

REPORT**rEIAR - Non-Technical Summary***Laurence Behan*

Submitted to:

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NON-TECHNICAL SUMMARY

1.0 INTRODUCTION

Golder Associates Ireland Ltd (Golder) have been commissioned to prepare this Remedial Environmental Impact Assessment Report (rEIAR) to accompany a substitute consent application for consent for an existing quarry over approximately 28.8 hectares (ha.) at Windmillhill, Rathcoole, Co. Dublin. This rEIAR is submitted on the instruction of Mr. Laurence Behan, owner and operator of this quarry who will be the Applicant for substitute consent.

It is noted that this rEIAR has been prepared in tandem with an EIAR to accompany an application under Section 37L of the Planning and Development Act, 2000 as amended, for further development of the existing quarry as a quarry by the same Applicant.

This document is a Non-Technical Summary (NTS) of the rEIAR, and its purpose is to describe the Development and provide a summary in non-technical language of the key findings of the rEIAR submitted to An Bord Pleanála (ABP) in support of the substitute consent application.

The quarry, the intended subject of application for substitute consent, lies at the centre of a contiguous, established landholding of approximately 73 ha. That landholding is centred on the townland of Windmillhill and covers much of that townland area, with minor portions of the landownership extending north-westerly into the townland of Steelstown and south-easterly into the townland of Carrigeen.

The centre of the landholding has been the subject of historic, current and intended future extraction of rock, and is roughly rectangular in shape with its long axis orientated parallel to the N7/M7 (Naas Road). The southern boundary is delineated by the local Windmillhill Road (L6065), and the western and eastern boundaries of this area by the Windmillhill townland boundaries. This area extends to approximately 46.14 ha. and constitutes the EIA project boundary for this quarry.

The lands the subject of this rEIAR (the subject lands) at approximately 46.14 ha. entirely encompass the substitute consent application area of approximately 28.8 ha, (Figure 1). The reserve at this quarry is greywacke rock, overlain by boulder clay, currently worked to an average depth of 173 mAOD. The reserve is excavated by blasting, and subsequently crushed and screened by mobile plant on the quarry floor. Crushed and screened aggregate is transported to a centrally located existing administration and processing plant area over approximately 5 ha. that holds further processing plant (washing, screening, grading, bagging), an asphalt production plant and concrete plant. This plant and processing area is an established part of the quarry area and has also been formerly used for the recovery of inert construction and demolition (C&D) waste.

To note, a remedial Stage 1 Screening Report for Appropriate Assessment (AA) has been submitted to accompany this substitute consent application. This assesses the potential effects which may have occurred on Natura 2000 sites and associated qualifying species as a result of the Development.

A review of historic aerial photography and information supplied from the Ordnance Survey of Ireland has been used by the various technical disciplines in the compilation of this rEIAR. Figure 2 below displays the 1991 aerial for the subject Site overlayed on 1994 aerial. For comparison the 2020 aerial of the lands has been provided in Figure 3.

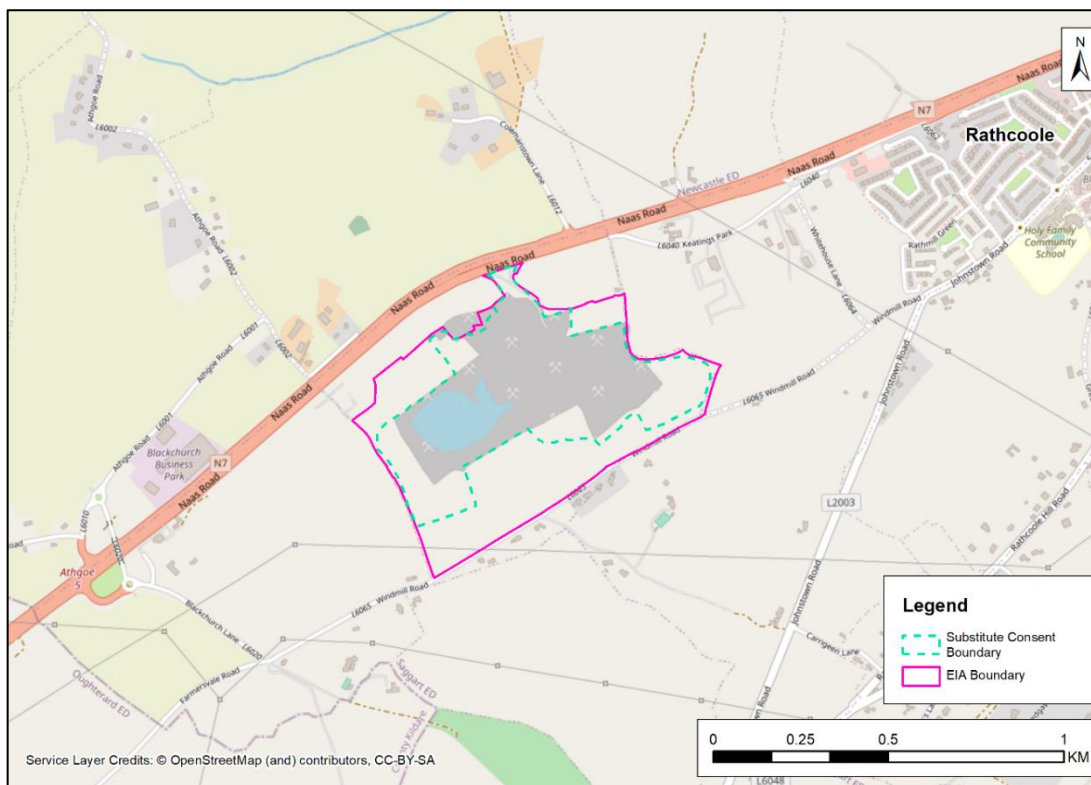


Figure 1: Location, Substitute Consent Application Boundary and the EIA Boundary of the Development.

