last over 60 years without intervention.

An irreversible impact is defined as a change to the baseline that would not reverse itself naturally. Such impacts will usually be long-term and irreversible, such as the removal of best and most versatile agricultural soils. A reversible impact is defined as a change to the

baseline conditions that would reverse naturally once the source of the impact is exhausted or has stopped.

5.3.2 Significance Criteria

The approach followed to derive effects significance from receptor value and magnitude of impacts (Stage 4) is shown in Table 5-3. Where Table 5-3 includes two significance categories, reasoning is provided in the topic chapter if a single significance category is reported. A description of the significance categories used is provided in Table 5-4.

Table 5-3 – Significance matrix

	Magnitude of Impact (Degree of Change)				
Environmental value (Sensitivity)		**Negligible**	**Low**	**Medium**	**High**
	High	Slight	Slight or moderate	Moderate or large	Profound
	Medium	Imperceptible or slight	Slight or moderate	Moderate	Large or profound
	Low	Imperceptible	Slight	Slight	Slight or moderate
	Negligible	Imperceptible	Imperceptible or slight	Imperceptible or slight	Slight

Table 5-4 – Significance categories and typical descriptions

Significance Category	**Typical Description**
Profound	An effect which obliterates sensitive characteristics.
Large	An effect which, by its character, magnitude, duration or intensity alters a significant proportion of a sensitive aspect of the environment.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Imperceptible	An effect capable of measurement but without significant consequences.

Residual adverse effects of ‘large’ or ‘profound’ significance are considered to be ‘significant’ for the purposes of this assessment.

If required following the assessment of the current level of effect significance, additional mitigation measures (remedial measures) may be presented that will be used to avoid, prevent, or reduce the magnitude of the impact (Stage 5). The significance of the effect considering the additional mitigation is then assessed (Stage 6) to give the residual effect significance. Any monitoring that will be required to measure the success of the mitigation is included (Stage 7) (see section 5.9).

5.4 Baseline and Existing Conditions

This section presents baseline information on soils, land use, land quality and geology. Information about the water environment (including hydrogeology) is presented in Chapter 6 (Water).

5.4.1 Land Use

A full description of land use change arising from the Project over the temporal assessment period, and to the present is provided in Chapter 2 (Project Description).

5.4.1.1 Baseline Conditions (1 January 2000)

Aerial imagery indicates that prior to Project the Application Site comprised agricultural lands consisting of fields bordered primarily by hedgerow. The private entrance located on the local road (L7049) on the south of the EIA boundary is shown to be present (see Figure 5-2).

