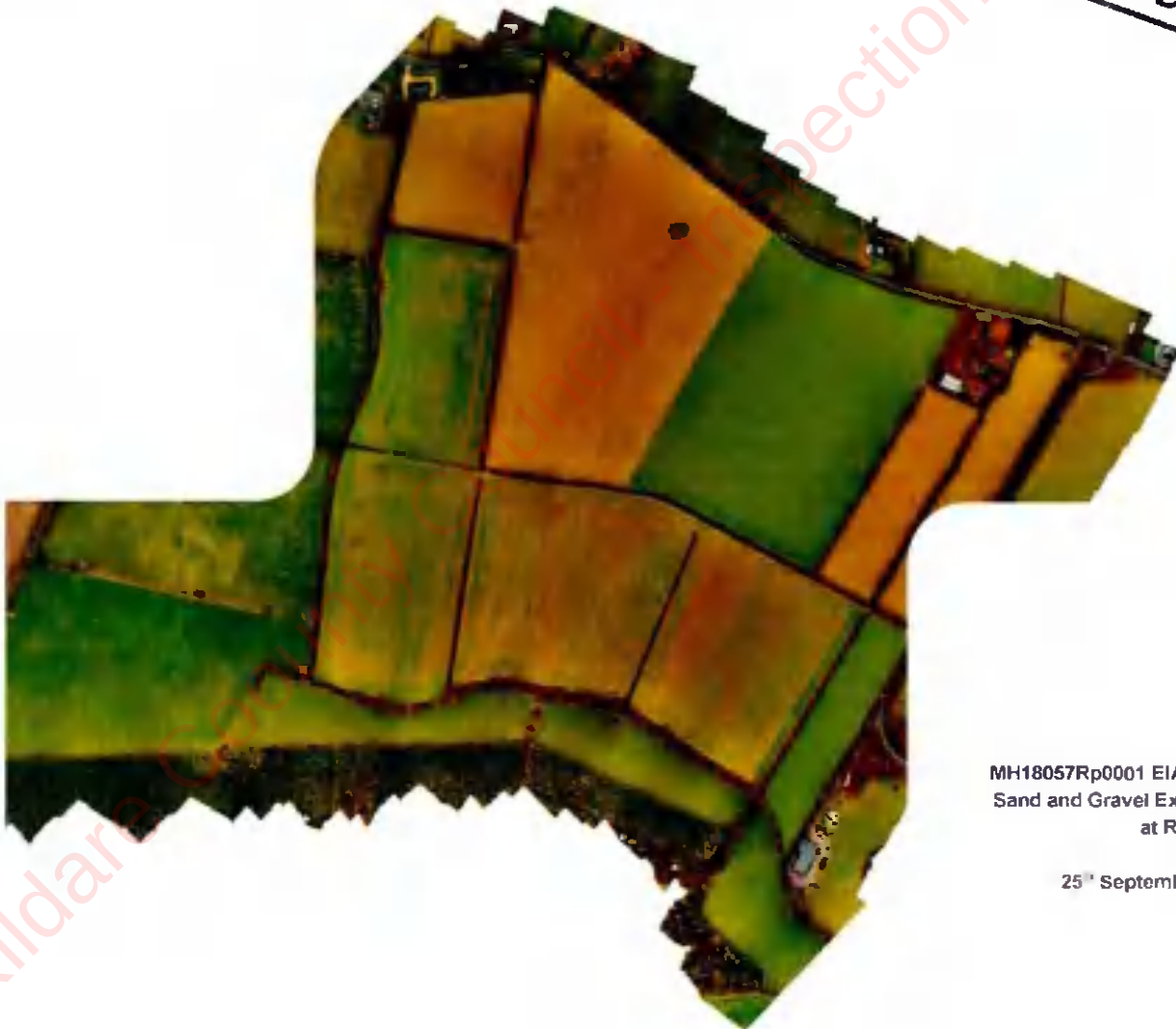


SAND AND GRAVEL EXTRACTION AT RACEFIELD

Environmental Impact Assessment Report
Volume II: Main Text



MH18057Rp0001 EIAR Vol II
Sand and Gravel Extraction
at Racefield
F01
25th September 2019

REPORT

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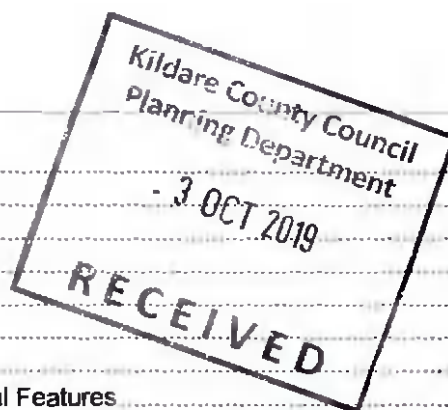
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GLOSSARY

AADT – Annual Average Daily Traffic

ACA – Architectural Conservation Area

AES – Advanced Environmental Solutions Ltd.

AFM – Annals of the Four Masters

AONB – Areas of Outstanding Natural Beauty

ATC – Automatic Traffic Counter

BAP – Biodiversity Action Plan

CDP – County Development Plan

C&D – Construction and Demolition

CFRAM – Catchment Flood Risk Assessment and Management

CIEEM – Chartered Institute of Ecology and Environmental Management

CIRIA – Construction Industry Research and Information Association

COMAH – Control of Major Accident Hazards

CRTN – Transport's Calculation of Road Traffic Noise

CSO – Central Statistics Office

CMP – Construction Management Plan

DAU – Development Applications Unit

DCHG – Department for Culture, Heritage and the Gaeltacht

DECLG – Department of Environment, Community and Local Government

DEFRA – Department of Environment, Food and Rural Affairs

DMRB – Design Manual for Roads and Bridges

DMURS – Design Manual for Urban Roads and Streets

EC – European Communities

EF – Emission Factor

EIAR – Environmental Impact Assessment Report

ELC – European Landscape Convention

EMRA – Eastern and Midland Regional Assembly

EIA – Environmental Impact Assessment

EPA – Environmental Protection Agency

EU – European Union

GDA – Greater Dublin Area

GHG – Greenhouse Gas

GWB – Groundwater Bodies

HA – High Amenity



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HGV – Heavy Good Vehicle
HLC – Historic Landscape Characterisation
HLCT – High Lying Character Type
IAPS – Invasive Alien Plant Species
ICF – Irish Concrete Federation
IEMA – Institute of Environment Management and Assessment
IFI – Inland Fisheries Ireland
IOA – Institute of Acoustics
KCC – Kildare County Council
LCA – Landscape Character Area
LCT – Landscape Character Types
LoW – List of Wasta
LV – Light Vehicles
MCA – Multi-Criteria Analysis
NBDC – National Biodiversity Data Centre
NCT – National Car Test
NHA – National Heritage Areas
NIAH – National Inventory of Architectural Heritage
NLS – National Landscape Strategy
NPF – National Planning Framework
NPWS – National Parks and Wildlife Services
NRA – National Roads Authority
NTA – National Transport Authority
OPW – Office of Public Works
OSI – Ordnance Survey Ireland
pNHA – proposed National Heritage Areas
pSPA – proposed Special Protection Area
QLFS – Quarterly Labour Force Survey
QNHS – Quarterly National Household Survey
RFC – Ratio to Flow to Capacity
RMP – Record of Monuments and Places
RPA – Root Protection Area
RPO – Regional Policy Objectives
RPS – Record of Protected Structures
RSA – Road Safety Authority
RSES – Regional Spatial and Economic Strategy
SAC – Special Areas of Conservation



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SCI – Site of Community Importance

SMR – Sites and Monuments Record

SPA – Special Protected Areas

TEN-T – Trans-European Networks

TII – Transport Infrastructure Ireland

TMP – Operating Traffic Management Plan

tpa – Tonnes per annum

UNESCO – The United Nations Educational, Scientific and Cultural Organisation

VOCs – Volatile Organic Compounds

WADT – Weekly Average Daily Traffic

WFD – Waste Framework Directive

WHO – World Health Organisation

WMA – Waste Management Act

Zol – Zone of Influence



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1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared to accompany an application by Kilsaran Concrete (trading as Kilsaran Build) for planning permission for a proposed sand and gravel extraction facility at a greenfield site at Racefield, Ballyshannon, Kilcullen, Co. Kildare. Processing of the extracted material will be carried out on-site to produce a range of aggregates to be used by the applicant in the manufacture of concrete and asphalt at locations off-site.

An EIAR is defined in the EIA Regulations (S.I. 296 of 2018) as: 'a report of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive'. The EIAR is prepared by the developer (in this case Kilsaran Concrete) and is submitted to a Competent Authority (in this case Kildare County Council - KCC) as part of a consent process.

The proposed development consists of a new sand and gravel extraction development and related ancillary site works over the application site area of c.32.2 hectares and will consist of:

- Extraction of sand and gravel within an extraction area of c.17.2 hectares using both wet and dry extraction processes at a rate of 250,000 tonnes per annum to a total extraction volume of circa three million tonnes of sand and gravel;
- On site processing of extracted sand and gravels including crushing, washing (with associated closed circuit silt disposal lagoons) and screening prior to export off site and all ancillary works and structures;
- Installation of site facilities consisting of prefabricated canteen/welfare facilities, bunded and covered fuel tanks, weighbridge, wheelwash, packaged waste water treatment system and perimeter screening berms;
- Ancillary site works include a new access point onto the public road adjacent to Racefield House along the L-8006 local road, and
- Final restoration of the site to a mix of terrestrial and freshwater wildlife habitat.

The proposed extraction operational period is for 12 years with 2 years to complete restoration (total duration sought 14 years). A detailed description of the proposed development is provided in Chapter 3 of this EIAR. The accompanying planning application drawings provide further details of the proposed development.

The EIAR is produced as part of the Environmental Impact Assessment (EIA) process. The Environmental Impact Assessment process is governed by the EIA Directive (EU Directive 2014/52/EU), which has been adopted into Irish legislation principally via the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. 296 of 2018).

The planning application is made under the Planning and Development Act 2000 (as amended) and in accordance with the requirements of the Planning and Development Regulations 2001 (as amended).

1.1 Objective of the Proposed Development

The stated objective of the proposed development is as follows:

- To establish a new sand and gravel extraction facility at Racefield, Ballyshannon, County Kildare to produce a range of aggregates to be used by Kilsaran in the manufacture of concrete and asphalt products off-site and to allow for the final restoration of the site to a mix of terrestrial and freshwater wildlife habitat.

It is within this context that the EIAR has been prepared and assessments have been undertaken. The objectives of this EIAR are to achieve the following:

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- Identify the likely environmental impacts of the proposed development having regard to the characteristics of the local environment;
- Evaluate the magnitude and significance of the likely environmental impacts; and
- Propose appropriate measures to avoid or minimise adverse environmental impacts.

1.2 Applicant Details

The developer for the purposes of this EIAR and applicant for planning permission is Kilsaran Concrete (trading as Kilsaran Build). Founded in 1964, Kilsaran Concrete is a wholly Irish-owned company, whose business is primarily in the production of materials for the construction industry.

Kilsaran is primarily a concrete manufacturing company with expertise and experience in the field of quarrying, aggregates production, concrete manufacturing, road surfacing materials manufacturing and road making. The applicant is a long-established operator extracting raw materials from its own quarries/pits and manufacturing end products at its various manufacturing plants across Ireland for the Irish market.

The company employs over 500 people directly and operates twelve sand and gravel pits and a further twelve hard rock quarries. Kilsaran manufactures various concrete products from 20 locations, mainly in the east, midlands and south of the country. The company also has three asphalt plants located strategically within extractive sites throughout its operational area. Kilsaran has also expanded into the UK market with a Supply and Distribution depot added in Manchester serving the north west of England and the greater UK market.

Kilsaran is a member of the Irish Concrete Federation (ICF), the trade organisation for the concrete products and aggregate industries in Ireland and commits itself to the principles of the Federation's Environmental Code. It operates all its quarries in accordance with the environmental guidelines of the ICF and current best practice for the quarrying industry, as set out in the publication Guidelines on Environmental Management in the Extractive Industries published by the Environmental Protection Agency (EPA, 2006).

1.3 Legislative Context

Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from EIA Directive (85/337/EEC), which is in force since 1985 and applies to a wide range of defined public and private projects. The initial Directive was amended three times in 1997, 2003 and 2009, which were in turn codified by Directive 2011/92/EU. Directive 2011/92/EU has been further amended in 2014 by Directive 2014/52/EU.

The primary purpose of the EIA Directive (Directive 2011/92/EU as amended by 2014/52/EU) is to ensure that public and private projects which are likely to have significant effects on the environment are granted development consent only after an assessment of the likely significant environmental effects of those projects has been carried out i.e. an EIA.

The provisions of the EU EIA Directive are transposed into law in Ireland primarily through the Planning and Development Act 2000 (as amended) and the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. 296 of 2018).

1.4 EIA Process

Environmental Impact Assessment (EIA) is defined as 'the process of examining the environmental effects of the development from consideration of the environmental aspects at design stage, through to the preparation of an Environmental Impact Statement [now referred to as Environmental Impact Assessment Report], evaluation of the EIS [EIAR] by a competent authority and the subsequent decision as to whether the development should be permitted to proceed, also encompassing public response to that decision'¹

¹ EPA (2002 and Revised Draft 2017). Guidelines on the Information to be Contained in Environmental Impact Statement Reports. Draft Guidelines

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Broadly speaking the EIA process involves a number of steps which include the production of an EIAR, although this is not the end in itself but rather an output to assist in a wider decision-making framework. This EIAR will be used by KCC to make a decision to grant or refuse the application or to seek further information if required.