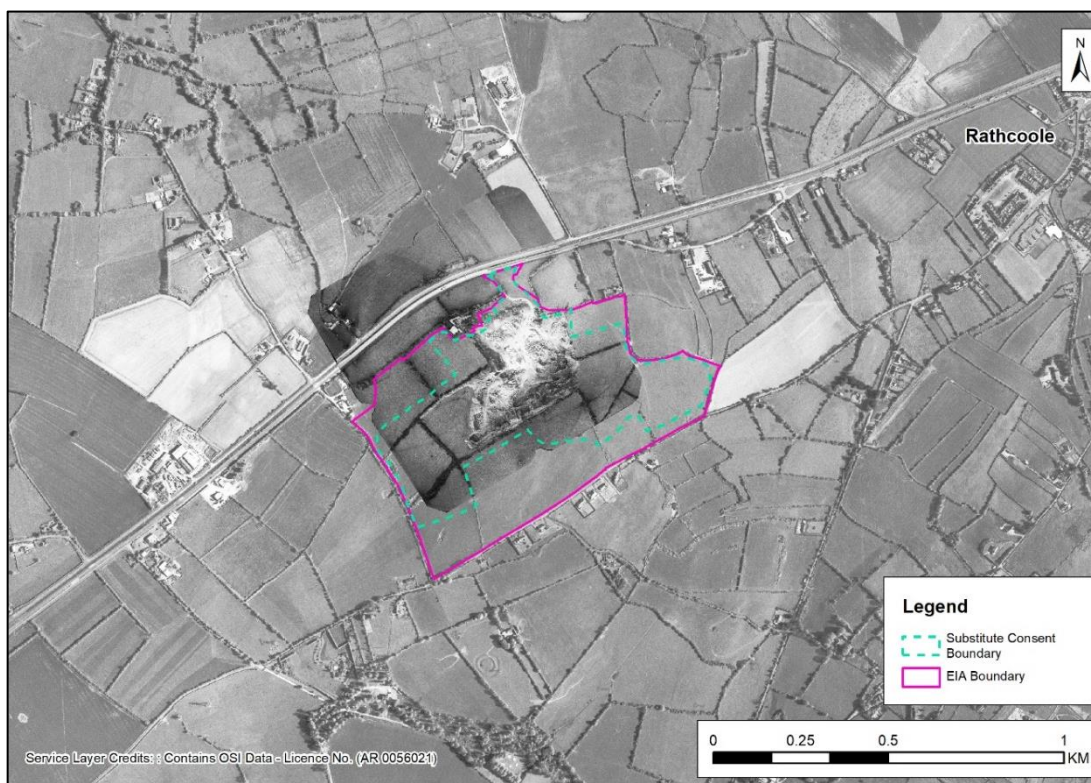


Figure 2: 1991 aerial overlay on 1994 aerial, Substitute Consent Application Boundary and the EIA Boundary of the Development.

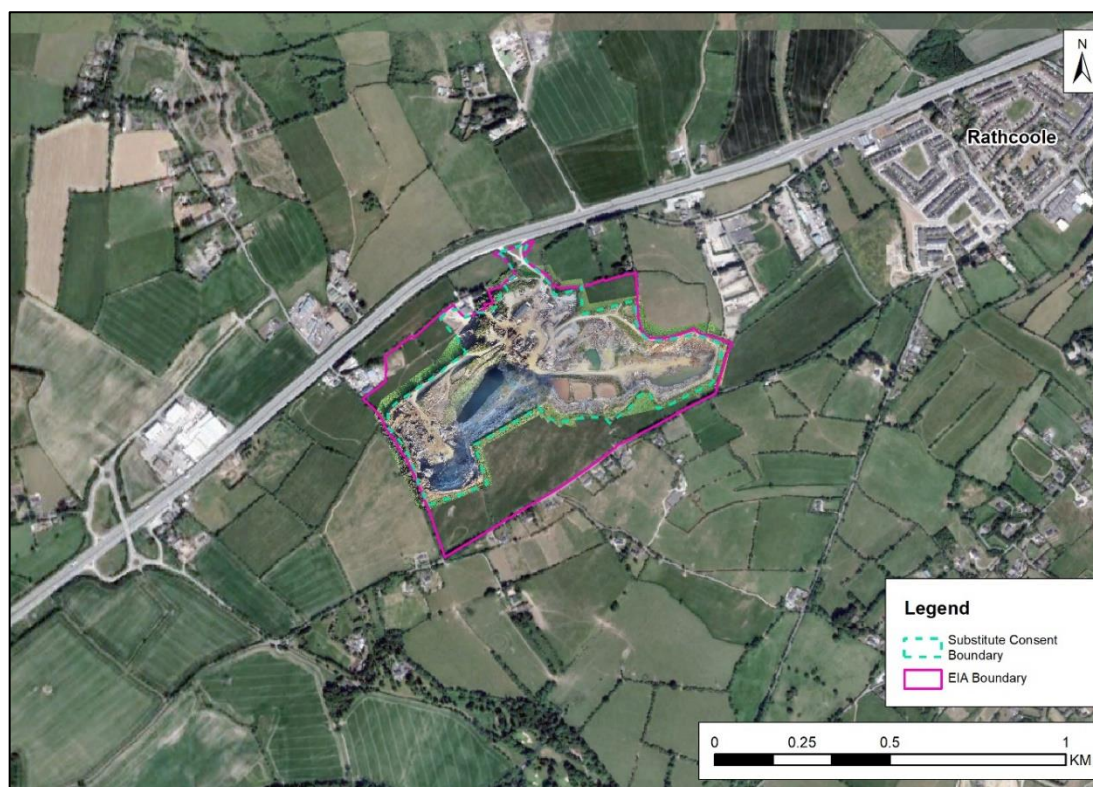


Figure 3: 2020 drone aerial overlaid on google map aerial, Substitute Consent Application Boundary and the EIA Boundary of the Development.

1.1 EIA Scope and Methodology

Environmental Impact Assessment (EIA) is a process used to predict the adverse and beneficial impacts of a proposed development. It provides a means of drawing together the findings from a systematic analysis of the likely significant environmental effects of a scheme to assist planning authorities, statutory consultees and other key stakeholders in their understanding of the impacts arising from a development.

Certain proposed developments, due to their type, and scale automatically attract the requirement for EIA by a competent authority as part of that authority's formal assessment of the development proposal when that proposal seeks permission, consent or licensing. As set out in the next section, a hierarchical suite of European and national legislation and guidance govern EIA and direct EIAR content.

Remedial EIA and rEIAR arise where retrospective consent for development that ought to have attracted the requirement for EIA has been undertaken. The consent for that type of development is substitute consent, itself the subject of dedicated legislative provision that in the first instance only allows the seeking of substitute consent after the granting of leave to make such an application or upon direction notice from an authority.

In this instance, the substitute application that this rEIAR accompanies is by Order of the High Court [2018 No. 929 JR] of August 2020, that set aside a previous substitute consent application decision (ref. PL06.SU0068) granting relief including:

"...that a fresh application for substitute consent submitted by the Applicant to the Respondent pursuant to the Record of Executive Business and Managers Order of South Dublin County Council dated 9th August 2012 in respect of the determination made and notice issued under section 261A(2)(a), 261A(3)(a) and 261A(7) of the Planning and Development Act, 2000 as amended in relation to the quarry at Windmill Hill Rathcoole county Dublin..."

Legislation requires that an EIA be carried out for certain classes of project or development. The Development was screened against the Schedule 5 (Developments for the purposes of Part 10) threshold criteria for EIAs in the Planning and Development Regulations (2001, as amended), and was found to exceed the EIA threshold for an extractive industries development which proposes the '*Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares*'.