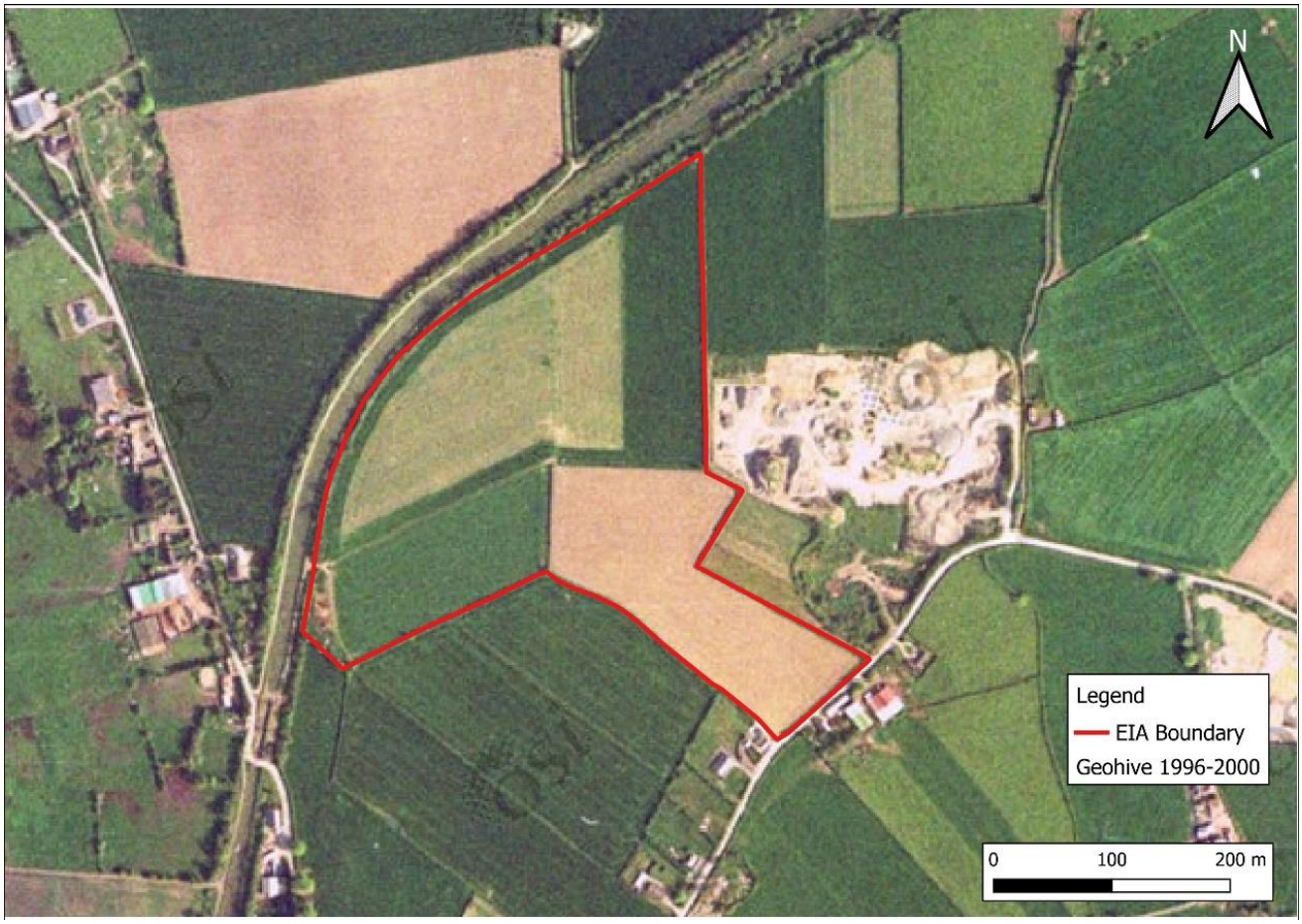

Figure 5-2 - Land use prior to Project (Map Genie Imagery 1996-2000)

Historical mapping indicates that the Application Site was likely in agricultural use by at least 1834. Fields and field boundaries over the Application Site are shown in the 1829-1834 Cassini 6" mapping records and the 25" mapping series from 1897-1913 (Heritage Council Online heritage maps viewer, 2025). Historical mapping indicates changes to field boundary configurations have taken place on the Application Site since 1834.

5.4.1.2 Existing conditions (31 December 2006)

The earliest publicly available arial imagery following the cessation of extraction activities on the application Site is from 2009 (Google Earth Satellite). The 2009 arial imagery (see Figure 5-3) shows collected waters present on the quarry floor. The image also shows the extent of the historical stockpiling areas on the Application Site.