In line with current guidance, the EIA for the proposed development commenced at the project design stage. Subsequently, the scope of the study was determined with input from specialists in technical, planning and environmental disciplines.

Several interacting steps typify the early stages of the EIA process and include:-

- **Screening** - the term used to describe the process for determining whether a proposed development requires an EIA;
- **Scoping** - This stage firstly identifies the extent of the proposed development and associated site, which will be assessed as part of the EIA process, and secondly, it identifies the environmental issues likely to be important during the course of completing the EIA process through consultation with statutory and non-statutory stakeholders;
- **Assessing Alternatives** - This stage outlines the possible alternative approaches to the proposed development. Consideration of alternative layouts, alternative designs and alternative processes within the final chosen site are set out in Chapter 2 of this EIAR; and
- **Assessing and Evaluating** - The central steps of the EIA process include baseline assessment (desk study and field surveys) to determine the status of the existing environment, impact prediction and evaluation, and determining appropriate mitigation measures where necessary.

Figure 1.1 outlines the overall EIA process and the position of the EIAR in the overall process. Further details on the requirement for an EIAR and other related documentation is provided in the Planning Report which is also submitted as part of this application

The EIAR will accompany an application to KCC wherein it will be circulated to statutory stakeholders and made available to the public for consultation prior to any decision being made. It is acknowledged that the EIA process can extend beyond direct consent and into implementation of monitoring and mitigation programmes with the end focus being the protection of the environment in the long-term.



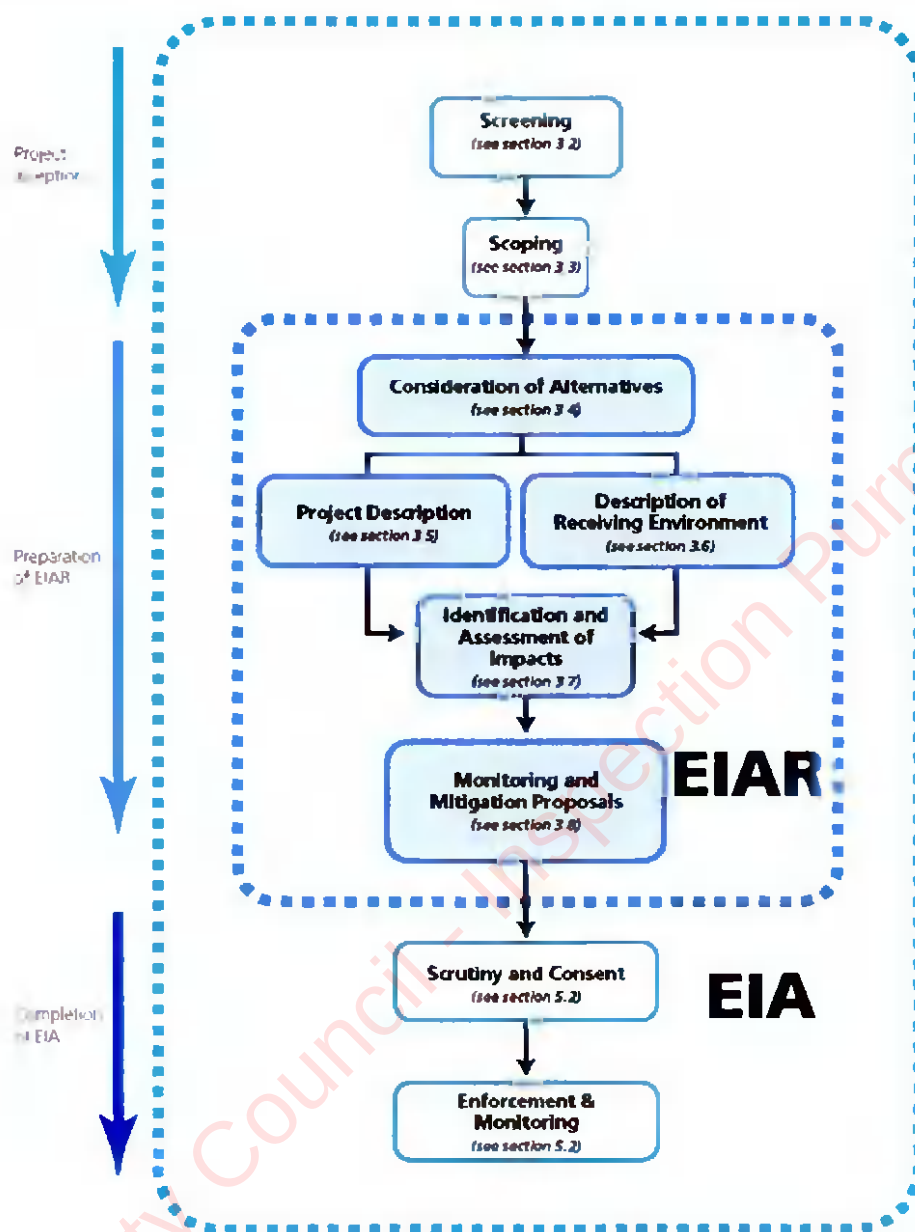


Figure 1.1: The Position of EIAR within the EIA Process²



² EPA (August 2017). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Draft Guidelines

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1.5 Requirement for EIA – Screening

Section 172 of the Planning and Development Acts 2000 - 2018 states that EIA must be undertaken by the planning authority or the Board, as appropriate, for an application for consent for a proposed development where either:

(a) the proposed development would be of a class specified in—

(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either—

(I) such development [would equal or exceed, as the case may be,] any relevant quantity, area or other limit specified in that Part, or

(II) no quantity, area or other limit is specified in that Part in respect of the development concerned,

or

(ii) Part 2 [(other than subparagraph (a) of paragraph 2)] of Schedule 5 of the Planning and Development Regulations 2001 and either—

(I) such development [would equal or exceed, as the case may be,] any relevant quantity, area or other limit specified in that Part, or

(II) no quantity, area or other limit is specified in that Part in respect of the development concerned,

or

(b) (i) the proposed development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations 2001 but [does not equal or exceed, as the case may be,] the relevant quantity, area or other limit specified in that Part, and

(ii) it is concluded, determined or decided, as the case may be — that the proposed development is likely to have a significant effect on the environment.

Schedule 5 of the Planning and Development Regulations 2001 – 2018 sets out classes of development for which EIA is required. Part 2 (2) (b) of that schedule relating to 'Extractive Industry' states that EIA is required for development which comprises:

(b) Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares.

The application area for the proposed sand and gravel extraction facility covers an area of c.32.2 hectares with extraction over an area of c.17.2 hectares (and therefore exceeds the threshold of 5 ha outlined in Part 2(2)(b)). As a consequence, the proposed development is screened in for EIA and hence this EIAR has been prepared as a statutory requirement of the planning application.

1.6 Scoping of the EIAR

Scoping is an integral part of the EIA process, the aim of which is to identify matters that should be covered in the EIAR. It is defined in the EC Guidance³ as:

'determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR'

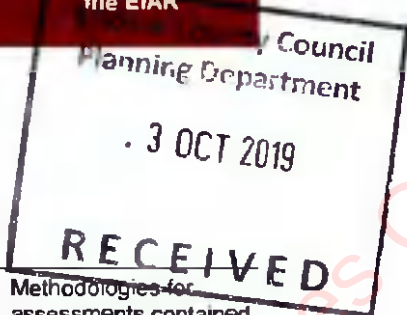
The starting point for this is the list of information in the (amended) Annex IV of the 2014 EIA Directive which sets out the minimum information to be provided in an EIAR. This is outlined below in Table 1.1, which notes the provisions of Annex IV and it identifies where each of the requirements of Annex IV are addressed in this EIAR.

³ EC (2001), Guidance on EIA Scoping

Table 1.1: Requirements of Annex IV of the EIA Directive and where addressed in the EIAR

Annex of EIA Directive	Provision of the EU Directive	Where addressed in the EIAR
Annex IV – Item 1	Description of the project, including in particular: (a) a description of the location of the project; (b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.	Chapter 3: Project Description
Annex IV – Item 2	A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Chapter 2 Alternatives
Annex IV – Item 3	A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge	Baseline general description of the general site and surrounds in Chapter 3 Baseline of specific environmental topics provided in each specialist environmental chapter Likely evolution of baseline conditions without implementation of the project in the 'Do-Nothing' section of each specialist chapter.
Annex IV – Item 4	A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydro morphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	Each of the specialist environmental chapters – Chapters 4 to 13 (sections outlining 'Receiving Environment' and 'Potential Impacts')
Annex IV – Item 5	A description of the likely significant effects of the project on the environment resulting from, inter alia: (a) the construction and existence of the project, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulative effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.	Each of the specialist environmental chapters – Chapters 4 to 13 (sections outlining 'Impact Assessment')

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Annex of EIA Directive	Provision of the EU Directive	Where addressed in the EIAR
	(g) the technologies and the substances used. The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.	
Annex IV – Item 6	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Methodologies for assessments contained in each of the specialist environmental chapters – Chapters 4 to 13 Any technical difficulties or deficiencies in data encountered are identified in each of the specialist environmental chapters, and in summary in Section 1.10 of Chapter 1 - Introduction.
Annex IV – Item 7	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis) That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	Each of the specialist environmental chapters – Chapters 4 to 13 (sections outlining 'Mitigation Measures' and 'Impact assessment/Residual impacts')
Annex IV – Item 8	A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council (*) or Council Directive 2009/71/Euratom (**) or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	The identified potential 'accidents' arising are outlined in Section 3.9
Annex IV – Item 9	A non-technical summary of the information provided under points 1 to 8.	EIAR Volume I: Non-Technical Summary

The scoping of an EIAR is also concerned with identifying those aspects of the environment where there is an interaction, either direct or indirect, positive or negative, with the project and as a consequence there are potential effects, which need to be assessed.

Article 22 of the EIA Directive (2014/52/EU) states that environmental impact assessments should 'take account of the impact of the whole project in question.... during the construction, operational and, where relevant, demolition phases.' In light of this direction, it is necessary to clarify that the proposed development does not constitute a traditional construction phase. There will be a small element of construction required for access improvements, site infrastructure, topsoil/overburden stripping and construction of silt lagoons and perimeter screening bunds. However, the main element of the development will be the extraction and processing of sand and gravel on-site and the small construction phase will run concurrently with this extraction (operation) phase. As such, these phases are combined for the purposes of

this impact analysis and for the purposes of this EIAR, the phases assessed under each environmental topic are as follows (as set out in Chapter 3):

- **Construction/Operational Phase** - this phase constitutes
 - Enabling works (works required for new site access, treatment of hedgerows, utility diversions, establishment of site welfare facilities, etc.);
 - Site preparation works including topsoil & overburden stripping from the extraction area;
 - Extraction and on-site processing of sands and gravels that includes crushing, washing (with associated silt disposal lagoons) and screening;
- **Restoration Phase** - this phase constitutes
 - The restoration of the site to a mix of terrestrial and freshwater wildlife habitat following cessation of all extraction and removal of all plant and equipment from the site. There will be some environmental monitoring carried out during this period.

A scoping process to identify the issues that are likely to be most important during the EIA process was carried out and informed the format of this EIAR. During this process, information on the proposed development and an indicative site layout was provided to consultees inviting any comments, queries or observations from the contacted parties on the nature of the proposed development, the potential environmental impacts and the content of the EIA.

1.7 Structure and Format of the EIAR

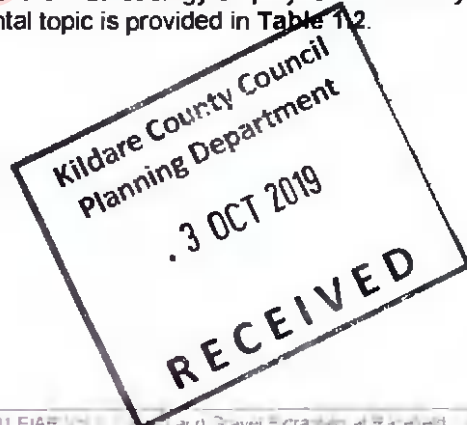
The EIAR has been prepared in a 'Grouped Format' structure having regard to the prescribed environmental factors of the EIA Directive and the 2017 EPA Guidance: 'Population and Human Health; Biodiversity, Land & Soils, Water, Air, Climate, Material Assets, Cultural Heritage, Landscape, Interactions.'

In this way each aspect of the environment is presented as a separate section referring to the environment as it exists, likely significant impacts, and proposed mitigation measures. The advantages of using this format are that it is easy to investigate a single topic and it facilitates easy cross-reference to specialist studies.

This EIAR has been compiled to comply with the requirements of Article 94 and Schedule 6 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). The overall EIAR is arranged in three volumes, as follows:

- **Volume I: Non-Technical Summary** - A non-technical summary of the information contained within Volume I in accordance with Annex IV – Item 9.
- **Volume II: Main Text** - This is the main volume of the EIAR and provides information on the location and scale of the proposed development, details on design and impacts on the environment (both positive and negative) as a result of the proposed development.
- **Volume III: Technical Appendices** – This volume contains specialists' technical data, project drawings and other related reports that have been referenced throughout Volume II.