Each technical environmental topic necessarily has separate legislative, policy and best practice requirements, however, the assessments have applied the same overall standard approach. These include:

- Confirming the relevant legislative and policy context;
- Determining the applicable study area for that discipline;
- Establishing the baseline conditions for that discipline (February 1990);
- Identifying potential receptors and their importance;
- Identifying potential sources of impact (change) to the receptors due to the Development;
- Applying a risk-based assessment methodology to evaluate the level of significance of environment effects resulting from each of the identified impacts;
- Where applicable, propose measures to avoid, reduce or remedy undesirable potential impacts, as appropriate, and thereby reduce the level of significance of each potential effect; and
- Conducting a final assessment of residual environmental effects, factoring in the measures and compensation strategies.

The rEIAR was prepared by appropriately qualified and competent consultants as required by the EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU). Further technical details concerning the scope and methodology of the rEIAR have been provided in Chapter 2 of the rEIAR.

The structure of the main rEIAR document is laid out as follows:

- Chapter 1 – Introduction, Scope and Methodology;
- Chapter 2 – Project Description;
- Chapter 3 – Population and Human Health;
- Chapter 4 – Ecology and Biodiversity;
- Chapter 5 – Land, Soils and Geology;
- Chapter 6 – Water;
- Chapter 7 – Air Quality and Climate;
- Chapter 8 – Noise and Vibration;
- Chapter 9 – Cultural Heritage;
- Chapter 10 – Landscape and Visual;
- Chapter 11 – Traffic;
- Chapter 12 – Material Assets; and
- Chapter 13 – Interactions.

1.2 The Need for the Development and Consideration of Alternatives

The greywacke rock reserve at the subject location is of proven quality, capable of being used to produce aggregate for construction purposes and asphalt products.

As with all aggregate extraction development the nearer the supply of aggregate to the market, the more economically viable it is and given the nature of aggregate deposits, quarries can only be worked where these occur. Aligned to this economic situation is the environmental and social preferability of locally sourced aggregates. Aggregates sourced close to their market is preferable to that sourced at more remote locations as it lessens road traffic and associated environmental impacts and economic costs. Socially, the local sourcing of construction aggregate strengthens the local economy through job provision and associated spending, and exploits advantages and opportunities inherent in local supply chains.

Aggregates are an essential material for the construction industry and are used in all major development plans (including housing, road surfacing, infrastructure etc.). As such, they are of major significance to the overall growth of their local areas and the country, and an important economic resource despite fluctuations in levels of construction due to wider economic forces, or the Covid-19 pandemic suspension of construction in place at the time of writing this rEIAR.

The purpose of this rEIAR is to assess the Site with regard to experienced / potential impacts on the environment, and to recount / propose measures to avoid, reduce or remedy undesirable potential impacts, as appropriate.

In this case, the quarry site represents the sole land asset upon which the developer's companies and employees rely. The developer has a personal intergenerational association with the lands and is a quarry operator and employer who wishes to maintain this asset. The continued quarry use and sustainable further development is contingent on further planning permission to secure future reserves, especially as the substitute consent process is restricted to extant development. The reader is minded that a concurrent application with an EIAR is to be submitted for a lateral expansion of the existing quarry in order to recover additional reserves.

Maintaining the quarry site and adjacent suitable lands as a viable quarry, with associated processing facilities, will ultimately realise the extraction potential of this established quarry, and will maintain the direct and indirect jobs which have only lately returned to pre-recession levels.

1.2.1 Site Selection

In this instance, the rEIAR has arisen as a direct requirement of an application for leave for substitute consent. In other words, the subject site is not a proposed site but rather an existing extraction and processing site. In view of the retrospective nature of the substitute consent process we cannot point to a site selection methodology employed in choosing the subject site. As such, site selection is outside the control of the developer having originated from their inheritance of the extant quarry land in the 1960s and the expansion of same to today.

The existence of the established quarry and associated processing area suggests that the persistent, continuous use of the subject lands for a quarry was more feasible, in environmental and economic impact terms, than developing a new greenfield quarry.

1.2.2 Alternative Designs Considered at the Subject Site

In common with the site selection methodology, alternative design proposals are precluded due to the retrospective nature of the rEIAR. A review of historic aerial photography and information supplied by the developer suggests that the subject lands were extracted from their centre since the 1960s, roughly emanating where the established plant and processing area occurs in a westerly and then easterly direction. It can be seen from late 2020 topological survey data that extraction was by two benches, to an average depth of

173 mAOD. It is assumed that the direction of extraction workings was dictated by the extent of the landholding and the direction of the deposit itself. As such, the subject site now has an established form and layout, and the sole proposal contained within this rEIAR is a concept restoration of this area to have regard to EIA requirement for mitigation of foreseeable impacts.

2.0 PROJECT DESCRIPTION

2.1 Development Description

The subject lands have been used for quarrying since ca. 1710 and first obtained planning permission for rock extraction in 1968. As such, the quarry and associated uses are an established feature of the landscape and the main feature of the EIA project lands.

The extracted area extends to 28.8 ha. and occupies the centre of the EIA project unit. The quarry has a roughly oblong shape with a west-east axis of approximately 800 m, and a north-south axis of approximately 340 m.

The current average working depth of the quarry is approximately 173 mAOD. The reserve consists of greywacke (sandstone) and is extracted by blasting and mechanical means. The excavated material is crushed and screened on the quarry floor by mobile plant and transported to the central processing area for washing and grading.

The N7/M7 national primary road lies immediately north of the lands and the site is accessed from this road which was first upgraded in the 1960s commensurate with the first planning permission for quarrying stone on the lands.

The quarry is accessed at a single location from the N7/M7 and holds a centrally located existing administration and processing plant area over approximately 5 ha. that currently holds 2 no. office buildings, 4 no. portacabins, 4 no. containers, 2 no. storage / maintenance sheds, a storage / drying shed, water recycling unit and silt press, an asphalt plant, a concrete plant and washing, crushing, screening and bagging plant. Also, within this plant and administration area are 2 no. weighbridges, 4 no. wheel washes, fuel storage and refuelling area, 1 no. operations water well and sewage holding tank. The concrete plant and the storage / drying shed have been erected within the last three years and will be the subject of a separate planning application process.

2.2 Major Accidents and Disasters

The EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU), requires that an assessment is made of *'the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned'*.

The consideration of major accidents and disasters seeks to assess the relevant accidents and disasters which a Development is vulnerable to, and the relevant accidents and disasters that a Development could give rise to. These unforeseen and unplanned events are to be assessed on the risk of their occurrence, however in view of the retrospective nature of this rEIAR the scope of this section is limited to a rudimentary review of previous operations at the Site.

Potential risks of major accidents and / or disasters which are inherent to quarrying operations include;

- Fire / explosion;
- Unplanned outages or disruption to services;
- Road traffic accidents resulting from Heavy Good Vehicle (HGV) movements;
- Contamination of the groundwater/ surface water;
- Flooding; and

- Falling debris or the collapse of benches or quarry faces.