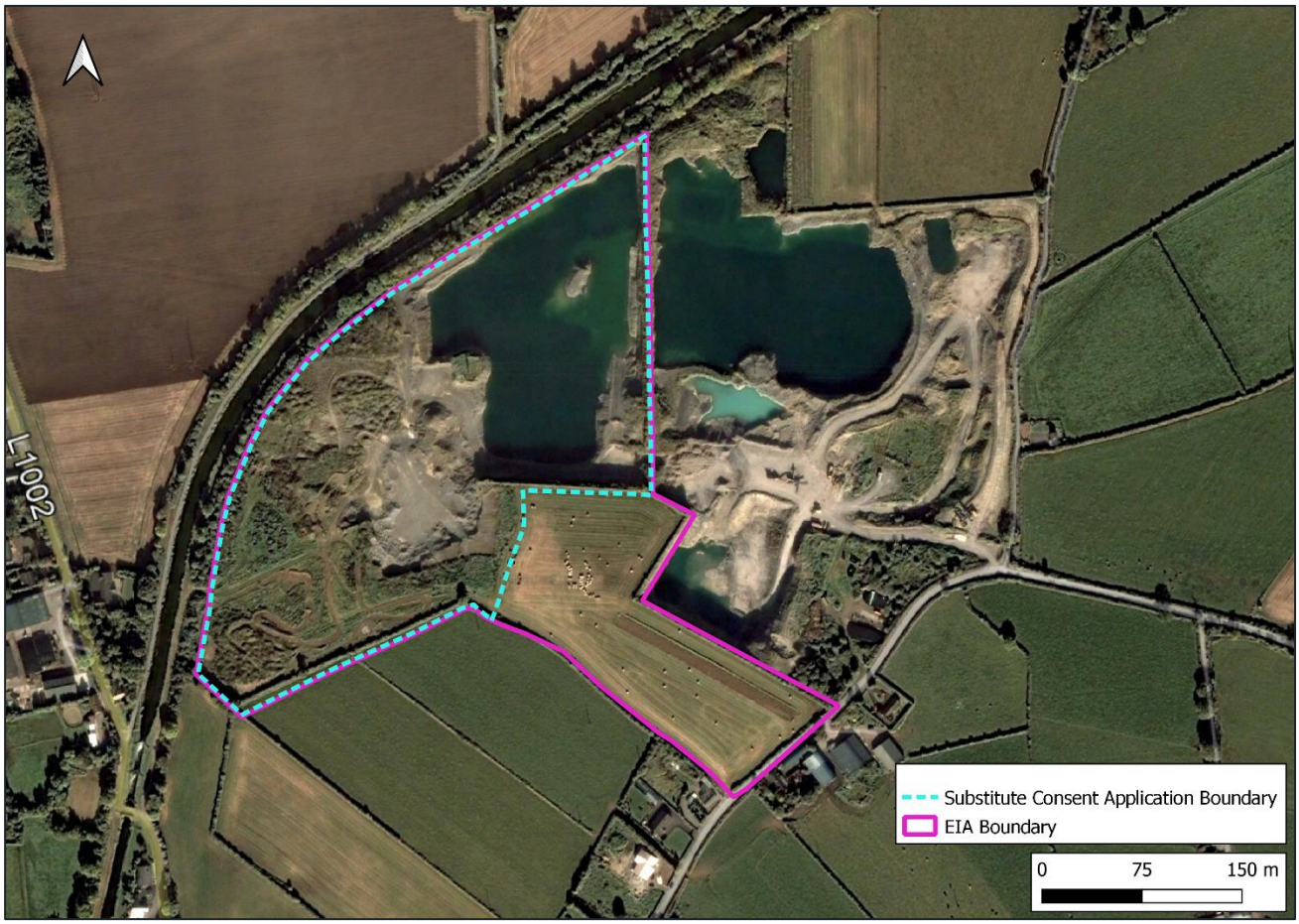

Figure 5-3 - EIA Boundary overlain on October 2009 (Google Earth)

5.4.2 Superficial Geology (Soil and Quaternary Sediments)

Teagasc's Irish Soil Information System (SIS) mapping shows the soil cover over the entire Site area (Figure 5-4). This soil map is representative of the baseline soils at the Site prior to activities within the extraction area.

Figure 5-4 - Irish Soil Information System (SIS) Mapping overlain on ESRI Satellite aerial.

Soil associations are groups of soil types that commonly occur together in the landscape and these associations make up the Irish Soil Information System national database (EPA, 2024). There are 11 Soil Great Groups, which are a hierarchical arrangement that can be used for taxonomical classifications. Table 5-5 lists the different soil categories within the Study Area.

GSI (2024) data indicated that the soil associations mapped within the study area consists of luvisols, alluvial and ombrotrophic soils, which are described as follows (EPA, 2025):

- Luvisols have high activity clays throughout and lack the abrupt textural change of Planosols. These are soils in which clay is washed down from the surface soils to an accumulation horizon at some depth.
- Alluvial soils are formed in deposits of river, lake, estuarine or marine alluvium. The majority of series described are associated with recent rivers and streams. The lake alluviums found in Ireland are mostly associated with depressions at the sites of glacial or post-glacial lakes.
- Ombrotrophic peat soils are rain-fed peat soils in lowland (raised bog) and upland positions (blanket peat). They are oligotrophic with a pH < 4.0 (in CaCl2 1:2.5 undried, equivalent to pH 4.5 in 1:2.5 H2O) throughout the reference section.