An outline of the methodology employed consistently in each technical chapter of Volume II to examine each environmental topic is provided in Table 12.



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Table 1.2: Methodology employed to evaluate each Environmental Topic

Section	Content
Introduction	This section will expand on the information presented in Chapter 3 (Project Description) and will take account of the feedback from stakeholders in relation to the scope and level of detail of the proposed assessment.
Assessment Methodology	This section will include a clear description of the approach including methods used to predict/forecast impacts, sources of information used and standards and guidance employed.
Baseline Conditions (Existing Environment)	This section will comprise a description of the specific environment into which the proposal will fit, taking account of other developments likely to occur. The particular aspects of the environment will be discussed in terms of their context, character, significance and sensitivity.
Impact Assessment	The potential impact of the proposal will comprise a general description of the possible types of impacts which proposals of this kind would be likely to produce during the combined construction operational phases and the restoration phase. This includes a consideration of the 'Do Nothing' scenario. This scenario describes the environment as it would be in the future if no development of any kind is carried out. An assessment of the specific direct and indirect impacts that the proposed development may have during both the construction and operational phases of the proposed development, in the absence of any remedial or reductive measures. The predicted impacts will be discussed having regard to their character, magnitude, duration, consequences and significance.
Mitigation Measures	A description of any specific remedial or reductive measures considered necessary and practicable resulting from the assessment of potential impacts during the construction and operational phases. Monitoring proposals will also be included in this section as appropriate.
Cumulative Impact	The cumulative impact of the proposed development, along with other permitted and existing developments in the vicinity will be considered.
Residual Impact	This section will review the impacts of the proposed development with mitigation measures in place and identifies remaining negative impacts.

The spatial extent of the project for environmental assessment purposes will vary between the different topics in identifying environmental effects on receptors and on resources. Resources consist of items such as land, habitats, water resources, access routes and networks and community facilities. Receptors consist of human beings and the social and economic systems within which they operate and depend upon.

1.8 Appropriate Assessment

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as 'The Habitats Directive', provides legal protection for habitats and species of European importance. Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites (Annex 1.1).

In the context of the proposed development, the requirement for Appropriate Assessment (AA) under the Habitats Directive is transposed by the Planning and Development Acts 2010, as amended; 'the Planning Acts', and the Planning and Development Regulations (2010 to 2018, as amended). RPS has prepared a Natura Impact Statement (NIS) for the proposed development and this has been included in the planning application to KCC. Further details are noted in Chapter 5 Biodiversity.

1.9 EIAR Study Team

It is a requirement of the Directive that the EIAR be prepared by competent experts. As noted in the 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment' published in August 2018, the Directive 'does not define the term 'competent expert', although Recital 33 of the 2014 Directive states that experts involved in the preparation of EIARs should be 'qualified and competent'. The term 'qualified expert' is not interpreted as necessarily someone with a formal qualification but could also be a person with significant knowledge and experience in a particular field. The term 'qualified' is not used in the operative provisions of the 2014 Directive.'

This EIAR has been prepared by RPS, on behalf of Kilsaran Concrete, with specialist inputs as outlined in Table 1.3. In any event, the project team who managed this EIAR and undertook the specialist environmental impact assessments are both competent and qualified in relevant disciplines.

Table 1.3: EIAR Project Team Contributors

Company	Contributions	Lead Author	Qualifications & Professional Memberships
RPS	Chapter 1: Introduction	Caitriona Reilly	BSc. (Hons), HDip (GIS), Dip (Acoustics & Noise Control), IDipNEBOSH, MIEEnvSc, MIOA
RPS	Chapter 2: Alternatives	Paul Chadwick Caitriona Reilly	BA (Mod) Chemistry, M. Phil in Atmospheric Chemistry, AIEMA See above
RPS	Chapter 3: Project Description	Caitriona Reilly Paul Chadwick	See above BA (Mod) Chemistry, M. Phil in Atmospheric Chemistry, AIEMA
RPS	Chapter 4: Population & Human Health	David Garvey Paul Chadwick	BAI Civil, Structural & Env Engineering See above
RPS	Chapter 5: Biodiversity	Miles Newman Letizia Cocchiglia	BSc MSc PG Dip PhD CEnv, MCIEEM BSc (Hons) Environmental Biology, PhD Freshwater Biology, MIES
RPS	Chapter 6: Land, Soils & Geology	Janka Nitsche	B A Natural Science (Mod. Geology), MSc. Environmental Eng., PhD Research Hydrogeology
RPS	Chapter 7: Water	Vincent McArdle	B.E (Hons) Civil Engineering, MSc Environmental Engineering, CEng, MIEI
RPS	Chapter 8: Air Quality & Climate	Paul Chadwick	See above
RPS	Chapter 9: Noise & Vibration	Caitriona Reilly Eugene McKeown	See above BE (Hons) Mechanical Engineering, LLB Bachelor of Laws, MSc Master of Science in Applied Acoustics, MIOA, CEng MIEI
RPS	Chapter 10: Traffic & Transportation	Ronan Grealy	B.E. (Hons) Civil and Env Engineering, M Eng Sc (Civil), CEng MIEI
RPS	Chapter 11: Material Assets (Built Services)	Paul Chadwick	As above
Courtney Deery Heritage Consultancy	Chapter 12: Cultural Heritage	Dr Yolande O'Brien	BA (Hons), MA (Landscape Archaeology), PhD (Archaeology), MIAI
RPS	Chapter 13: Landscape	Eimear O'Connor Stuart Anderson	B Agr Sc (Horticulture), MSc Landscape Architecture, MLA BSc Landscape Design and Plant Science, BTEC Forestry, PGDip Landscape Management, CMLI - Chartered Member of the Landscape Institute
RPS	Chapter 14: Interactions & Cumulative Impact	Caitriona Reilly David Garvey	See above See above

1.10 Technical Difficulties or Deficiencies in Knowledge Encountered

No technical difficulties were encountered when preparing this report. Discipline specific data limitations are identified with each chapter as relevant.

General assumptions that have been made during preparation of the EIAR are set out below.

Relevant information has obtained from publicly available sources and mapping databases such as the EPA, NPWS, GSI, OPW, etc. It has been assumed that the information is correct and while reasonable care and skill has been applied in review of this data; no responsibility can be accepted for inaccuracies in the data supplied.

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1.11 Consultation

The purpose of this section is to document the extent and nature of third party consultation that has taken place in relation to the proposed development. It also outlines the key issues raised during the consultation process and how these issues have been addressed by the project team and considered in the impact assessments as described in **Chapters 4 - 13**.

A pre-planning consultation meeting was held between officials of Kildare County Council and the applicant as part of this planning application on the 27th of June 2019 at the offices of the planning authority in Naas, Co. Kildare. The proposed development was presented at this pre-application meeting. The following issues were raised at this meeting:

- Potential concerns in relation to impacts on residential amenity; impact on scenic route and noise & dust;
- Traffic Impact Assessment would be required;
- Details of haul routes should be specified;
- Photomontages required for the scenic route to the east of the site;
- The proposal should be accompanied by an Appropriate Assessment; and
- Ecological restoration proposal should be outlined in the EIAR.

An informal EIAR scoping exercise was undertaken as part of the EIAR process. During this process parties were consulted by letter in May 2019 with details of the proposed development including a brief project description coupled with a site location map and indicative site layout plan. The consultation process invited any comments, queries or observations from the contacted parties on the nature of the proposed development, the potential environmental impacts and the content of the EIAR. The letter was issued via e-mail to the following organisations on the 2nd of May 2019:

- Kildare County Council (Roads, Drainage, Environment Departments)
- Kildare County Council Heritage Officer
- Development Application Unit, Department of Culture, Heritage and the Gaeltacht
- Inland Fisheries Ireland
- Environmental Pillar
- BirdWatch Ireland
- Bat Conservation Ireland
- National Biodiversity Data Centre
- Geological Survey of Ireland
- An Taisce
- Transport Infrastructure Ireland
- National Transport Authority
- Irish Landscape Institute
- An Bord Pleanála
- Department of Communications, Climate Action and Environment
- Department of the Housing, Planning, Community and Local Government
- Health Service Executive
- Institute of Public Health in Ireland
- Office of Public Works

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- Fáilte Ireland
- The Heritage Council
- Teagasc
- Friends of the Irish Environment
- Local IFA
- National Monuments Service
- ESB Networks
- Irish Water
- Department of Education & Skills

The primary objective of involving these organisations and parties at an early stage in the EIA process is to aid in the scoping of and the content of the EIAR. Table 1.4 presents the summary of the consultation responses received. All comments and recommendations from each of the Statutory Authorities and Consultees have been taken into consideration in this EIAR. Full copies of all consultation responses are included in Appendix 1.1 of Volume III of the EIAR.

Table 1.4: Statutory and Non-Statutory Organisations and other Competent Parties Consulted

Consultee	Key observations, issues & concerns raised in Response
Geological Survey of Ireland (GSI)	• There are no CGSSs located within the vicinity of the site. With the current plans, there is no envisaged impact on the integrity of County Geological Siles by the proposed developments. • GSI encourage discussion on end-of-life plans for the operations and would be happy to recommend ways to promote the geology to the public or develop tourism or educational resources if appropriate. • The Geoheritage Programme tries to promote a partnership between geological heritage and active extraction, with such measures as those outlined in the 'Geological Heritage Guidelines for the Extractive Industry'. • Should development go ahead, all other factors considered GSI would much appreciate a copy of reports detailing any site investigations carried out. • Should any significant bedrock cuttings be created, GSI asked that they will be designed to remain visible as rock exposure rather than covered with soil and vegetated, in accordance with safety guidelines and engineering constraints.
Transport Infrastructure Ireland (TII)	• The EIAR should identify the methods/techniques proposed for any works traversing/in proximity to the national road network in order to demonstrate that the development can proceed complementary to safeguarding the capacity, safety and operational efficiency of that network. • Consultations should be had with the relevant local authority/National Roads Design Office with regard to locations of existing and future national road schemes. • Clearly identify haul routes proposed and fully assess the network traversed. • Separate structure approvals/permits and other licences may be required in connection with the proposed haul route and all structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed. A Traffic and Transport Assessment (TTA), subject to meeting the appropriate thresholds and criteria be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads.
Heritage Service Executive (HSE)	• The EIA should include an assessment of potentially significant cumulative impacts from the proposed development. This should include cumulative traffic, noise, dust and hydrological impact assessment. • The Environmental Health Service (EHS) considers the following should be assessed in the Environmental Impact Assessment (EIA): a) Any potentially significant emissions to surface water; b) Any potentially significant emissions to ground water, and c) Any potentially significant emissions to air, including noise, vibration and dust. • When assessing the above the existing environment, the assessment methodology and evaluation criteria should be clearly reported in the EIAR. Any mitigation proposed should be

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Consultee	Key observations, issues & concerns raised in Response
	identified and the predicted residual impact clear. Assessment should be carried out for both the construction phase and the operation phase of the proposed development. • The EHS emphasises the need for early and meaningful public consultation in the development process. Accurate information should be obtained regarding the location of sensitive receptors, and there should be on going engagement with these receptors during the EIA process • The future use of the restored site should be included in the public consultation process • It is recommended that an Environmental Management System (EMS) is identified in the EIA that includes details of training and reviewing of the effectiveness of the EMS. The EMS should be devised in accordance with international standards • Any potential discharges to surface water resulting from proposed wet excavation and washing of sand/gravel should be assessed, including an assessment of existing baseline water quality and assimilative capacity, if there are proposed discharges to surface water. • Any proposed emissions of treated effluent to surface or ground water should be assessed in the EIA • The EIA should assess any potential impacts from surface water run-off and identify drainage requirements and any settlement ponds or lagoons. This assessment should include details of how any lagoons are to be adequately sealed with an impermeable material to prevent leaching to groundwater. • The EIA should include details of the fuels and chemicals to be used and stored on site and the method proposed for the bunding of fuel and chemical storage tanks. • It is recommended that detailed information is gathered on the location of private wells serving properties within the vicinity of the proposed operation. • The EIA should assess any potentially significant impacts from dust during the construction and operation of the proposed development. • The EIAR should identified dust minimisation methods that are to be used to reduce dust generation from activities on the proposed site • The EIA should assess any potential significant impacts from noise and/or vibration during the construction and operation of the site • Details of the location and frequency of any proposed noise monitoring should be included in the EIAR • Specification details for the septic tank and how it is proposed to empty/treat any effluent from the tank must be included in the EIAR • The potential to provide a facility on site which will provide an opportunity for health gain for the wider community should be considered, for example, walkways, cycle paths, woodland paths, pitch and putt course or an amenity park

Development Applications Unit (DAU), Department of Culture, Heritage and the Gaeltacht	Archaeology: • Due to the large scale of this development, it is this Department's recommendation that an archaeo-geophysical survey should be carried out on site. In addition, in order to examine any possible archaeological features identified by geophysics and to investigate further, the overall archaeological potential of the proposed development site, test excavations, as described below, should be carried out across the site. • Geophysical survey and Pre-development testing shall consist of the following – Geophysical survey should be carried out across the entire site. – The applicant is required to engage the services of a suitably qualified archaeologist (licensed under the National Monuments Acts 1930–1994) to carry out predevelopment testing at the site. No sub-surface work shall be undertaken in the absence of the archaeologist without his/her express consent – The archaeologist is required to notify the Department of Culture, Heritage and the Gaeltacht in writing at least four weeks prior to the commencement of site preparations. – This will allow the archaeologist sufficient time to obtain a licence to carry out the work – The archaeologist shall carry out any relevant documentary research and shall excavate test trenches at locations chosen by the archaeologist, having consulted the proposed development plans – Having completed the work, the archaeologist shall submit a written report to the Planning Authority and to the Department of Culture, Heritage and the Gaeltacht. – Where archaeological material is shown to be present, avoidance, preservation in situ, preservation by record (excavation) and/or monitoring may be required. The Department of Culture, Heritage and the Gaeltacht will advise the Applicant/Developer with regard to these matters
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Nature Conservation:

Consultee	Key observations, issues & concerns raised in Response
	- The department listed a number of documents and guidelines which should be consulted during preparation of any EIAR or EIAR screening document including: - Circular Letter: PL 05/2018 Transposition into Planning Law of Directive 2014/52/EU - Dept. of Housing, Planning and Local Government (2018), Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment - Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, Environmental Protection Agency, 2017 - European Commission guidance document on the implementation of the EIA Directive (Directive 2011/92/EU as amended by 2014/52/EU): Environmental Impact Assessment of Projects. Guidance on the preparation of the Environmental Impacts Assessment Report, European Commission, 2017 - DoEHLG's Quaries and Ancillary Activities: Guidelines for Planning Authorities (2004), particularly section 3.5 - Natural Heritage, section 3.6 - Landscape (with specific reference to restoration and after-care); and section 4.7 (i) - Landscaping and Restoration of the site - The EPA's Environmental Management Guidelines Environmental Management in the Extractive Industry (Non-scheduled Minerals) (2006) - European Commission's Guidance Document Non-energy mineral extraction and Natura 2000 (2011).