During the assessment period of 1990 to the present day, activities at the Site have not resulted in accidents or disasters which are deemed to be 'Major', therefore there has been an imperceptible effect (including no effect) of the Site activities on the surrounding environment in regard to major accidents and disasters.

3.0 POPULATION AND HUMAN HEALTH

The population and human health assessment describes the human environment and identifies and assesses any construction and operational related impacts from the activities at the Site. The human environment and potential impacts on the 'quality of life' as a consequence of the Development's operation during the assessment period of 1990 to 2021 have been discussed under the following headings:

- Populations;
- Employment;
- Amenity;
- Land-use;
- Human health; and
- Health and safety.

Impact Assessment and Mitigation Measures

An assessment of residential receptors during the assessment period has been made in relation to a 500 m EIA boundary offset. A total of 39 No. existing third-party residential dwellings are found to be currently within 500 m of the Site boundary, of these 16 No. receptors are located within 250 m of the Site boundary. The number of residences is based on a field survey, a review of aerial photography during the assessment period, DCCAE Eircode mapping and a local authority planning permission search. In comparison to the 1991/1994 aerial, 34 No. third-party residential dwellings were found to be within 500 m of the Site boundary. Over the study period there have been 5 residential receptors developed in the area surrounding the Site. Three properties owned by the Applicant and located within their land holding have also been identified.

Potential impacts to human health from effects of the Development to water surrounding the Site include discharges to the underlying groundwater. This could result in a change in water quality depending on the activities that are undertaken. There is the potential for impacted underlying groundwater to migrate to local groundwater wells and effect the users of such water supplies.

The potential associated health impacts were assessed via the biophysical factors of air, water, and noise and vibration by the appropriate chapters in the rEiAR.

Potential impacts to human health from the air include dust generating activities on the Site and increase in concentrations of airborne particles, emissions from the asphalt plant, nitrogen dioxide due to exhaust emissions from diesel powered vehicles and equipment used on site, and vehicles accessing the Site.

Impacts to human health from excess noise and vibration on site may result in; hearing loss and various vibration syndromes of workers from high level occupational exposure; and also annoyance and effects on mental health in the surrounding residential receptors.

The Development also had the potential to impact on local businesses, rural enterprise and amenities surrounding the Site.

The various assessments undertaken indicated that there were no significant adverse effects on the human environment, amenity and health as a result of the operational Development during the assessment period. Some small positive economic factors were identified during this period through the creation of local employment both directly and indirectly.

4.0 ECOLOGY AND BIODIVERSITY

Study Area and Scope

The ecology and biodiversity chapter considers the effect of the Project on ecology and biodiversity between 1990 and the present day (2021).

In order to establish what species and habitats may occur at the Site a study area was defined. The study area for ecology and biodiversity includes all habitats, including the built form, as the Site expanded between 1990 and the present day. Historical mapping, anecdotal evidence and habitat assessment of neighbouring lands have all been used to predict the Site conditions between 1990 and Spring 2021. In any retrospective assessment uncertainty may be a feature. As such, a conservative approach has been adopted to recognise impacts and the remedial mitigation strategy presented is also weighted in favour of a conservative scenario of mitigation hierarchy adoption. It should be noted that the scale of the development footprint i.e., land take was ca. 10.1 ha in 1990 compared with ca. 28.8 ha in 2020.

Method and Guidance

Baseline ecological surveys within the Study Area have occurred since 2015 and are on-going during 2021. Good practice survey methods have been used throughout this work as described in Chapter 5 of the rEIAR.

The impact assessment methodology used is as defined within the second edition of the Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Managers (CIEEM), 2018). In accordance with CIEEM guidance (2018), the value of habitats and species has been measured against published selection criteria defined by the CIEEM (2018), where available

Existing Baseline Conditions

International Designations (Natura 2000 sites)

There are six Natura 2000 sites located within 15 km of the Site as listed below:

- Red Bog, Kildare SAC – (c. 7.5 km south of the Site);
- Poulaphouca Reservoir SPA – (c. 10 km south of the Site);
- Wicklow Mountains SAC (c. 12 km south east of the Site);
- Wicklow Mountains SPA (c. 12 km south east of the Site);
- Glensamole Valley SAC (c. 7.5 km east of the Site); and
- Rye Water Carton SAC (c. 10 km north of the Site).

National Designations (NHAs) and pNHA

No Natural Heritage Areas (NHAs) were identified within 5 km of the Site. However, three proposed NHAs (pNHAs) were identified.

- Killeel Wood pNHA (c. 4 km South of the Site);
- Slade of Saggart And Crooksling Glen (c. 3 km south-east of the Site); and
- Grand canal (c. 4 km north-west of the Site).

Habitats

During 1990 habitats outside of the quarry footprint were dominated by improved agricultural grassland (GA1 - Fossitt (2000)). Discrete areas of scrub, arable, hedgerow and semi-natural woodland were also recorded in the broader Site and all of these habitats would have been residually affected between 1990 and 2021. The cumulative total of habitat loss amounts to ca. 18 ha.

Retrospective Fauna Assessment

Walkover surveys and camera trapping were carried out to identify mammal species likely to have utilised the Site. Badger, rabbit and fox were all recorded on Site. A possible badger sett was also recorded within the Site at this may have been in-situ for some years. Some limited potential for roosting bats was recorded. It is also possible that bats used the Site to forage and commute.

The Site periphery, including boundary features are likely to be used by general passerine and farmland bird species using the hedgerows surrounding the Site for nesting and foraging. It is possible that Site operations have created habitat for some bird species, such as Jackdaws who frequently nest in crevices on exposed rock faces.

In addition, a Peregrine Falcon (*Falco peregrinus*) is known to make use of the quarry faces that would have otherwise not existed at the Site. The peregrine has used the Site for some years and the Site disturbance does not appear to have affected the species. There are no water courses running through the Site or directly adjacent to it. Ordnance Survey maps show that the nearest stream lies to the east and drains into the Griffeen River, which itself joins the River Liffey in the centre of Lucan village. The Tootenhill Stream flows in a north-easterly direction about 0.75 km to the east of the Site. Areas of open pooled water are noted on the quarry floor, and the absence of aquatic or marginal plants indicates that there is little or no residual biodiversity value in these features.

Potential Effects

Given the nature of the retrospective assessment, the operational impacts are summarised below:

- Land take (permanent loss) ca. 18 ha;
- Habitat modification through anthropogenic effects;
- Disturbance to habitats and species through noise from traffic and blasting;
- Individual species disturbance / mortality; and
- Impacts of dust as a result of historic extraction activities.

Potential direct and indirect impacts from water quality and quantity are as follows:

- Local (Site based) Impacts of dust and Site runoff (sediments, fuel, etc.) as a result of quarrying activities; and
- Impacts on surface water quality within the Site.

Mitigation and Management

Good practice management of plant and machinery will continue to be adopted to avoid pollution on Site. All retained habitats on Site will be suitably protected and habitat creation will occur at the Site to address tree and hedgerow loss on a 'like for like' basis. A concept restoration plan for the Site will be implemented which will detail all of the planting and habitat creation committed as part of the Project.