Table 5-5 – SIS Associations within the study area.

Soil Association Code	Soil Great Group	Description
Elton (1000c)	Luvisol	Fine loamy drift with limestones
Lake (05LAK)	Alluvial	Lake alluvium
River (05RIV)	Alluvial	River alluvium
Peat (1xx)	Ombrotrophic	Rain-fed peat soils

GSI (2025) data indicates that the subsoils underlying the Site are composed of gravels derived from Limestones and till derived from Limestones (Figure 5-5). In the northern section of the study area GSI mapping indicates there is cut over raised peat. To the west of the study area there are areas of alluvium and lacustrine sediments.

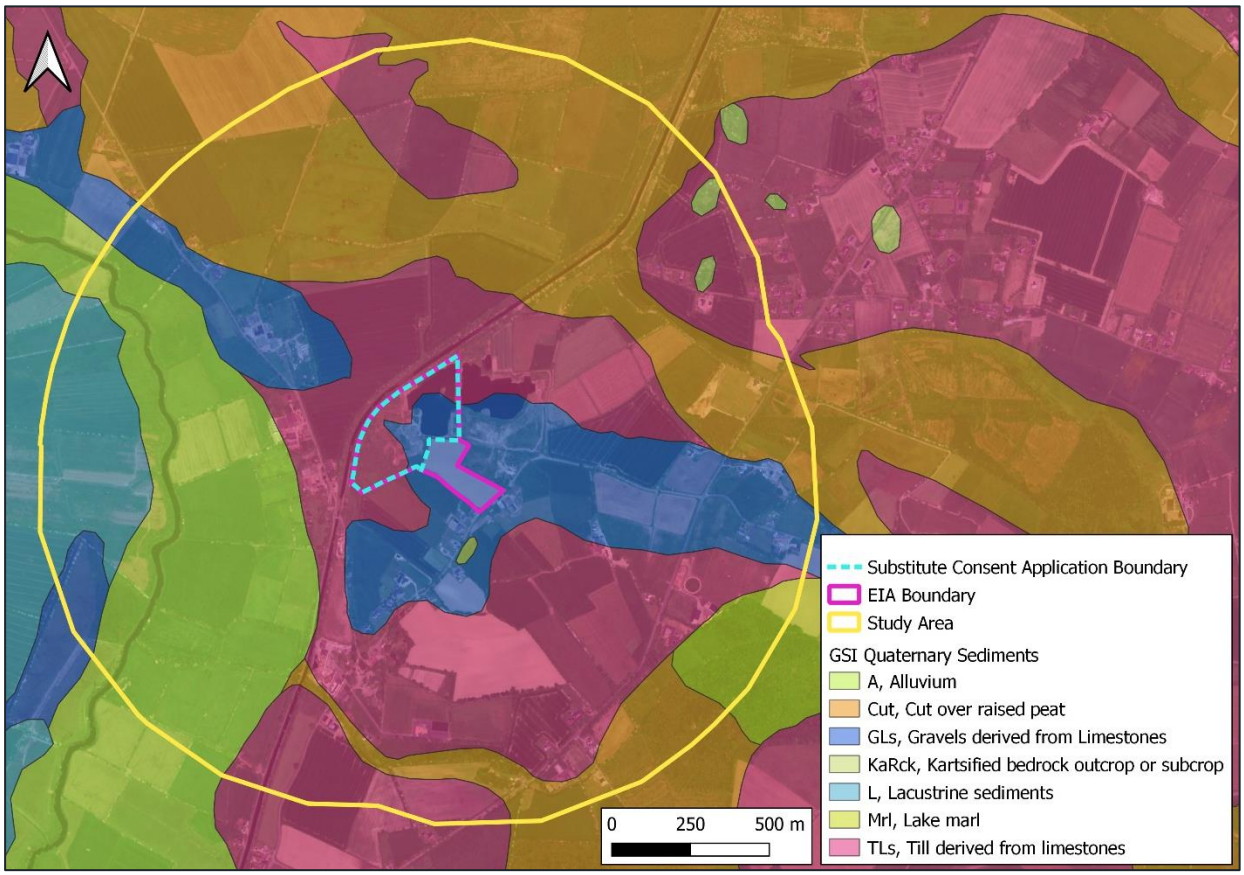

Figure 5-5 - Underlying Quaternary Sediments (subsoil) (GSI, 2022) overlain on ESRI Satellite aerial.