Prior to the lodgement of the planning application and associated documentation, a public consultation exercise with the local community took place via the distribution of a public information sheet during September 2019. A mail drop of public information sheets was delivered to properties in the vicinity of the proposed development to inform residents of the details of the proposal, the planning process and the means to engage in the process.

Other consultations and informal discussion held by contributors in undertaking their environmental impact assessments are detailed in the specialist environmental sections of the EIAR, together with details of relevant archives and documentation held by state agencies and organisations

1.12 References

European Communities (Environmental Impact Assessment) Regulations, 1989 as amended;

Planning and Development Acts 2000 to 2018;

Planning and Development Regulations 2001 to 2018;

EU Directive 2011/92/EU as amended by Directive 2014/52/EU;

Department of Housing, Planning and Local Government, 2018, Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment;

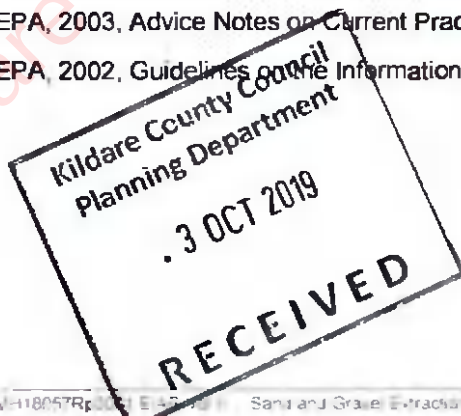
European Commission, 2017, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2001/92/EU) as amended by 2014/52/EU);

EPA, 2017, Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements;

EPA, 2015, Draft Advice notes for preparing Environmental Impact Statements,

EPA, 2003, Advice Notes on Current Practice in the preparation of Environmental Impact Statements,

EPA, 2002, Guidelines on the Information to be contained in Environmental Impact Statements





2 ALTERNATIVES

2.1 Introduction

This chapter sets out the context in which the main reasonable alternatives to the proposed development were considered by Kilsaran and an indication of the main reasons for the final project chosen, taking into account the effects on the environment. It outlines the main operational alternatives considered by Kilsaran to meet the identified objective of the proposal set out in Chapter 1 of this EIAR.

The consideration of alternatives has been undertaken by a multi-disciplinary technical, environmental and planning project team and is considered to have concluded with the identification and selection of a solution that provides the best balance between technical, environmental and community / social indicators.

The 'Do-Nothing' alternative was also considered to retain Racefield in its current condition; greenfield site, which is used for agricultural use as pasture and arable lands.

The 2002 EPA Guidelines highlighted three different categories under which alternatives should be considered. This has since been expanded to five categories in the draft 2017 EPA Guidelines the applicability of which has been considered within this chapter including the following:

- Alternative Locations;
- Alternative Layouts;
- Alternative Designs;
- Alternative Processes, and
- Alternative Mitigation Measures.

Within these scenarios, a number of 'Do-Something' alternative scenarios were considered within the analysis.

2.2 Legislative Context

Identification and assessment of possible alternatives to the proposed development is an important part of the EIA process in order to ensure the proposed development is optimal in terms of location, land use and environmental impacts. Article 5 (1) (2) of Directive 2014/52/EU requires that the EIAR provided by the Development must address:

'A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'.

The 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment', August 2018, prepared by the Department of Housing, Planning and Local Government indicates, state that for 'reasonable alternatives':

4.12. *The Directive requires that information provided by the developer in an EIAR shall include a description of the reasonable alternatives studied by the developer. These are reasonable alternatives which are relevant to the project and its specific characteristics. The developer must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment.*

4.13. *Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. A 'mini- EIA' is not required for each alternative studied.*

The draft 2017 EPA 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' also notes that reasonable alternatives relate to matters such as project design, technology, location, size and scale. They also note in terms of 'alternatives that *'the objective is for the developer to present a representative range of the practicable alternatives considered.'*

The key environmental and practical considerations which influenced the design of the proposed development and alternative layouts on the subject lands included the following:

- The topography of the subject site and the potential recoverable reserve of gravel (determined from ground investigation work completed in 2019);
- The lateral area of the reserve to be excavated, reflecting significant setbacks from the local road to mitigate potential negative landscape, visual, air, noise and human health impacts;
- The existing site features including watercourses, field drains, hedgerows, trees and protected species under the Wildlife Act, 1976, and the Wildlife Amendment Act, 2000;
- An ESB exclusion zone, relating to the 400 kV Moneypoint-Dunstown power line which traverses the site;
- Access and road infrastructure with proximity to the national road network and key transport corridors, namely the R418 and M9;
- Proximity to sensitive receptors including residential properties, schools etc. and the need to minimise disturbance and potential nuisance to the public arising from the extraction and processing operations; and
- Water management regime to eliminate the need to discharge process water from the site.

2.3 Alternative Locations

In support of this EIAR, alternative locations have been assessed for completeness. This section outlines the main aspects which were taken into consideration for the alternative sites for the proposed development.

This is a resource based development and therefore the aggregate reserve can only be extracted where it occurs and where the environmental effects of working these aggregates can be minimised and managed to an acceptable level. The Kildare County Development Plan 2017 – 2023 states that *'The extractive industry depends on the locational siting of the resource. In County Kildare, these resources are concentrated in the slopes of the eastern upland areas and the central uplands. They can also be found in some parts of the transitional lands to the east and south east of the county and also in the north western lowlands'*. As such, this development is not like a physical infrastructure project or other commercial enterprise which can be sited at many locations, this is a resource tied development.

Mitigation suggests that, for the limitation of road traffic, and economic and environmental cost of transport of material it is preferable that extracted material be also processed where it is extracted. However, this is not the only criteria, which determines a suitable location for an aggregates site. Sites are selected based on the following criteria:

- Environmental effects;
- Willing seller;
- Distance from market; and
- Required quality and quantity to justify capital investment, etc.

It is usually the case that where a number of these criteria are not met the alternative is discounted. Over the last number of years Kilsaran Concrete actively look for replacement aggregates sources and development sites within the Kildare area on an ongoing basis in order to continue their business and replace existing supplies that are being worked. In this period, a number of potential sites have undergone a

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review process of suitability. Due to confidentiality processes between the various landowners and Kilsaran Concrete, it would be a breach and violation of this confidentiality to disclose the name and location of each of these sites.

In any event, not all of the sites under review and consideration were discounted for their potential environmental effects. Other reasons for discounting locations included the following:

- The seller at one location sold to a competitor at the last possible moment;
- The deposit at another location was deemed unsuitable after digging trial pits due to high clay content.

Environmental effects which played a part in the discounting of alternative sites included factors such as poor access down unsuitable county roads, too far from the intended market (excessive haulage) or proximity to built-up areas. At one location the deposit was found to be predominantly silty sand and was located a long distance down a narrow local tertiary road that would have required prohibitive investment to upgrade.

2.4 Alternative Layouts

EPA Guidance states 'Alternative layouts can often be devised to consider how different elements of a proposal can be arranged on a site, typically with different environmental, as well as design implications'.

Alternative designs, including alternative layouts within the site were considered, with particular attention being paid to the direction of the phased working. The design and phased layout that was chosen and presented in the accompanying planning application drawings is considered to best minimise the potential impacts on the environment from noise, dust and visual impacts. Alternative designs for the processing plant were considered before the final designs were chosen.

Development of the sand and gravel extraction facility will occur within the land ownership boundary, which is in direct control of Kilsaran. The extraction area has been designed to have sufficient area available to maintain perimeter screening for residential and sensitive receptors.

It is proposed to work the sand and gravel pit in phases so that it will lead only to a gradual land take of 17.2ha over a period of 12 years, instead of immediate overburden stripping and extraction over the full extraction footprint. This gradual land take will not have a dramatic sudden impact on the fauna of the area, instead it will allow them to adapt to the pit workings and relocate to adjoining lands.

The loss of 17.2ha of agricultural lands within the application site can be mitigated against and compensated for, through the provision of boundary buffer planting and restoration of the pit upon cessation of extraction operations.

As the pit will be worked in a phased manner in a south to north direction, with only a gradual removal of the topsoil / overburden as and when is required, this will result in the internal hedgerows being retained for as long as possible. This will result in the proposed development benefiting from additional natural screening and allowing the additional perimeter buffer screening (berms and vegetation planting) to be established before removal of the internal hedgerows.

2.4.1 Sensitive Receptors

When assessing alternative layouts, the sensitive receptors must be considered with a view to select a layout which would minimise the impact of the proposed development on the surrounding environment, and would be the most sustainable solution considering the following:

- Proximity to sensitive human receptors (noise/dust/air quality);
- Buffer zone/perimeter screening;
- Visual impact; and
- Compatibility with existing/proposed infrastructure.

There is a primary school, Ballyshannon National School located circa 1.5km east of the site along the R418, 150m to the north of Ballyshannon Cross Roads. Suncroft National School is located circa 2km as the crow flies and 3.5km via the road network. The school is located 1km off the L4002 to the west of the site in the village of Suncroft.

The 400 kV Moneypoint-Dunstown power line traverses the application boundary. The Health and Safety Authority (HSA) and ESB Networks, under a joint initiative, have published a code of practice (CoP) relating to overhead electricity lines⁴, which came into effect on the 1st May 2019. The CoP outlines exclusion zones and safe operating distances around electricity infrastructure.

In terms of health and safety, there will be formal engagement with the relevant utility providers regarding exclusion and safe operating distances around electricity infrastructure and the CoP will be adhered to in full. Height restriction barriers and equipment will be used onsite to demark electricity infrastructure.

The CoP outlines a hazard zone which is a lateral area near an overhead electricity line which must normally be isolated from the work site by physical barriers. The dimensions of the hazard zone are related to the voltage of the overhead line and in this instance the hazard zone for the 400kV line is a minimum of 10 metres (on both sides of the outside electricity line).

High voltages can arc across a distance in air, and this makes it hazardous to come close to high voltage lines ranging from 10kV to 400kV. An exclusion zone is a region around a live overhead electricity line which must never be breached in order to avoid electrical arcing or flashover. Construction plant and/or materials being lifted or moved must never breach the exclusion zone at any stage. The exclusion zone for operating plant and machinery and materials near a 400kV line is 8 metres.

Field surveys have confirmed the presence of badger activity. Observations included bedding, mammal trail and snuffle holes. In line with best practice an exclusion zone of 30 metres was recommended around those areas of habitat identified as either confirmed/potential badger habitat.

The proposed development includes a new access to the site directly from the L-8006. The new access will intersect a section of the L-8006 where the horizontal alignment is predominately straight, which will maximise forward visibility of the access along the L-8006. The junction radii will be 15 metres. It is considered that 160 metre sightlines will be achievable once the hedgerow is cleared. It is proposed to provide advance warning signage of the new access.

An alternative proposal was examined in which the existing vehicular access to the farm would be altered and upgraded to provide the necessary visibility splays in both directions. The access will be provided with a 20 metre set-back off the carriageway to allow a car or truck to pull in off the public road. The reason for discounting this option is detailed below.

This section compares the alternatives examined which are outlined as follows:

- Option 1: The existing site entrance is located along the L-8006 at the northern boundary of the site adjacent to Racefield House. The use of this site entrance as it currently exists does not provide adequate visibility sightlines. The alteration of the existing site entrance would require the loss of existing mature treeline adjacent to the existing farmyard access and although it would improve sightlines, it would not improve them to the required TII standards

⁴ Health & Safety Authority (May 2019). *Code of Practice for Avoiding Danger from Overhead Electricity Lines, 2nd Edition*

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- Option 2: The proposed development would include for the construction of a new site entrance from the L-8006, located 10 metres from the existing site entrance. This new entrance will have improved sightlines at 160m east and west of the site entrance following clearance of the exiting hedgerow, however the existing mature treeline would be retained. In addition, the diversion of existing ESB line will need to be carried out in consultation with ESB.
- Option 3: The proposed development would include for the construction of a new site entrance from the L-8006, c. 120 metres from the existing site entrance. Although this new entrance would achieve the desired sightlines, it was discounted as the proposal would move the site entrance in close proximity to a residential receptor, thereby resulting in negative impact to this residence in terms of air, noise and increased traffic movements.