Bat activity surveys will be undertaken, and monitoring of the possible badger sett will also occur. A breeding bird (including Peregrine Falcon) survey has been commenced. The result of this work will form the basis of a

Peregrine Falcon management and monitoring plan for the Site. To increase opportunities of roosting bats and nesting birds, a number of bat and bird boxes will be incorporated in the restoration plan for the Site, placed on trees of a suitable size. In addition, to increase opportunities for invertebrates within the Site, invertebrate boxes will be provided under the restoration plan. These boxes will be located in sheltered areas of new and retained vegetation, in association with hedgerows.

Residual Effects

Residual effects have been considered to be effects that were identified in the impact assessment process prior to the consideration of any additional mitigation, as full details of some of the additional mitigation are yet to be developed. These effects were all identified as being not significant to minor afforded to species of Site and Local (higher and lower) importance in the period 1990 to 2021. In essence, the favourable conservation status of species and habitats on Site between 1990 and 2021 has not been adversely compromised. The on-going operation of the quarry, committed delivery of mitigation measures and eventual restoration of the quarry is likely to result in all effects being considered to be not significant. In essence, this can be described as having no perceivable impacts on ecological features (habitat or species). Impacts may be beneath levels of perception, within normal bounds of variation. Depending on the efficacy of the restoration proposals at eventual closure of the Site, there may be an opportunity to provide a minor positive (net gain) for biodiversity value at the Site level.

5.0 LAND, SOILS AND GEOLOGY

This assessment considers and assesses any potential impacts resulting from quarrying related activities that have been carried out at the Site on the surrounding land, soils and geology.

Baseline Conditions

The Site comprises lands which are currently used for quarrying activities.

Three main land uses have been identified within the Site and the study area (500 m from the EIA boundary); these are agricultural and single-house residential lands, the N7/M7 road network and the quarry site. The lands to the north, west, south and east can be characterised as rural in nature, with land uses in the area being agricultural and single-house residential. Dry cattle, sheep rearing and grazing of horses are the main activities in the area, with further arable activities to the south-west. Between the period 1990 and 2021 the N7/M7 road and agricultural and single-house residential land use has remained unchanged. Some additional housing has been accommodated in the landscape during this period, but the overall land use remains unchanged.

Corine landcover classification (EPA, 2018) classifies the area the same as the adjacent N7/M7 road classification, that of 'Road and Rail Network', however the area of land should be classified as 'Mineral Extraction Sites' which is typical of such rock quarries. The lands to the south, east and west are defined as 'Agricultural Areas' and 'Pastures'.

There are no soils remaining in-situ in the existing extraction area due to historical extraction activities onsite. The plant area is composed of Made Ground (e.g. concrete pads, hard standing and concrete foundation areas for the plant area) overlying natural ground (soils). The northern, southern and western parts of the Site containing agricultural fields are underlain by natural ground.

The Irish Soil Information System layer (EPA, 2021) indicates that soils on the Site were once compositionally uniform across much of the EIA study area, prior to extraction activities. Superficial deposits were comprised of a clayey drift with siliceous stones.

Subsoils are mapped by the EPA (2021) as being sandstone and shale tills which have a clayey texture and are derived from Lower Paleozoic parent material around the northern perimeter of the Site and underlying the majority of the wider study area. The majority of subsoils underlying the quarry area have been identified on

the EPA's mapping portal (2021) as bedrock which is at surface, this extends into the south, west and east of the study area.

Four groundwater monitoring wells installed in March 2020, recorded a very thin soil cover (ca. 0.5 – 1 m thick) overlying a layer of weathered/fractured greywacke which became more competent with depth.

The Site is underlain by the Carrighill Formation of Silurian calcareous greywacke, siltstone and shale. The floor of the quarry area in 1990 was ca. 158 mAOD. The current visible floor of the existing quarry is at ca. 150 mAOD. The extraction area has expanded from an initial 10.1 ha in ca. 1991, to the current 28.8 ha.

Between the period 1990 and 2020, ca. 17,500,000 tonnes of rock have been extracted with an average of ca. 500,000 tonnes extracted per year, however, in reality annual extraction rates varied throughout the period based on economic demand. A notable high occurred during the Celtic Tiger years (2007 – 2009) with an annual extraction rate of ca. 1,000,000 tonnes per year. In contrast, 2010 saw annual extraction slump to ca. 50,000 tonnes. A further slump occurred in 2011 and 2012 with annual extraction rates of ca. 10,000 tonnes per year.

A review of available aerial photography indicates that the Site was the only extraction operation within the study area and no other designated geological assets or heritage sites were identified within the study area.

A review of the GSI's landslide susceptibility classification layer (GSI, 2021) indicates that the majority of the Site area has a classification of Moderately Low to High susceptibility.

The Radon Map for Ireland (EPA, 2021) indicates that the Site and study area are located in an area where between 1% and 5% of homes are estimated to be above the radon reference level.

Impact Assessment and Mitigation Measures

Four main sensitive receptors were identified in the impact assessment for the Site: superficial deposits (soil/subsoils), bedrock geology, land (agricultural land) and human health. These are classified as of negligible, medium, negligible and high sensitivity respectively.

The main potential impacts and associated effects considered were as follows:

- Activities or events that might have impacted land quality (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;

A review of water quality during the assessment period (refer to Chapter 6) indicates that groundwater quality is generally good.

The nature of the development involved the removal and storage of superficial deposits. The impact on these can be considered temporary in nature, as they are stored for reuse as a fundamental part of the Site's restoration. The superficial deposits were generally very thin (ca. 0.5 – 1 m) and of low value locally. By the nature of quarrying the underlying deposit of rock has been removed which has resulted in a direct and irreversible impact on the Site. The valuable resource has been used in construction projects, including the N7/M7 road network during the assessment period.

A geotechnical appraisal of the Site undertaken in 2021 identified potential geohazards associated with the excavation areas and the silt lagoons. The report recommended the emplacement of catch-berms in sections

of the quarry where faces are structurally complex. The silt lagoons also require attention to avoid possible weakening.

Remedial mitigation measures shall include:

- Toe protection (catch-berms) are required to be put in place along the bottoms of the majority of non-active/production faces. Non-active/production faces should have their access blocked off with berms/bunds and relevant warning signage;
- Recommendations in geotechnical appraisals shall be implemented accordingly; and
- Geotechnical appraisals shall be carried out at the appropriate frequency identified in the Health and Safety Authority's, 2008, 'Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations', or as identified in current appraisals.

The assessment concludes that the existing Development has not given rise to significant adverse effects on the land, soil or geology at or surrounding the Site during the assessment period of 1990 to 2021. In all cases the residual adverse effect is Not Significant and not greater than Moderate.