5.4.3 Bedrock Geology

The GSI Bedrock Geology 1:100,000 map (Figure 5-6) indicates that the Site is underlain by the Allenwood Formation, which is described as consisting of pale-grey generally massive

shelf limestones and their dolomitised equivalents. The Allenwood Formation is Carboniferous in age.

The area to the west of the study area is underlain by the Lucan Formation, which consists of dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. The Lucan Formation is Carboniferous in age.

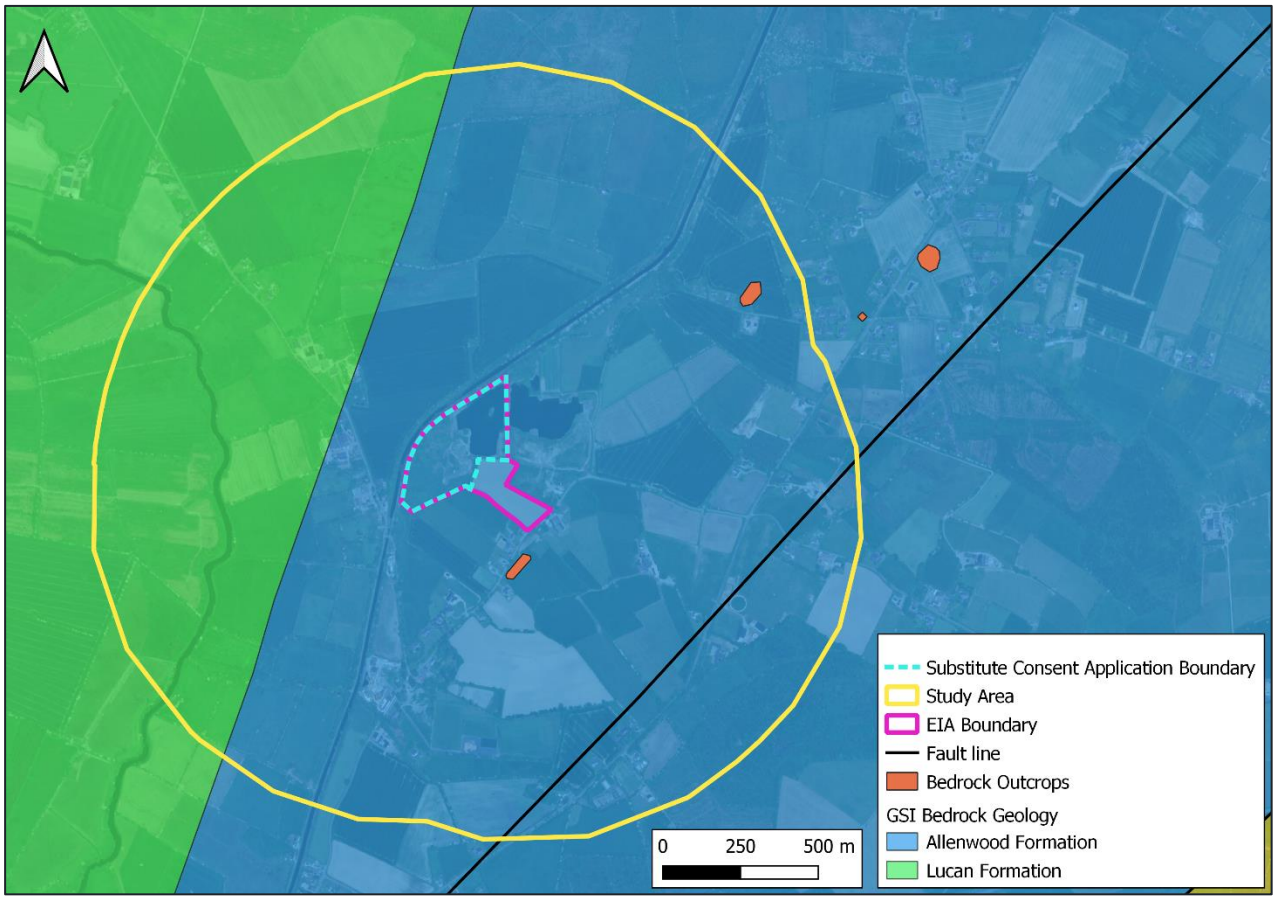

Figure 5-6 - Underlying Bedrock Geology (GSI, 2022) overlain on ESRI Satellite aerial.