In summary, Option 2 is the preferred alternative for the proposed development, as safety is improved with the splayed entrance providing greater visibility and favourable driving conditions.

2.5 Alternative Designs (Remediation Proposals)

EPA Guidance states that 'many environmental issues can be resolved by design solutions that vary key aspects such as the shape of buildings or the location of facilities. Where designers are briefed at an early stage on environmental factors, these can be considered during the design development process, along with other design parameters'. This section outlines the main aspects which were considered for the alternative restoration options for the proposed development. The main alternatives multi-criteria analysis is summarised in Table 2.1.

2.5.1 No Restoration

This scenario is based on the absence of any coherent restoration plan for the site following cessation of extraction operations after 12 years. The void space would remain with pooled groundwater at the base of the pit with 1:2 sloped pit walls extending to the surface. All plant and machinery would be removed to other sites but the pit void would remain unaltered.

In relation to biodiversity, for such a scenario the habitat lost at site enabling (hedgerows, etc.) would remain lost with no active habitat restoration. However, disused gravel pits are known to actively recolonise with locally occurring vegetation and over time there would be some development of wetland and terrestrial habitat at the site. For water quality, there would be limited impact on the quality and quantity of groundwater given the free flowing nature of the gravel bed. Surface water would have limited impact given the absence of any pathway from the pit to the network in the area.

The impacts on population would be largely neutral with limited impact on employment and socio-economic. In terms of human health and dust, there would be potential for slight negative through windblown dust from bare ground but this will dissipate in the short-term as vegetation begins colonising the pit walls. Noise impacts would be neutral given the absence of any activity on site. In short, the impacts on the human environment would be largely neutral for this scenario. The absence of traffic for infilling would be positive for this scenario relative to any active infilling operation.

Land and soil would be a slight negative given that the soil characteristics of the site would be permanently altered and the future land use compromised. Similarly, material assets would be negative given that the potential future use of the site would be severely limited with no restoration undertaken.

In relation to the built environment, landscape would be a significant negative for this scenario with a vacant pit remaining unrestored. While the site is somewhat screened there are sensitive views in the area and hence this is considered a negative impact. The negative impact may soften in time with recolonization by vegetation but the impact remains negative. Cultural heritage would have a neutral impact given the low site sensitivity for this discipline.

2.5.2 Infilling with Virgin Material

This potential scenario involves the progressive restoration of the pit with virgin material (like for like sands and gravels) to restore the land back to natural ground levels for agricultural land use.

This option would be a net negative for material assets in that there is limited economic value in extracting sand and gravel and then importing other sand and gravel for another pit development elsewhere as part of the restoration programme, this scenario is counterintuitive. While there would be a land use positive in restoring the site to natural ground levels, overall this scenario would be a significant negative for material assets.

Similarly, this scenario would be a significant negative for traffic in that the number of haulage vehicles required would be doubled through three million tonnes of material imported for restoration. This negative traffic impact would also result in negative community, air quality, noise and human health impacts along the haul route and in the area around the site.

Landscape impacts would be neutral to positive in that the lands would be restored to natural ground level while cultural heritage would also be neutral. Water and soils would be largely neutral as the site would be restored to the existing soil and groundwater regime.

Biodiversity would potentially suffer a slight negative as restoration of the site to natural ground and agricultural land use would have limited ecological benefit unless hedgerows were fully reinstated. Relative to the no restoration scenario whereby there is potential for natural habitats to develop, restoring to current land use has a neutral to negative impact.

2.5.3 Infilling with Waste Material

Similar to the above scenario but for this alternative, the vacant pit is employed as a landfill or soil recovery facility used to recover waste material to restore the land back to natural ground levels for agricultural land use.

This type of operation is common in Ireland and the greatest potential for this site would be as a soil recovery facility to take inert soil and stone from the construction industry. Such an operation would likely require a waste licence from the EPA to operate and the licensing and enforcing regime employed by the EPA would be designed to mitigate any impact. It is important to note that a soil recovery facility would not require a basal liner like a landfill given the lower risk nature of the material.

Similar to the above scenario, the negatives for traffic, community, noise, air and health would all be identical for this scenario given the traffic volumes anticipated. If the waste material is soil or stone there is limited additional health risk but this would be more significant if other waste streams were infilled.

The significant negative for this scenario relates to water quality as the infilling of waste material below the watertable would have potentially negative implications for water quality and by extension, water dependent ecosystems.

Landscape impacts would be neutral to positive in that the lands would be restored to natural ground level while cultural heritage would also be neutral.

2.5.4 Infilling with Article 27 Material

Under Article 27 of the Waste Framework Directive excess soil and stone produced during construction projects may be classified as a by-product if it meets each of four by-product conditions. Article 27 declarations offer alternatives in certain circumstances, where there is a certain demand for the soil and stone material.

In the Article 27 alternative scenario, the site would be used for accepting soil and stone by-products to infill the void space and restore the site. Unlike the waste scenario, the Article 27 scenario would not be regulated by the EPA and there would be no ongoing enforcement of the site, however, the EPA are involved in the declaration stage at the outset.

There is little variation in the impacts and risk posed by an Article 27 site relative to a licensed soil recovery facility. As such, the concerns relating to water quality and biodiversity are just as pertinent for this alternative as for the waste alternative. Similarly, the potential impact for other environmental disciplines are in line with those presented for the waste scenario.



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2.5.5 Restoration to Park Land

This scenario is considered whereby there is no infilling undertaken at the site but the pit void undergoes some restoration to facilitate park land for the community. Such a parkland may include walking paths, fishing amenity, etc. and restoration of gravel pits have been developed in such a manner in Ireland.

Like the no restoration scenario, this option is positive for traffic relative to the infilling options as there is no need for the importation of three million tonnes of fill material by road. However, there would be some traffic implications around a parkland whereby car parking is required for visitors to the site. This would require the development of additional car parking facilities on the site to cater for visitors and additional visitor traffic would be experienced on the local road. Hence the impact on traffic is neutral to slight positive relative to the infilling operations.

The community impact would be positive through the provision of a community resource in the area with the park land with potential positive impacts on human health and well-being. There would be perceived negative community impacts in relation to public safety, liability, anti-social behaviour, out of hours security, nuisance, littering, long-term maintenance and ownership.

Biodiversity and water would likely have a mixed impact as parkland can involve development of natural capital but this may be impacted by human interference caused by visitors to the park. As such, any habitat development may be disrupted by walkers, cyclists, fishing, etc.

Material assets and landscape would be positive where the community resource was developed sensitive to the surrounding landscape and a valuable resource was developed and used by the community. A key issue for material assets relates to land ownership and liability for the parkland and who (whether Kilsaran, KCC or a third party) takes ownership of the lands and is liable for public safety and the upkeep of the site.

Other parameters are largely in line with the findings of the no restoration scenario considered.

2.5.6 Restoration as an Ecological Resource

Similar to the parkland, this scenario is based on the site being restored as an ecological resource whereby there is no public access to the site but the pit void is employed to generate a mix of terrestrial and aquatic habitat on the site. This is common practice in Ireland and the UK and there are many examples of how sand and gravel pits have developed valuable ecological resources on cessation of extraction.

Clearly there is a significant biodiversity gain for this scenario relative to each of the other scenarios presented in this analysis. The pit walls, the central pond and the stockpiled overburden and topsoil provide the capacity for a range of habitats to be developed with limited works on the site. This option also allows for the compensation of habitat lost in site clearance and the reinstatement of hedgerows and other features for biodiversity.

The other advantages offered by this scenario relative to the park land relate to traffic and material assets. With no public access the ecological site would not suffer with the need for car parking and visitor traffic like the park land. In addition, issues such as public safety and liability are removed from the concerns relating to land ownership and the asset value of the site.

Other positives such as landscape are the same as that for the park land relative to the no restoration scenario while the remaining parameters are largely neutral and in line with the park land scenario.

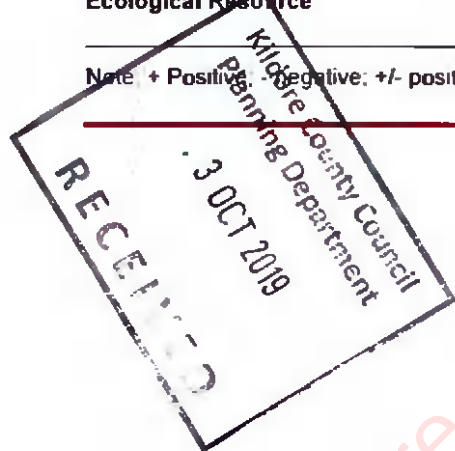
2.5.7 Restoration Conclusion

Based on the multi-criterion analysis presented in Table 2.1, the restoration of the site as an ecological resource is the preferred option and is proposed in this EIAR as the proposed development. Further details are provided in Chapter 3 (Project Description) and Chapter 5 (Biodiversity).

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Table 2.1: Restoration Alternatives Multi-Criteria Analysis

Approach	Population	Health	Biodiversity	Land and Soil	Water	Air Quality and Climate	Noise	Traffic	Material Assets	Cultural Heritage	Landscape
	Environmental Considerations										
No restoration	0	0	+	-	0	0	0	+	-	0	--
Infilling with Virgin Material	-	-	0/-	0	0	-	-	-	--	0	0/+
Infilling with Waste Material	-	-	-	-	--	-	-	-	--	0	0/+
Infilling with Article 27 Material	-	-	-	-	--	-	-	-	--	0	0/+
Restoration to Park Land	+	+	+/-	-	+/-	0	0	+/-	+/-	0	+
Restoration as an Ecological Resource	0	0	++	-	+	0	0	+	+	0	+
Note: + Positive; - Negative; +/- positives and negatives. 0 neutral (reference to do nothing)											



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2.6 Alternative Processes

Kilsaran Concrete is primarily a concrete manufacturing company with expertise and experience in the field of quarrying, aggregates production, concrete manufacturing, road surfacing materials manufacturing and road making.

The consideration of alternative processes is confined to alternative processing for the aggregate products that will be produced at Racefield. In general, the alternative processes that are under consideration only show subtle variation.

EPA Guidance states 'Within each design solution there can be several different options as to how the processes or activities of the project can be carried out, e.g. the management of processes that affect the volumes and characteristics of emissions, residues, traffic and the use of natural resources'.

The method of extraction will be dry and wet working with a long reach excavator used to extract material below the watertable and a wheeled front-end loader will be used to excavate material above the watertable. Various grades of aggregate will be processed on site and these materials will be loaded onto Kilsaran haulage trucks which will deliver the material to market.

For wet workings, the use of a long-reach excavator versus a dragline was considered. Due to the size and depth of the deposit, it is considered that to use a long reach excavator is the most appropriate option. Material excavated in the wet workings will be stockpiled and allowed to drain, prior to being loaded into the tip-in hopper of the processing plant.

Material will be processed using mobile plant which will be located within the pit void. The aggregate processing plant chosen for this proposed development will be crushing, washing (with associated closed circuit silt disposal lagoons) and screening process which is similar to those used in other Kilsaran operations. The processing plant includes washing process using water to remove fine particles. This process results in a wet aggregate which reduces dust generation. The alternative to this process is dry screening which results in greater potential for dust generation and a poorer quality aggregate.

The alternative to utilising mobile plant would be to erect a fixed crushing, washing and screening plant. Fixed plant is considered more appropriate where larger output than proposed is required. Therefore, processing using mobile plant is the preferred option.

2.7 Conclusions

Having regard to the reasonable alternatives considered in relation to the current proposal, the preferred project alternative on which this EIAR is based includes the following:

- The proposed sand and gravel extraction at the Racefield site;
- The construction of a new site entrance from the L-8006 located 10m from the existing site entrance;
- Restoration of the site as an ecological resource; and
- Material processing using mobile plant.

The detailed description of this scenario is presented in **Chapter 3** with an environmental assessment of impact presented in **Chapters 4 to 13** of this EIAR.

2.8 References

European Communities (Environmental Impact Assessment) Regulations, 1989 as amended;

EU Directive 2011/92/EU as amended by Directive 2014/52/EU;

Department of Housing, Planning and Local Government, 2018, Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment,

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EPA, 2017, Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements;

EPA, 2015, Draft Advice notes for preparing Environmental Impact Statements;

EPA, 2003, Advice Notes on Current Practice in the preparation of Environmental Impact Statements;

EPA, 2002, Guidelines on the Information to be contained in Environmental Impact Statements.

Health & Safety Authority (May 2019), *Code of Practice for Avoiding Danger from Overhead Electricity Lines*, 2nd Edition.



3 PROJECT DESCRIPTION AND NEED FOR DEVELOPMENT

3.1 Introduction

This chapter of the EIAR provides a description of the proposed sand and gravel extraction facility, providing details of the key development features, land requirements and construction, operation and restoration requirements. It also includes information to support the need for the development within the construction market.