6.0 WATER

Water enters the Site through direct rainfall precipitation and via the movement of groundwater through the subsurface which predominantly flows from southeast to northwest, coincident with local topography. In the excavated areas of the Site in the eastern and western areas, water is present in the lowest elevations of the pits. The excavations on the Site intersect the groundwater table and therefore ponds are considered to be a mix of both groundwater and rainfall. Once present in the pit, this water mass is subject to evaporation and also provides some recharge to the underlying bedrock. Rainfall on other areas of the Site predominantly infiltrates the ground where it is subject to evapotranspiration or becomes recharge to groundwater.

Bedrock underlying the Site is classified as unproductive. Flow in the bedrock is likely to be predominantly confined to bedding planes, faults and fractures due to the fine-grained, low porosity nature of the bedrock. Connectivity of fracture sets within the bedrock is expected to be low, with limited lateral connectivity (tens of metre from the Site), and limited connectivity of groundwater with off-site receptors (such as adjacent domestic water supplies). There may be zones of increased hydraulic conductivity in the unexcavated upper weathered zones (or shallow zones subject to blasting) which can allow for rapid infiltration of rainwater. This hydraulic conductivity decreases with depth as weathering of the rock reduces. Pumping at the Site is shown to cause drawdown localised to the quarried areas, with limited impact observed in the surrounding natural ground.

Groundwater quality within the central areas may be impacted due to activities at the Site, however quality results for boreholes located at the Site perimeter are generally good and further prove the dysconnectivity of the Site with surrounding receptors. Some exceedances of drinking water standards were noted, most frequently naturally occurring metals such as arsenic and some sporadic exceedances of hydrocarbons and total coliforms, which are interpreted to be derived from off-site sources. Bottled water is used as drinking water on-site.

There are no watercourses which pass through the Site boundary. Local surface water features are predominantly fed by rainfall runoff from higher topographical areas which collect in natural gullies and form headwaters for tributaries to larger streams and rivers. The topography of the Site and the surrounding area means that surface water runoff from the Site (e.g. in the event of flooding from the Site) could eventually reach the N7/M7 or contribute to the River Griffeen, however assessment shows that there is sufficient attenuation capacity within the quarried areas to allow capture of rainfall under extreme storm events.

As part of the water management system on the site, water abstracted from the western quarry pit is discharged following periods of prolonged rainfall to a culvert located on the northern portion of the Site adjacent to the N7/M7. Water from this culvert is discharged into the roadway drainage system. It is unknown where the water in the roadway drainage system flows to from this point and may discharge to a tributary of the River Griffeen near Rathcoole. The water quality of the River Griffeen is generally shown to be good, with no exceedances of environmental quality standards and no effects identified regarding the potential discharge of pumped water via the N7/M7 roadway drainage system.

Impact Assessment and Mitigation Measures

Three main sensitive receptors were identified in the impact assessment for the Site: groundwater (quality and level), surface water (quality) and floodplain areas associated with discharge to the River Griffeen. These are classified as being of negligible, medium and low sensitivity respectively.

No pathway was identified between the Site and Natura 2000 designated sites as these are located at distances exceeding 8 km from the Site and not in hydraulic connectivity with the Site. Equally, there is no pathway between the Site and human health receptors (both on-site employees and off-site residential receptors).

Mitigation through embedded design and remedial measures determines that the existing Development has not given rise to significant adverse effects on the water environment at or surrounding the Site during the review period of 1990 to 2021. In all cases the residual adverse effect is not significant and not greater than slight.

7.0 AIR QUALITY AND CLIMATE

This assessment considered the potential air quality and climate effects associated with the historic operation of the Site. The effects have been assessed in the context of relevant national, regional and local air quality policies.

A qualitative assessment of dust impacts from the quarrying activities has been undertaken in line with Institute of Air Quality Management (IAQM); Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016.

A traffic screening and quantitative operational phase assessment of effects from road traffic emissions has been undertaken in accordance with the Environmental Protection UK/Institute of Air Quality Management guidance document 'Land –Use Planning & Development Control: Planning for Air Quality' (EPUK/IAQM 2017). Detailed dispersion modelling using ADMS-Roads has been undertaken to determine the effect of the Development on traffic derived pollutants, nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}), at nearby sensitive receptors.

An assessment of combustion emissions from the on-Site asphalt manufacturing plant has been undertaken using the latest version (Version 5.2.2) of CERC ADMS5 dispersion modelling software, to predict concentrations of NO_x, NO₂, SO₂, PM₁₀ and PM_{2.5} at identified sensitive receptors.

Impact Assessment and Mitigation Measures

The background air quality has been classified using Site monitoring data for dust gathered between both 2007 and 2015, and 2020 and 2021, and EPA monitoring data for NO₂, NO_x, SO₂, PM₁₀ and PM_{2.5}. Climate data for the area has been obtained from the Met Éireann station at Casement Aerodrome, Baldonnell, Co. Dublin, ca. 5.5 km northeast of the Site, and has been used to inform the assessment.

This assessment has considered the potential emissions to air and impacts on receptors from particulates, traffic emissions and combustion emissions from each source. As these activities will be undertaken at the same time, there is a need to consider the potential combined/ cumulative impacts of these. The assessment of impacts demonstrates that there will have been an impact on Air Quality during the historic operation of the Site, but the impact will have been slight or less. Due to the conservative nature of the assessment which has been

undertaken it is likely that the impacts will have been negligible to slight. Therefore, the historic operation of the Site is considered to be Not Significant in terms of Air Quality.

The Behan's Development is not considered to be of a sufficient scale to have had the potential to impact the regional or local climate in any significant manner. In addition, the operation of plant and traffic movements at the Site are estimated to have generated less than 11.39 kt CO₂e (carbon dioxide equivalent) per annum, equalling approximately 342 kt CO₂e over the 30- year assessment period. The Application Site has not had any significant effects on local prevailing weather conditions, nor has the Development increased the potential of flooding in the surrounding area. Therefore, the historical impacts on climate and climate change are considered to be Not Significant.

8.0 NOISE AND VIBRATION

This assessment considers historical noise and vibration impacts from the quarry as it was in 1990 up to current operations in 2021.

Noise monitoring was undertaken by the quarry from 2007, excluding a pause from 2016 to 2019. The noise environment at the closest Noise Sensitive Receptors (NSRs) to the quarry was noted to be dominated by road traffic noise from the N7/M7 dual carriageway at the time of the most recent noise survey. Operational noise from the quarry was only sporadically audible at the monitoring position and was inaudible at properties to the north, east and west of the quarry.