5.4.4 Site Investigations

Boreholes logs produced during the installation of groundwater monitoring wells indicate drift (overburden, and sands and gravels) thickness ranges from ca. 6 m (BH4) to the east of the Site, to ca. 11.5 m (BH2) to the northwest of the Site. The sands and gravels of the drift therefore thicken to the west of the Site. A summary of the borehole logs and a figure showing their locations is provided in Chapter 6 (Water).

5.4.5 Geological Assets and Heritage

There are no designated County Geological Sites located within the study area (Parkes and Sheehan-Clarke 2005).

5.4.6 Geohazards

The GSI's landslide susceptibility classification layer (GSI, 2023) indicates that lands within the study area are of 'Low' landslide susceptibility. There have been no previously recorded landslide events within the study area (GSI, 2022).

GSI data indicates that there are no karst features in the area.

It is noted that the risk of instability of soils and/or bedrock which would result in a partial collapse of material can occur in a quarry environment. Further discussion of geotechnical hazards has been provided in Chapter 14 (Major Accidents and Disasters) of this rEIAR.

The Radon Map for Ireland (EPA, 2023) indicates that the Site and study area are located in an area where 1 in 5 homes are estimated to have high radon levels. A High Radon Area is classified by the EPA as any area where it is predicted that 10% or more of homes will exceed the Reference Level of 200 becquerel per cubic metre (Bq/m3). As radon is a naturally occurring gas derived from the decay of uranium in rocks and soils which is geologically controlled, the radon reference level during the assessment period is unlikely to have differed from the current reference level.

5.5 Selection of Sensitive Receptors

Taking account of the above and the receptor classification method described in Section 5.3.1., the receptors carried forward in this assessment and their assigned importance are presented in Table 5-6.

Table 5-6 - Soil, Land and Geology Receptors

Receptor	Importance and Reasoning
Mineral or aggregate reserves	Low (no rarity, ubiquitous across Ireland local importance)
Land (soil/sub-soils) at and immediately adjacent to the Project	Medium (potential permanent loss moderate fertility soils of local importance)*
Human Health (workers during operation)	High (human health receptor)
*Medium is given as a 'worse case' scenario for the permanent loss of soils. Agricultural land has no rarity on a local scale and is ubiquitous across Ireland The importance of change in land use on this attribute is therefore predicted to be Low.	

5.6 Characteristics of the Project

The Project is described in Chapter 2 (Project Description). Characteristics of the Project relevant to this assessment include:

- Stripping of soils, sands and gravels that has occurred primarily within the quarry void space,
- Blasting and mechanical excavation of bedrock,
- Processing of materials to create a commercial product (e.g. crushing and screening of rock to create aggregate),
- Stockpiling overburden within the Application Site, and,
- Use of vehicle, plant and equipment in the quarry operations.

5.7 Potential Effects

The main potential impacts and associated effects that are considered and assessed in the following sections relate to:

- Activities or events that might have impacted land quality or human health (e.g. leaks and spills from machinery or stored substances, or discharges);
- Change of land use/land take (i.e. loss of agricultural lands);
- Loss of superficial deposits and bedrock; and
- Destabilisation and/or subsidence of unconsolidated soils, sub-soils or rock faces.

5.7.1 Land Quality and Human Health

Fuel and other substance leaks or spills from machinery/equipment and vehicles used during Project could have affected the chemistry of the soil/sub-soils (where it was still in-situ) or the health of workers that could come into contact with it.

Publicly available records for the historical operation are limited and there is no record of spills or leaks having occurred on the Application Site. There is considered to be limited potential for leaks given the scale and likely relatively low volume of traffic and plant types in operation at the Site[2] during the assessment period. The Project was a commercial operation and it is therefore assumed that vehicles and plant were serviced and maintained to a suitable standard.

During a number of site walkovers carried out during 2024 there was no visual or olfactory evidence of any. There is also no evidence of spills or leaks observed in the 2024 groundwater monitoring results (see Chapter 6 Water).