The description of the project is presented in the following sections and provides a general description of the site in its current greenfield state and a description of the proposed development to include the proposed site facilities (how the site will be organised), proposed operations (how the extraction activities will take place) and the proposed restoration plan of the site.

It should be noted that the surveys, assessments and information that form the basis of this EIAR are based on the details of the project as described in this chapter, which has been developed to a stage that permits a fully informed EIA to be carried out by the competent authority.

It should be noted that while this chapter provides a general description of the site, each subsequent specialist environmental chapter provides a further description of the specific characteristics of the site and wider environment in the context of that specific topic.

3.2 Extractive Industries

Extractive industries are important for the supply of aggregates and construction materials and minerals to a variety of sectors, for both domestic requirements and for export. Unlike most other forms of development, minerals can only be worked where they are found. This means that the spatial distribution of mineral resources and consequently the potential for workings is dictated by geological considerations and not by the demands of human geography. The construction materials sector is a strategically important one, as without its products, our built environment would simply not exist in its present form⁵.

3.2.1 Aggregates and Concrete Products Industry Overview

Aggregates (stone, sand and gravel) are critical for the development and maintenance of Ireland's built environment, infrastructure and for our people's quality of life. They are used directly as key construction materials and are used in the manufacture of a large range of products including ready-mixed concrete, concrete blocks, concrete roof tiles, precast concrete units and asphalt. Ireland's economy could not function without aggregates which touch virtually every aspect of our lives – in housing, schools, hospitals, offices, roads, rail, airports, water infrastructure and agriculture.

As an example, over 300 tonnes of aggregates are required to manufacture the building materials used to construct a typical single urban house, with substantially more required in a one-off rural dwelling. Aggregates are also used extensively in the construction, upgrade and maintenance of Ireland's 98,000 km road network and other essential transport infrastructure such as bridges, car parks and footpaths.

In essence, aggregates underpin the economy and are the backbone of sustainable construction in Ireland, without which modern and future living would not be possible.

The Irish Concrete Federation (ICF)⁶ reported that there were 500+ active quarries and 200+ concrete manufacturing plants with an estimated 5,000 people employed directly in the aggregates and concrete

⁵ Competitive Analysis of the Construction Materials Sector on the Island of Ireland – an Update; November 2015

⁶ The Irish Concrete Federation (ICF) is the national representative organisation for the Irish aggregates and concrete manufacturing industry. ICF has 90 members operating in approximately 300 locations throughout Ireland and members are involved in the manufacture of aggregates and concrete products for supply to the construction industry.

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products industry in 2017. The ICF also states that every year over 7 tonnes of aggregates per head of population is placed on the market by the aggregates industry and in 2017 there was > 7 million tonnes of sand and gravel produced in Ireland as illustrated in Figure 3.1.

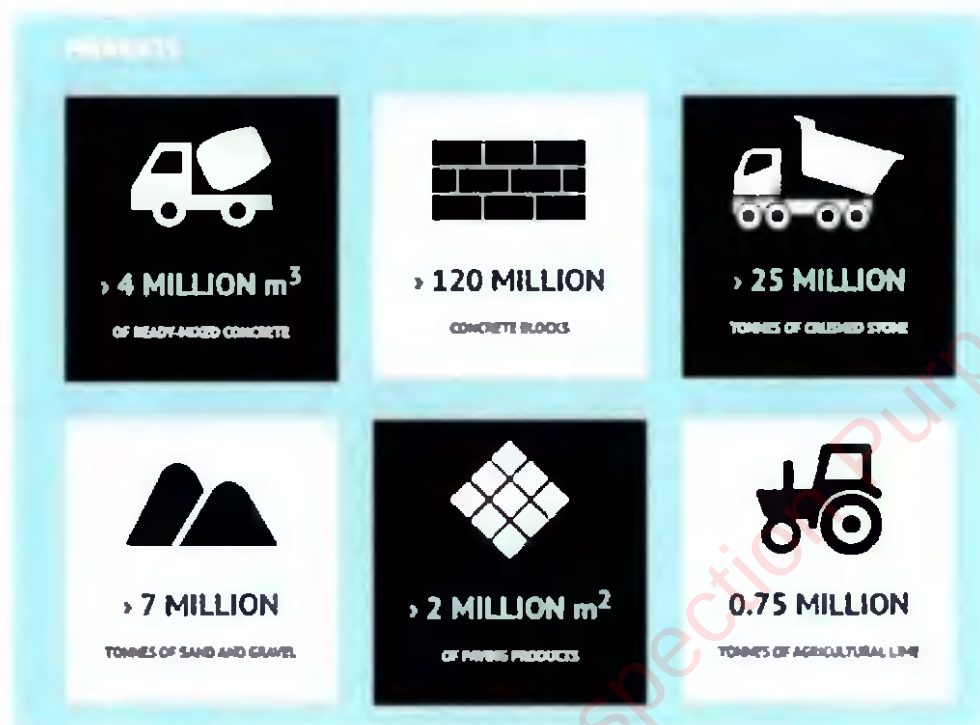


Figure 3.1: Irish Quarrying and Concrete Products Industry 2017 (Source: ICF)

The estimated output of land based aggregate and aggregate derived construction materials in Ireland since 2013 is outlined in Table 3.1. This level of output occurred at a time of limited demand as a result of the impact of the recession and the corresponding reduction in house building, commercial development and government infrastructure spending⁷.

Table 3.1: Irish Aggregate and Aggregate Based Materials Production

Year	Aggregates (Million tonnes)	Sand and Gravel	Total	Ready Mixed Concrete (million m ³)	Concrete Blocks (million units)
2013	20	5	25	2.4	55
2014	21	5	26	3.1	70
2015	22	6	28	3.5	85
2016	26	7	33	4.2	95
2017	26	7	33	4.3	120

Source: ICF, December 2018

The demand for aggregate based construction materials will increase in the coming years, given the launch and publication of the Irish Government's long-term investment plans and strategic investment priorities set out in the National Development Plan 2018-2027⁸. This National Development Plan sets out the significant

Submission by the Irish Concrete Federation on the National Marine Planning Framework Baseline Report, December 2018

Project Ireland 2040, National Development Plan 2018 – 2027 (Government of Ireland, Prepared by the Department of Public Expenditure and Reform, Published February 2018)

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level of investment, almost €116 billion, which will underpin the National Planning Framework⁹ (NPF) and drive its implementation over the next ten years means that aggregate based construction materials will increase in the coming years, given that the houses, roads, schools and other priorities identified in the NDP will require a sustainable supply of aggregates from our national aggregate reserves.

The ICF states that while Ireland currently has a ready supply of high quality aggregate reserves, existing terrestrial reserves at active quarries and pits are being progressively diminished by ongoing extraction activity and are not being replenished at an equivalent rate.

The NPF recognises the essential role of aggregates to the country's economy, growth and development, the wellbeing of its people through incorporation of the following statement:

Extractive industries are important for the supply of aggregates and construction materials and minerals to a variety of sectors, for both domestic requirements and for export. The planning process will play a key role in realising the potential of the extractive industries sector by identifying and protecting important reserves of aggregates and minerals from development that might prejudice their utilisation.

Aggregates and minerals extraction will continue to be enabled where this is compatible with the protection of the environment in terms of air and water quality, natural and cultural heritage, the quality of life of residents in the vicinity, and provides for appropriate site rehabilitation.

This is supported with National Policy Objective 23 within the NPF which states the following:

Facilitate the development of the rural economy through supporting a sustainable and economically efficient agricultural and food sector, together with forestry, fishing and aquaculture, energy and extractive industries, the bio-economy and diversification into alternative on-farm and off-farm activities, while at the same time noting the importance of maintaining and protecting the natural landscape and built heritage which are vital to rural tourism.

3.2.2 Need for the Development

Kilsaran, whose business is primarily in the production of materials for the construction industry, actively look for replacement aggregates sources and development sites within the Kildare area on an ongoing basis in order to continue their business and replace existing supplies that are being worked. The need for the proposed development is twofold. The primary rationale arises from the need for continuity of supply of aggregate materials by Kilsaran to meet the ongoing demands of the construction industry and secondly in response to the need to invest in public infrastructure set out in the National Development Plan.

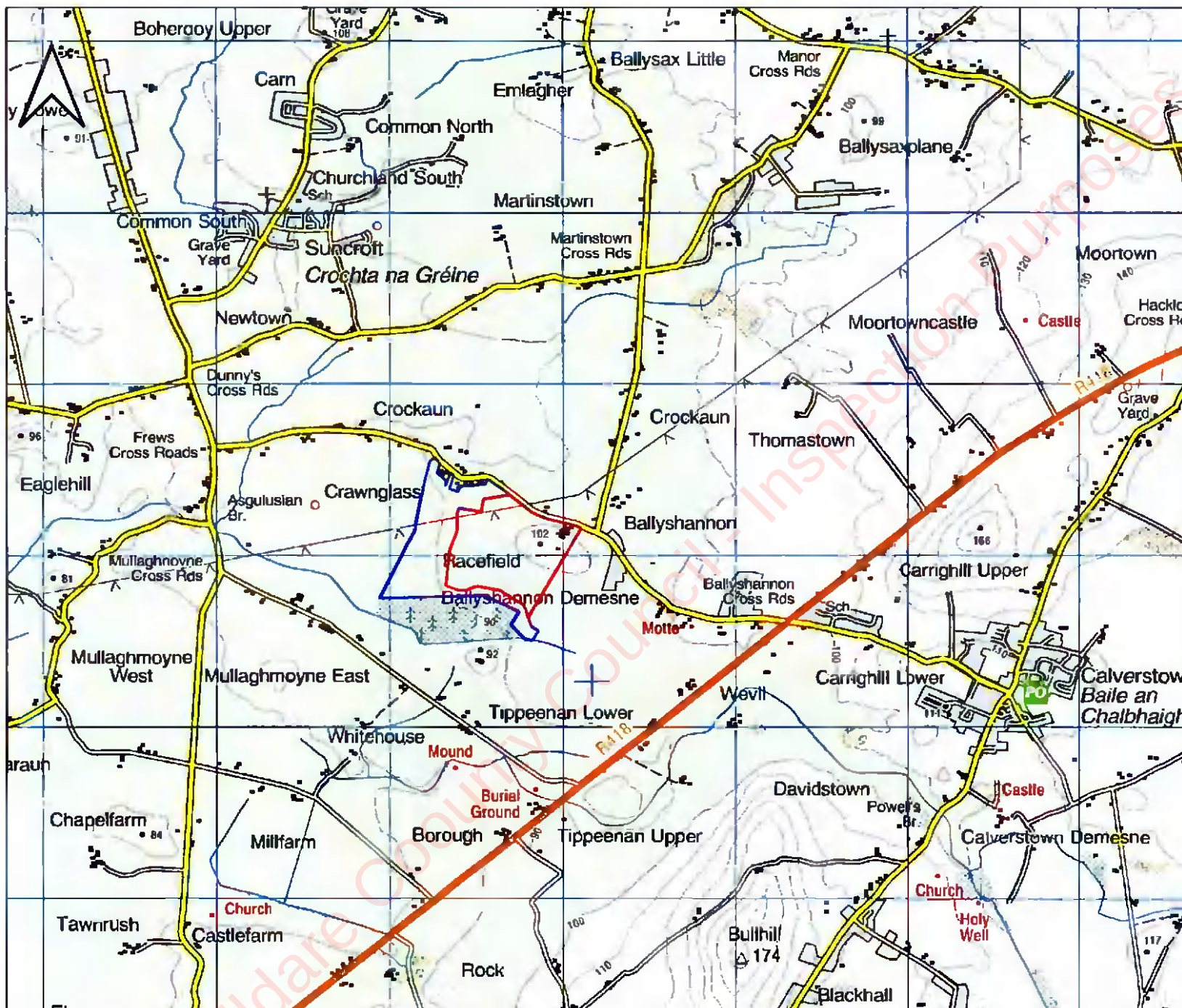
3.3 Project Location

The site is situated in Racefield, Ballyshannon, Kilcullen, Co. Kildare (Irish Transverse Mercator 677608, 705058) approximately 2.5km from Calverstown and approximately 7km from Kilcullen. The site location is shown in Figure 3.2.

The site is accessed via the L-8006 local road which bounds the north of the site which itself is accessed from the R418 to the east at Ballyshannon Crossroads via the L-8007 local road, located approximately 1.3km from the landownership boundary. The site can also be accessed via the L-4002 at Frew's Crossroads, also 1.3km from the landownership boundary.

The land use in the vicinity of the site is typically agricultural with the surrounding fields employed for a mixture of pasture and arable uses. The field pattern in the surrounding area is irregular, variable in scale and is delineated by low-lying hedgerows. There is a commercial coniferous plantation, Clonmoyle Forest under the ownership of Coillte which forms the southern boundary to the site.

⁹ Project Ireland 2040 National Planning Framework (Government of Ireland, Department of Housing, Planning and Local Government, Published February 2018)



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Legend

- Land Ownership Boundary
- Planning Application Boundary

Client **Kilsaran**
build

Project Kilsaran Racefield

Title Figure 3.2: Site Location

Issue Details

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Approved: XX	MH18057-RPS-00-XX-DR-Z-000010
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The human environment in the area consists mainly of residential properties, one-off housing along the local roads including the L-8006 and L-8007 (northern boundary), L-8009 (to the south), L-4002 (to the west) and the R418 (to the east). The nearest residential property to the site is a bungalow located along the L-8006/L-8007 at the northern boundary some 150m from Racefield House (EirCode: R56 D568).