Operational noise from the quarry has been predicted for four historical operational scenarios, 1990 / 1991 daytime and night-time operations, and 2020 / 2021 daytime and night-time operations. All modelled scenarios followed a highly conservative approach to determine the likely 'worst-case' noise levels at NSRs. Despite this approach the predicted historical noise levels are well within the daytime and night-time levels recommended by the EPA Environmental Management Guidelines – Environmental Management in Extractive Industry. The one exception was an exceedance at the applicant-owned property NSR8, occurring in Scenario 2 – baseline 1990 night-time operations. Any significant noise effects under this scenario would likely have been of short duration as the topography of the quarry changed substantially post-1991, resulting in much greater topographic screening by the operational face. Predicted operational noise levels at NSR8 in Scenario 4 – current night-time operations meet the noise limits. Predicted noise levels from quarry operations for all modelled scenarios have been found to be 'not significant'.

Vibration monitoring undertaken throughout 2019 and 2020 at the eastern and western boundary of the quarry resulted in no exceedances in the specified vibration limits. The probability of adverse comments due to blasting activities was low, and measured air overpressure levels were substantially lower than the levels which would see structural damage to windows.

No significant noise or vibration impacts have been identified throughout the operation of the quarry from 1990 to 2021.

9.0 CULTURAL HERITAGE

This chapter presents a retrospective assessment of the potential effects that may have occurred, and may continue to occur, on cultural heritage as a result of the Development during the operation phase (i.e., between 1990 and 2021). The term 'cultural heritage' is used collectively to refer to all assets of archaeological, architectural and historical or cultural value. The assessment includes a detailed baseline study to establish the existing conditions, and an effects analysis and retrospective impact assessment that considers both direct effects (e.g., physical disturbance) and indirect effects (e.g., changes to setting due to dust and visual changes). The assessment of indirect effects is informed by the results of other assessments, including air quality, noise and vibration, and landscape and visual. Where relevant, mitigation measures that were implemented to avoid or reduce impacts are described, and any remedial measures that could be taken are recommended.

In lieu of specific guidance from the Institute of Archaeologists of Ireland (IAI), the impact assessment conforms to the guidelines set out by the Chartered Institute for Archaeologists (CIfA, 2020a¹; 2020b²).

Impact Assessment and Mitigation Measures

There are five known cultural heritage assets within the Site, which all lie on the periphery of the existing quarry footprint. Direct impacts to these five assets were avoided as the southern area of the Site, where they are located, was intentionally not excavated. Whilst direct impacts to these known assets were avoided, it is considered that moderate adverse effects resulted from the Development due to indirect effects to their setting from increased noise and dust, and visual changes.

The potential for undiscovered archaeological remains to have existed, or to continue to exist, within the Site also cannot be discounted. It is considered that future quarrying activity at the Site in areas not previously excavated has the potential to directly impact on previously undiscovered archaeological remains that may exist within the quarry footprint, resulting in a potentially profound adverse effect.

Moderate and slight adverse effects are considered to have occurred to nine cultural heritage assets located within the wider Study Area as a result of visual changes to setting.

The southern area of the Site should continue to be protected from extraction to avoid direct impacts to the known cultural heritage assets located there.

No remedial measures are considered feasible to mitigate the residual effects that are likely to have occurred at cultural heritage assets within the Site.

10.0 LANDSCAPE AND VISUAL

This assessment is a retrospective assessment of the Landscape and Visual Effects – and the notable effects in the case are the effects which have occurred between 1990 which is the baseline date, and the present.

The Methodology and Limitations sections outline the difficulties in assessing a development retrospectively and in some cases (in particular the assessment of viewpoints) it is not possible to be exact regarding the extent of the change which has happened in this time, particularly as some quarrying would have been evident in 1990.

Landscape Effects

The landscape character of the area is characterised by the relatively flat and gently sloping lands interspersed with locally prominent hills. The area is primarily rural though some areas have an industrial character and the N7 road is a notable feature of the area.

The landscape effects resulting from the quarrying relate to effects on the landscape character of the site as well as the wider landscape, as Windmill Hill is a prominent feature in the landscape.

Landscape Effects range from Moderate to Significant and are considered adverse and Long Term to Permanent (Long Term effects include mounding while the removal of rock is considered Permanent).

At the localised landscape scale, the landscape effect is considered Moderate. Effects are mainly adverse (vegetation removal and loss of field/landscape pattern) to neutral (the creation of earth mounding along parts of the southern boundary is considered a neutral effect) in some areas depending on the scale and surface of the mounding.

¹ CIfA (2020a). Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment.

² CIfA (2020b). Standard and guidance for historic environment desk-based assessment.

At the wider landscape scale (within 5 km), the significance of effect that has occurred is considered to range from Moderate to Significant, and adverse, on certain parts of this landscape. Windmill Hill is an important and valued landscape element in the wider landscape, where the hills are a feature of the area's character. The changes to the topography are visible in the wider landscape from certain viewpoints, however it is noted that these are primarily to the north and west, with the views from the landscape to the south and east unchanged.

Visual Effects

Visual effects also vary. From 12 viewpoints selected, there is no visibility of the quarry development from three (Viewpoint 3, 6, 7). Moderate to Significant, adverse visual effects result from Viewpoints 1, 10 and 11 where the quarry face and Windmill Hill are prominent features of scenic views. However, it should be noted that the remaining viewpoints are mainly considered Not Significant (Viewpoints 2, 4, 5, 8, 9) with the quarry screened by either Windmill Hill topography itself as is the case for the receptors to the south east and along Windmill Road, as well as some viewpoint to the north/northwest where view to the quarry are screened by topography and vegetation. Viewpoint 12 which is a protected view is considered Slight-Moderate.

Therefore, visual effects vary considerably depending on the location.

It should also be noted that though several viewpoints are taken close to residences along Windmill Road and to the roads close to the N7 north of the quarry, due to the topography and screening near the site and along the roads (particularly Windmill Road) visibility is greatly reduced. However, it is noted that residences with upper storeys may obtain more open views of the site in some cases.

11.0 TRAFFIC

The current quarry site is accessed toward the centre of its northern boundary from the N7/M7 and has been accessed from that road since grant of planning permission for stone quarrying on site in 1968 (under Reg. Ref. 11547).

An estimation of traffic generation, including trips relating to export, and import, of materials, staff and ancillary trips, for the subject lands, was calculated with reference to historical levels of extraction and importation of material since 1990. These reflect trips such as delivery of materials, servicing of plant/machinery, meetings, etc.

The quarry has always operated for 5.5 days per week for approximately 50 weeks per year. The historical annual extraction rate (tonnes per annum) has been used in determining the trips generated by the facility since 1990. Material leaving the site has historically been transported as a mix of 10 tonne and 20 tonne loads, with an average load of 12.5 tonnes.

The assessment used AADT figures recorded and reported by Transport Infrastructure Ireland's (TII's) traffic counter TMU N07 015.0 W which is located on the N7 between Junction 5 Athgoe and Junction 6 Castlewarden, Killeel, Co. Kildare to approximate mainline westbound traffic volumes on the N7 from 2014 – 2020. As this information only contains traffic data since 2014, traffic growth factors, contained in the "Project Appraisal Guidelines - Unit 5" published by TII was used to retrospectively estimate the traffic volumes on the N7 for the years prior to 2014 (1990 - 2014).