Therefore, magnitude of effect to both land and human health is predicted to be Negligible (adverse), and therefore level of effect has been at most, Slight. Therefore, impacts to land

[2] Noting there is no record of the types or numbers of plant or vehicles used in the Project during the quarry operational life. Therefore types and numbers have been assumed based on similar developments from the early to mid 2000s and professional judgement to predict a reasonable 'worse case scenario'. See Chapter 2 (Project Description) for details.

quality and human health from site operations during the assessment period are considered to have been **Not Significant**.

5.7.2 Change of Land Use / Land Take

Extraction of rock during the assessment period created a quarry void of approximately 2.3 ha, which has had a permanent direct impact to the land at the Application Site. This land was previously used for agricultural purposes prior to extraction.

The Kildare CDP 1999 notes that nearly a third of farmers in County Kildare have another gainful activity, which is above the national figure of one quarter. It also notes that the sand and gravel extractive industry is a valuable source of employment for the county, where the quarrying activities do not impact Class A soils, areas of high amenity or the bloodstock industry. Considering these criteria, the Site is a suitable area for quarry development. The Kildare CDP 2005-2011 notes that 'the percentage share of total employment in agriculture in the county has dropped from 7% to 4.16% over 6 years' in the County.

The magnitude of the impact on land use is predicted to be *Medium,* and therefore level of effect has been *Slight*. Impacts to land use from the Project have therefore been **Not Significant**.

5.7.3 Loss of Soils and Mineral or Aggregate Reserves

Topsoil within the EIA boundary was stripped within the extraction area, over an area of approximately 2.3 ha. Some topsoil has been stored on site in stockpiles to the west of the EIA Boundary.

Topographical mapping indicated that overburden was stockpiled onsite. The fate of stripped topsoil is unknown and for the purpose of this assessment a 'worst case' scenario is assumed where this resource is permanently lost. Given soil loss was localised to the extraction area it is predicted that the magnitude of effect on topsoil is therefore Medium (adverse), therefore level of effect has been at most, Slight.

By the nature of quarrying, the sand and gravels and limestone bedrock were extracted from the land[3], which resulted in a direct and irreversible impact on the Application Site. However, the removed material has a medium to high resource potential and was likely used in construction projects. The Site is also located in an area where the sands and gravels and limestone bedrock are abundant. The impact of site operations to sands and gravels and bedrock as an aggregate reserve is therefore *Medium (adverse),* therefore level of effect has been at most, Moderate.

Therefore, impacts to soil, sands and gravels, and bedrock (aggregate reserve) from site operations during the assessment period are considered to have been **Not Significant.**

[3] Estimated to be 108,570 tonnes per year over the 7-year operational life of the quarry (see Chapter 2 Project Description for detail).

5.7.4 Geotechnical Instability

The Site is in an area of low seismic activity and the importance of this attribute is considered to be Low. There have been no known geotechnical incidents, which would include collapse of a wall or surface, recorded over the review period. Therefore, the magnitude of the impact is Negligible.

Therefore, impacts to geotechnical instability from site operations during the assessment period are considered to have been **Not Significant.**

5.8 Remedial Mitigation and Monitoring

There are no effects on the land, soils and geology from the Project that require remedial measures or monitoring.

5.9 Residual Effects

The assessment concludes that the existing Site has not given rise to significant adverse effects on the land, soil or geology at or surrounding the Site during the assessment period of 01 January 2000 to 31 December 2006. In all cases the residual adverse effect is **Not Significant** and not greater than Moderate.

5.10 Cumulative Effects

Assuming other developments in the area have incorporated widely adopted good design, practice and mitigation measures it is considered that there have been no significant cumulative effects of the Project with other similar developments in the locality during the assessment period.

5.11 Difficulties Encountered

Due to the limited publicly available information held for the extraction activities carried out onsite in the early to mid-2000s, assumptions have been made with regards to the operational timeline for extraction and type and volume of material extracted. Assumptions have also been made with regards to the nature and volume of plant uses for extraction and stockpiling activities. The rationale for these assumptions is set out in Chapter 2 (Project Description), and where relevant, within this chapter.

5.12 References

Aggregate Potential Mapping online map viewer (GSI, 2016) [Accessed: February 2025]

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