There is a primary school, Ballyshannon National School located circa 1.5km east of the site along the R418, 150m to the north of Ballyshannon Cross Roads. Suncroft National School is located circa 2km as the crow flies and 3.5km via the road network. The school is located 1km off the L4002 to the north-west of the site in the village of Suncroft.

Ballyshannon Stud¹⁰ is located to the north of the site along Martinstown Road, the L-8007. In addition, there is evidence of private domestic use equine related activities in the area with horse gallops, paddocks, horse walkers and stables visible from aerial photography.

Kilsaran's landholding contains a network of drainage ditches (albeit outside the project application area), typical of agricultural landuse and the Eaglehill Stream adjoins the southern boundary of the property. The Eaglehill Stream is not designated as a European site; however, it flows downstream and into the Kildoon River, which is designated within the River Barrow and River Nore SAC. The Kildoon River conflues with the Tully Stream, before it joins the main channel to the fifth order River Barrow located c. 3.9km downstream to the west.

3.4 Description of the Site

3.4.1 Landownership

All lands covered by this application are under the ownership of Kilsaran and the total landownership boundary is outlined in blue in Figure 3.3 and this covers an area of c.58.2 hectares. The application area for the proposed sand and gravel extraction facility covers an area of c.32.2 hectares outlined in red and this is comprised of all or part of eight agricultural fields and the area around Racefield House. The existing ground levels consist of gentle and smooth flowing contours, which vary from circa 85m to 101m AOD.

3.4.2 Existing Landuse

The site is currently in agricultural use, leased to local farmers for use as pasture and arable lands. The application area for the proposed sand and gravel extraction facility is comprised of all or part of eight agricultural fields delineated by hedgerow and the roadside boundary along the northern perimeter consisting of hedgerow.

3.4.3 Access Arrangements

The site is approximately 8.8km southeast of Kildare town. The site is accessed via the L-8006 and L-8007 local roads and the R418 (which is the former N78 National Secondary Road) which connects to the M9 Motorway. The site can also be accessed via the L-4002 at Frew's Crossroads, also 1.3km from the landownership boundary. The site is an approximate 7.5km drive from Junction 2 on the M9.

There is currently one vehicular access from the L-8006 Local Road to the farm yard adjacent to Racefield House, approximately 1.5km west of the junction with the R418. This is the main access point to the site and is currently secured by a lockable gate to prevent unauthorised vehicular access.

The L-8006/L-8007 road travels west from the R418 serving areas of ribbon residential dwellings. This local road is a two-lane single carriageway with sweeping bends in the horizontal alignment in the vicinity of the site and an undulating vertical alignment. Further details on the site access are provided in Chapter 10 Traffic and Transportation including a detailed assessment of road widths along the L-8006/L-8007 from the site to the R418.

¹⁰ <http://www.directoryoftheturf.com/index.cfm>

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There are also four additional existing agricultural access points to the agricultural lands along the northern boundary of the site from the L-8006 local road. These access points are for agricultural vehicles and are secured by gates.

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3.4.4 Services & on-site structures

Racefield House (EirCode: R56 D568) is located within the overall land ownership boundary and consists of a two-storey three-bedroom house of circa 165m² in footprint with adjoining farm yard. The farm yard consists of a cut-stone lofted coach house, two corrugated steel farm sheds and some other small farm buildings. The house is currently vacant. For the purposes of the planning application, the plot on which the house and farm yard sits is included in the development area.

The 400 kV Moneypoint-Dunstown power line traverses the site and there are two large pylons located within the land ownership boundary, the closest some 55m from the northern boundary of the application area. A medium voltage overhead electricity power line runs in a north-west direction to the north of the site. A low voltage three-phase overhead electricity power line runs traverse the site at the unoccupied Racefield House along the northern boundary.

There are no underground gas pipelines traversing the site or within the area. A potable water supply is currently available to the site from mains along the L-8006. No water main traverses the site. No sewer main is located within the site and the existing house is connected to a septic tank.

Telecom transmission poles and lines are evident along the northern boundary of the site. Telecommunications services, including phone and broadband, are available at the site and surrounding area. There is mobile phone coverage available at the site and local area.

3.4.5 Proximity to Residences and Sensitive Human Receptors

There is a linear pattern of residential dwellings to the north of the site along the L-8006, the closest of which is approximately 45m to the proposed extraction area. There are a total of 56 residential properties located within 1km of the proposed extraction area.

There are also a number of sensitive receptors in the locality, including farms and private domestic use equine related activities, two primary schools (Ballyshannon National School located circa 1.5km east of the site and Suncroft National School located circa 2km as the crow flies to the west of site in the village of Suncroft) and a Nursing Home (Suncroft).

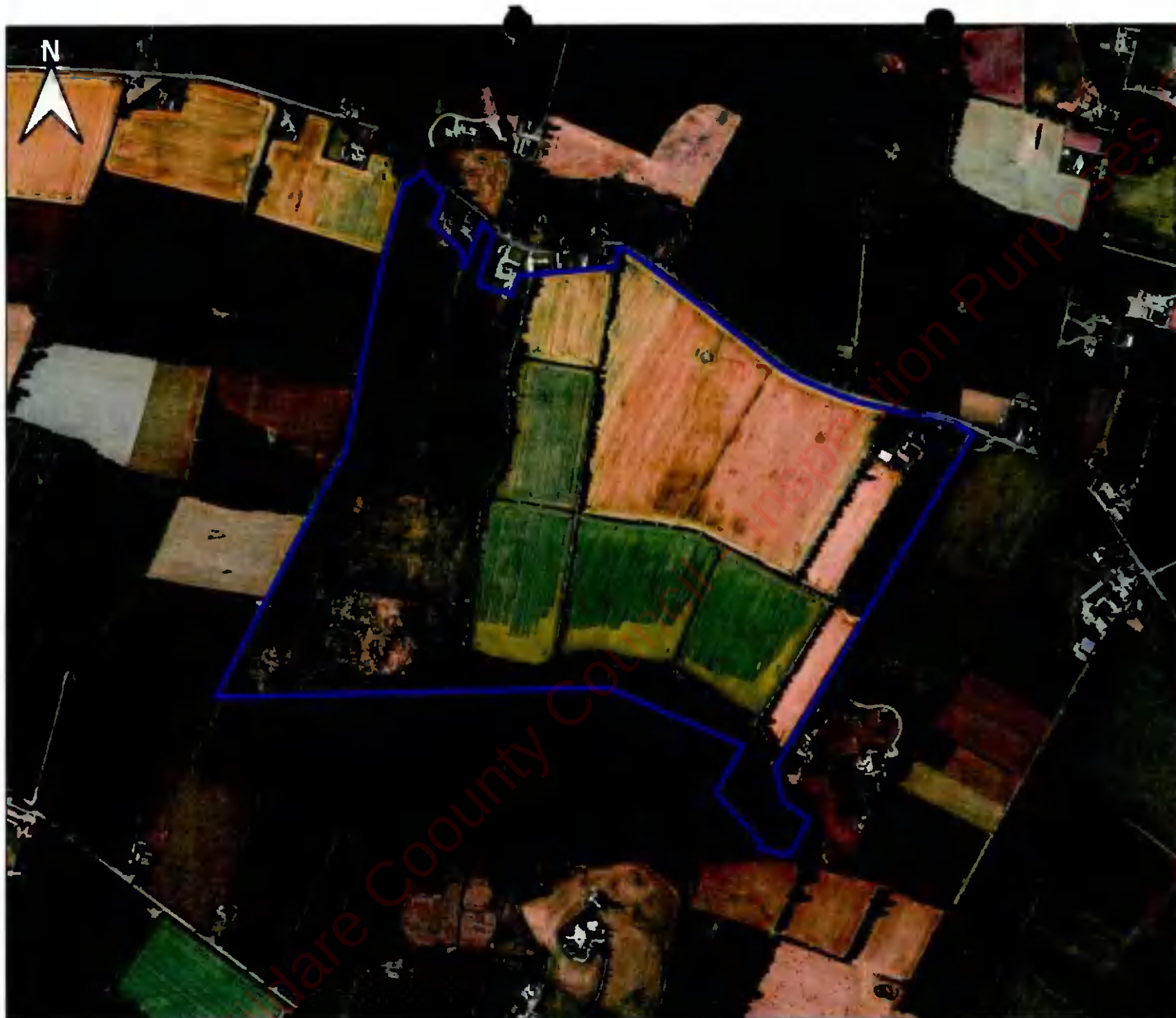
3.4.6 Landscape Character

The application area is located within two landscape character areas. The western part of the application area occurs within the Southern Lowlands and the eastern part of the application area occurs within the Central Undulating Lands. Both of these landscapes character areas are categorised as Class 1 low sensitivity and are described as 'Areas with the capacity to generally accommodate a wide range of uses without significant adverse effects on the appearance or character of the area'. Sand and gravel pits are deemed to have 'high compatibility' with both landscape character areas.

Scenic Route No. 25 is located approximately 1.3km south east of the application area and comprising views to the north-west of Kildare Plains from the R418 south of Moortown House to Tippeen Lower. The elevated nature of the road, which runs through the plains, and the generally low lying hedgerows provide for long distance views over the agricultural plains. The proposed development will lie within the viewpoint of this scenic route and the impact is assessed within this EIAR.

Scenic Route No. 35 is located approximately 4.5km north of the application area and comprising views of Dun Ailinne from the R418 from Moortowncastle to Knockbounce. While the proposed development lies outside the viewpoint of this scenic route, the potential for visual impact from Dun Ailinne is considered.

A designated scenic view is associated with the hilltop at Brewel Hill located over 6km south east of the application area. The application area will have minimum impact on any designated scenic view or route due to the distances involved and local topography of the area. Chapter 13 presents the analysis of landscape and visual impact of the proposed development.



Legend

— Landownership
Boundary

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Client **Kilsaran**
build

Project **Kilsaran Racefield**

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Figure 3.3:
Landownership Boundary

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3.4.7 Protected Ecological Sites

The closest European site to the proposed development is the River Barrow and River Nore SAC (Site Code: 2162), which is located c. 3.9km to the west of the proposed development. This SAC is downstream of the site, via the order 1 Eaglehill Stream and the order 3 Kildoon stream. The proposed development is located with the same Catchment Management Unit (CMU) as the River Barrow and River Nore SAC.

The connectivity of the site to the River Barrow and River Nore SAC and the potential for significant impact is assessed in **Chapter 5, Biodiversity** and in the **Natura Impact Statement (NIS)**.

3.4.8 Cultural Heritage

There are no registered monuments (RMP / SMR sites) within the proposed sand and gravel extraction site. The National Monument of Dún Ailinne is located 4.5km to the northeast and is visible from a small part of the proposed development.

The closest known archaeological site is an archaeological complex within Ballyshannon Demesne, 830m east of the application site. The existing 19th century St. James' Church is on the site of an earlier Medieval church and graveyard.

The townland of Racefield does not contain any protected structures or any structures recorded in the National Inventory of Architectural Heritage. A late 19th century farmhouse known as Racefield House is located in the northeast corner of the proposed development site. Ancillary buildings include a large stone barn, sheds and a high garden wall which has been incorporated into a farm building.

3.5 Site History

Historic mapping (1837-1842) shows Racefield with much the same field delineation patterns as today. Racefield House is not present at this time. Ballyshannon Demesne is located adjacent to the site. Subsequent mapping (1888-1913) shows the presence of Racefield House. Ballyshannon Demesne indicates the presence of a graveyard, church, mound, moate, Ballyshannon House and the site of Ballyshannon Castle is featured and labelled on the mapping.

Racefield was in the Jackson family for over 100 years and the name originates from the time it was used as a racecourse when the British army was garrisoned in the Curragh. Since early 1900, the farm has been associated with the bloodstock industry.

There are no historic planning permissions relevant to the current proposal associated with the lands but several applications are noted in the vicinity relating to single rural dwellings, many of which have been constructed including:

- An application for planning permission was granted by KCC in September 1997 for a bungalow, garage and septic tank at Racefield, Ballyshannon (Reg. Ref: 97491).
- Planning permission was granted in October 2002 for a dormer bungalow and associated works at Racefield, Suncroft, Co. Kildare (Reg. Ref: 02973). This is located approximately 400m north west of the extraction area.
- Permission was granted for another bungalow with associated works at Racefield, Suncroft in June 2006 (Reg. Ref: 03276). This site is located approximately 260m to the north west of the extraction area.

3.6 Do-Nothing Scenario

The 'Do-Nothing' scenario refers to a scenario whereby the site would remain in its current condition as an agricultural land holding. The lands are currently owned by Kilsaran and leased to local farmers for use as pasture and arable lands and this arrangement would likely continue until such a point that Kilsaran sought to divest the lands in the future.

The EIA Regulations require a description of the relevant aspects of the current state of the environment (baseline conditions) as well as and an outline of the likely evolution thereof without the development. In this EIAR this scenario is referred to as the 'Do-Nothing' Scenario and the evolution of the baseline in the absence of the proposed development is addressed in each of the relevant environmental disciplines presented in this EIAR.