The traffic generated by the quarry represent between 0.19% and 2.36% of total traffic on the N7 National Road between 1990 and 2020.

An assessment of the junction layout was undertaken based on an analysis of merge and diverge flow diagrams in accordance with Chapter 2 of TII Publications document DN-GEO-03035, version 4, "NRA addendum to Standard TD22/92- Layout of grade separated junctions," which was the relevant design standard at the time of construction.

The assessment determined that the junction layout, as constructed in 2006, did not meet the required geometric parameters for the merge and diverge layout in accordance with the relevant standards at the time. However, despite the design standards at the time not requiring an auxiliary lane for the diverge layout, one was provided which is more favourable than the required layout. Despite the junction not being constructed in compliance with the relevant design standards at the time, its layout has sufficiently accommodated the traffic volumes generated by the quarry since its implementation, and has maintained a good safety record.

The following amendments however would be required to ensure the junction layout complies with the current TII Publication documents as noted by the 2021 Traffic and Transportation assessment.

- 1) Nose length of 75 m with a ratio of 1:25 to be provided for the merge, and nose length of 70 m with a ratio of 1:15 to be provided for the diverge;
- 2) Auxiliary lane to be extended to 160 m for merge, and 150 m for diverge; and
- 3) Auxiliary Lane Taper to be extended to 75 m for merge, and 70 m for diverge.

However, due to the presence of an existing access to the east of the existing diverge lane, the full auxiliary lane and auxiliary lane taper is not feasible without conflicting with this access. It is therefore considered sufficient to retain the existing arrangement of the diverge at the quarry access as this has sufficiently accommodated the traffic volumes, and should continue to do so in the future. The merge should however be amended in line with the requirements listed above. Further design would be required prior to implementing the necessary road markings at this location.

12.0 MATERIAL ASSETS

Material assets comprise the physical resources in the environment, which may be of human or natural origin. The objective of the assessment is to ensure that these assets have been used in a sustainable manner with respect to operations at the Site.

Material Assets in the vicinity of the Site comprise of built services and infrastructure, such as:

- Electricity network utilities;
- Gas infrastructure;
- Telecommunications;
- Local water supplies and foul water network;
- Surface water drainage infrastructure;
- Waste management infrastructure; and
- Geological resource.

Other material assets include roads and traffic, which have been assessed in Chapter 11 (Traffic), and the potential effects of blasting and vibration on neighbouring dwellings (assessed in Chapter 8 (Noise and Vibration)).

Information for the assessment of potential impacts on the identified material assets was obtained by means of a desk-based review, and included the following sources:

- ESB network utility plans;
- Gas Networks Ireland utility plans;

- Eir CYBD mapping;
- Irish water utility mapping;
- Field surveys of the Application Site;
- Department of Communication, Climate Action and Environment (DCCAE) Eircode maps; and
- Aerial and ordnance survey maps of the area.

Impact Assessment and Mitigation Measures

Electricity

All works to the electrical lines and appropriate authorisations for connections would have been sought prior to the assessment period of the rEIAR. All works to the electrical power lines during the assessment period have been carried out in accordance with appropriate requirements and ESB Network guidelines and are therefore considered to be imperceptible.

Gas Supply

There have been no requirements for a GNI connection to service the Development. Therefore, there have been no additional supply demands on the GNI network from the Site. Excavation and blasting works have taken place on Site, however these activities have not been conducted in the vicinity of the distribution pipeline to the north of the Site between the boundary and the N7/M7. During the assessment period effects from the Site's activities on the gas supply network have been considered to be imperceptible.

Telecommunications

The Site currently utilises a privately owned mast located to the south of the pit for telecommunications. Previous hard-wired connections may have been used at earlier times during the assessment period. Effects from the Site's activities on the local telecommunication networks are considered to be imperceptible.

Local Water Supplies and Foul Water Infrastructure

Water used on Site during the assessment period has been abstracted from groundwater wells on the Site and the use of groundwater at the Site has been in existence for decades and at least pre-1990.

As the Site does not consume water from the local supply network then potential effects from the Site's activities on the water supply network are considered to be imperceptible.

Blasting activities are conducted onsite, however they have progressed in a westerly and southerly direction away from the Liffey aqueduct concrete main located to the north of the Site. Effects on this water main are therefore considered to be imperceptible.

The Site has employed a number of measures to protect the underlying groundwater from activities which have been undertaken. This included the safe storage of chemicals, the bunding of fuel storage tanks and the use of an interceptor associated with the hardstanding at the refuelling area. Therefore, potential effects from the Site's activities on the groundwater quality of local well users is considered to be imperceptible or slight.

Surface Water Drainage Infrastructure

Surface water on the Site infiltrates through the underlying soils and sub-soils and percolates to the groundwater. The Site has utilised a man-hole on Site which is linked to the public surface water network associated with the N7/M7 road for discharging groundwater intermittently following periods of prolonged rainfall. It is considered that these discharges have resulted in a negligible impact on the network resulting in effects during the 1990 to 2021 assessment period that are capable of measurement but without significant consequences (imperceptible).

Waste Management Infrastructure

Waste arising from activities at the Site has been managed by suitably qualified, permitted and licenced waste contractors. Limited waste streams have been generated by the Site activities during the assessment period, and it is considered that there has been imperceptible effects on the local waste infrastructure during that time.

Geology as an Economic Resource

The geology of the Site is described in detail in Chapter 6 (Land, Soils and Geology). The extraction of aggregate during the period of 1990 to 2021 is considered an acceptable use of the economic resource at the Site and material extracted from the Site has been used as raw materials in the construction industry. Potential beneficial impacts from the Site's extraction of the geological resources is considered to be low resulting in effects during the 1990 to 2021 assessment period that are slight.

13.0 INTERACTIONS

This assessment summarises the primary interactions and inter-relationships and provides a matrix to coherently display the interactions of these disciplines. The overall objective of this assessment is to identify whether additional remedial mitigation is required that would not otherwise have been identified in the individual study areas for these interacting or cumulative effects.

Interactions of rEIA study topic areas are typically displayed visually in a matrix table which identifies potential interactions which are likely to occur between the various disciplines. This table, from Chapter 13.0 of the rEIAR, has been reproduced in Table 1. Green shaded boxes identify the potential interacting disciplines where a relationship exists, and the respective phase where there is an interaction is also indicated.

Table 1: LBAR rEIAR Environmental Interactions.

	Pop. & Human Health	Ecology & Biodiversity	Land, Soils & Geology	Water	Air Quality & Climate	Noise & Vibration	Cultural Heritage	Traffic & Transport	Landscape & Visual	Material Assets
Pop. & Human Health										
Ecology & Biodiversity										
Land, Soils & Geology										
Water										
Air Quality & Climate										
Noise & Vibration										
Cultural Heritage										
Traffic & Transport										
Landscape & Visual										
Material Assets										



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