3.7 Development Description

This section provides a description of the proposed development and considers all relevant aspects of the project life cycle. There will be a small element of construction required for access improvements, site infrastructure, topsoil/overburden stripping and construction of silt lagoons and perimeter screening bunds. However, the main element of the development will be the extraction and processing of sand and gravel on site and the small construction phase will run concurrently with this extraction (operation) phase. As such, these phases are combined for the purposes of this impact analysis and for the purposes of this EIAR, the phases assessed under each environmental topic are as follows.

- Construction/Operational Phase - this phase constitutes:
 - Enabling works (works required for new site access, treatment of hedgerows, utility diversions, establishment of site welfare facilities, etc.);
 - Site preparation works including topsoil & overburden stripping from the extraction area;
 - Extraction and on-site processing of gravels that includes crushing, washing (with associated silt disposal lagoons) and screening;
- Restoration Phase - this phase constitutes:
 - The restoration of the site to a mix of terrestrial and freshwater wildlife habitat following cessation of all extraction and removal of all plant and equipment from the site. There will be some environmental monitoring carried out during this period

A proposed operational layout is shown in **Figure 3.4**

3.7.1 General Description

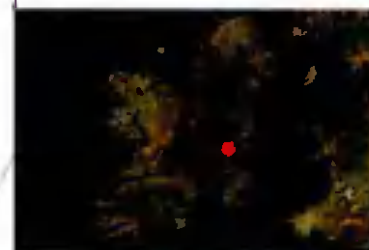
The proposed development consists of a new sand and gravel extraction development and related ancillary site works over the application site area of c.32.2 hectares and will consist of:

- Extraction of sand and gravel within an extraction area of c.17.2 hectares using both wet and dry extraction processes at a rate of 250,000 tonnes per annum to a total extraction volume of circa three million tonnes of sand and gravel;
- On site processing of extracted sand and gravels including crushing, washing (with associated closed circuit silt disposal lagoons) and screening prior to export off site and all ancillary works and structures;
- Installation of site facilities consisting of prefabricated canteen facility, welfare facilities, bunded and covered fuel tanks, weighbridge, wheelwash, packaged waste water treatment system and perimeter screening berms;
- Ancillary site works include a new access point onto the public road adjacent to Racefield House along the L-8006 local road; and
- Final restoration of the site to a mix of terrestrial and freshwater wildlife habitat.

The proposed extraction operational period is for 12 years with 2 years to complete restoration (total duration sought 14 years).



Legend	
Boundaries	
—	Land Ownership
—	Planning Boundary
—	Extraction Boundary
	Site Compound
	Silt Lagoon
	Seeded Earth
	Overburden Storage
—	WFD RIVER
—	Wet Drainage Ditch
	Racefield



Client **Kilsaran build**

Project **Kilsaran Racefield**

Title **Figure 3.4
Operational Site Layout**

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Issue Details			
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3.7.1.1 Aggregate Reserve Assessment & Extraction Rates

The volume, lateral extents and depth of overburden have been determined by ground investigation work completed in 2019 and undertaken by Kilsaran Concrete Unlimited.

The total recoverable reserve of gravel from within the proposed extraction area is estimated at three million tonnes. This is based on a final extraction design to a maximum depth to c.83.0m AOD within the extraction area. The lateral area has been established reflecting significant setbacks from the local road that mitigate potential negative landscape, visual, air, noise and human health impacts.

It is anticipated that extraction would be carried out at a rate of up to 250,000 tonnes per annum. This annual output would be considered small in comparison to typical mineral extraction developments.

The area to be excavated currently ranges from 93m to 101m AOD at its centre with overburden at an average depth of 2.0m as determined from site investigation work in 2019 and referred to in **Chapter 6, Land, Soils, Geology and Hydrogeology of this EIAR.**

3.7.1.2 Restoration Phase

As the groundwater level is close to the surface (circa 10-12 metres below current ground levels), extraction of aggregate will also be undertaken below the watertable. Material extraction below the watertable will result in the creation of an artificial lake which will be fed by the surrounding groundwater body.

Upon the cessation of extraction operations, the site will be restored to landscaped habitat lake capable of supporting many local terrestrial and aquatic habitats and associated wildlife. The primary focus in this restoration process will be treatment of the banks and surrounding hinterland so that they have good suitability for the development of habitats for a variety of species and restoration of any habitats lost during the operation phase (e.g. hedgerows).

3.7.2 Site Establishment (Enabling Works)

These are the works that are required in advance of proposed operations and include works required for access improvements, treatment of hedgerows, mitigation of badgers prior to construction, utility diversions, establishment of site welfare facilities, canteen, etc. The new site access and site compound is shown in detail in **Figure 3.5.**

3.7.2.1 Utility Diversions

ESB Network electricity poles and associated overhead low voltage three-phase electricity lines are present along the northern boundary of the site on the L-8006 local road. This overhead power line will be appropriately rerouted underground to accommodate the proposed site entrance and associated infrastructure and a connection will be agreed with the utility provider (ESB Networks) to ensure there are no significant impacts on the electricity supply to the local area.

3.7.2.2 Treatment of Hedgerows/ Boundary Treatment

It is proposed to cut back a section of the hedgerow and lower the boundary treatments on both sides of the proposed site access (which are under the ownership of the applicant) to optimise sight visibility in both directions of the access junction. Vegetation clearance will be undertaken outside of the bird nesting season (1st March to 31st August) or under the supervision of a suitably qualified ecologist.

3.7.2.3 Provision of New Site Access

It is proposed to provide a new access to the site directly from the L-8006 and a new 7.5m wide access road to the site compound and pit. The new access will intersect a section of the L-8006 where the horizontal alignment is predominately straight, which will maximise forward visibility of the access along the L-8006. The junction radii will be 15m. It is considered that 160m sightlines will be achievable once the hedgerow is cleared. It is proposed to provide advance warning signage of the new access under agreement with KCC Roads Department.

The boundary treatment at the site entrance will be sympathetic to the existing hedgerow boundaries in the area. Boundaries will consist of a secure metal fence (green in colour) coupled with planting of a parallel hedgerow that will establish and screen the fence over the lifetime of extraction.

Security gates will be provided for general security and set back from the road to allow vehicles a location to temporarily park off the public road while awaiting processing through the weighbridge.

3.7.2.4 Establishment of Site Infrastructure

The site establishment will include the development of hardstanding areas and site compound area in advance of the proposed operations. Following completion of the new site access the internal access route from the site access to the site compound area will be constructed and paved with a macadam surface. The access road from the weighbridge to the pit will be unpaved.

3.7.2.4.1 Site Compound

The site compound will consist of a portacabin with a canteen and welfare facilities. Five car parking spaces and bicycle parking facilities will be provided within the site compound.

3.7.2.4.2 Power Supply

There are no utilities or services crossing the proposed extraction area. An established ESB connection is in existence at Racefield House, which is located within the land ownership boundary. It is proposed that any power supply requirements associated with the on-site facilities will connect to this power supply.

3.7.2.4.3 Water Supply

There will be a requirement to supply potable water for human consumption to the welfare facilities at the site compound. The nearest public watermain operated by Irish Water (IW) is located on the L-8006 local road that bounds the site to the north. Racefield House which lies within the proposed application area is connected to this watermain. This watermain will supply potable water for human consumption to the welfare facilities and canteen contained in the portacabin.

The design and construction of the connection will conform to the current version of the Civil Engineering Specification for the Water Industry (CESWI), subject to the particular requirements applied to it by Irish Water, as outlined in the *Code of Practice for Water Infrastructure and outlines design and construction for developers (IW-CDS-5020-03)*.

A Design Submission will be prepared for issue to Irish Water through the standard procedures for such applications. This will be followed by the subsequent Connection Application subject to the agreement on the Design Submission.

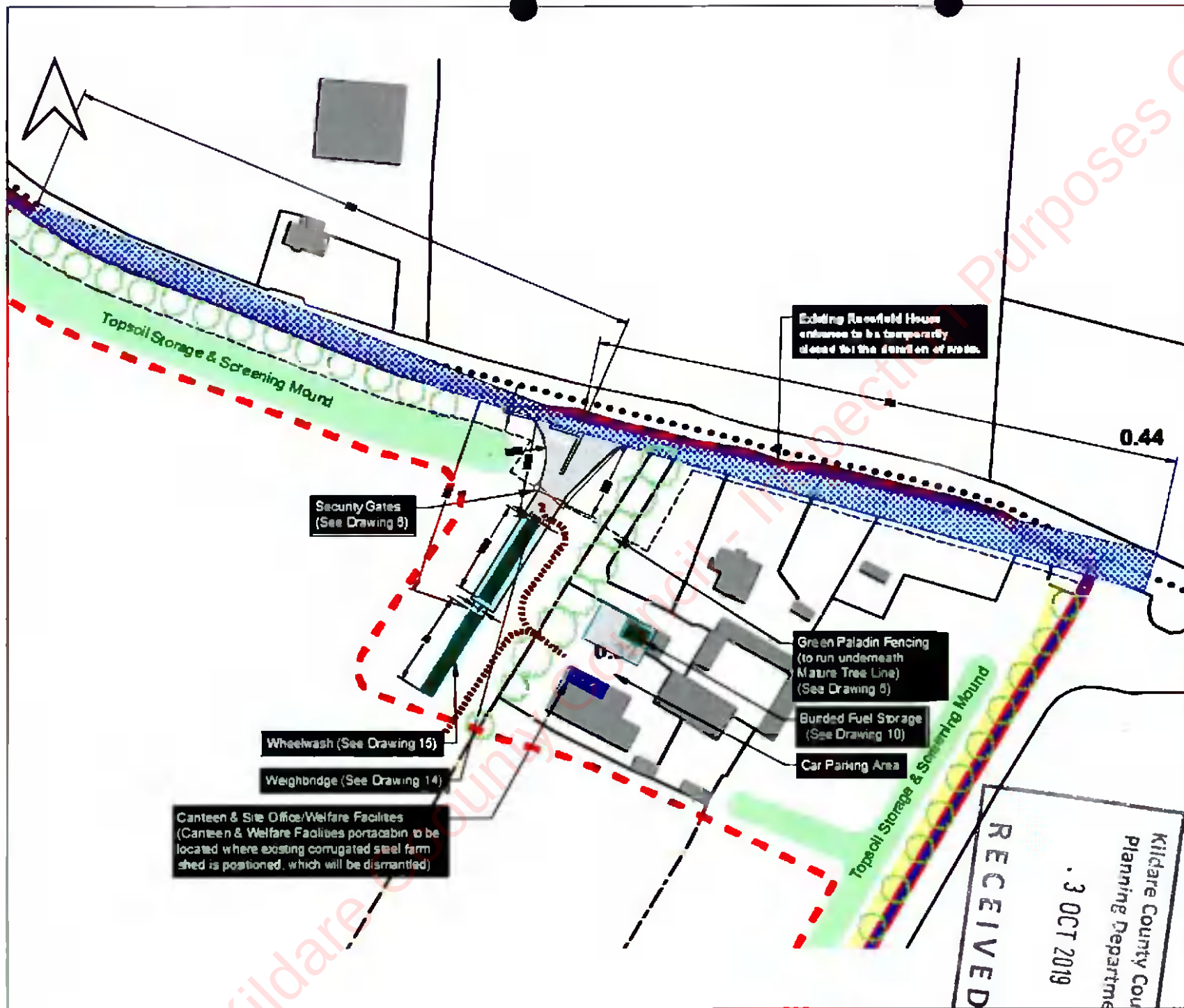
It is proposed that a new 'self-lay' 100mm diameter PE100 Class C watermain (complying with *BS EN ISO 1452-5:2009 Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure. Unplasticized poly(vinyl chloride) (PVC U). Fit for purpose of the system*) will be connected to existing IW watermain on the L-8006.

All new watermains will be overlaid with warning tape and tracer wire. The watermain will include the following as required:

- It is not proposed to install a flow metering system given the low projected usage and this will be agreed with IW through the connection process;
- A sluice valve, a straight length of pipework at least 10 times the meter diameter upstream of the meter, approved water meter, a straight length of pipework at least 5 times the pipe diameter downstream of the meter and a sluice valve; and

Air valves stop cocks and a fire hydrant will be installed as required through the design.

Prior to connection to the IW watermain, the testing and commissioning (flushing, cleaning, disinfection, sealing, etc.) of the site watermain will be undertaken in line with IW protocols.



Legend

Site Compound

Boundaries

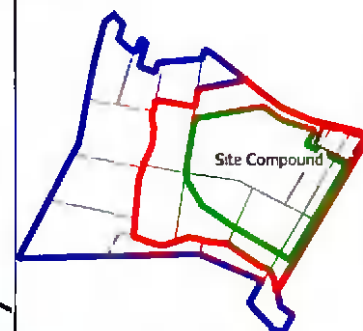
Landownership

Planning Application

Limit of Excavation

Ledgend for Map Below

Main map shows a detailed drawing of the site compound layout



Client: **Kilsaran build**

Project: **Kilsaran Racefield**

Figure 3.5:
Layout of the Site Entrance
and the Site Compound

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The layout drainage layout will be as per the typical layout for water mains within developments as presented in *IW Water Infrastructure Standard Details, Connections and Developer Services, Construction Requirements for Self Lay Developments (Ref. IW-CDS-5020-01 Rev. 03 December 2017)*. The Design Submission will be prepared in line with this guidance document as required by IW procedures.

3.7.2.4.4 Foul Drainage

Sanitary effluent water will be generated from the canteen, toilet and wash facilities within the site compound for the 3-4 persons directly employed on the site and Kilsaran hauliers using the site. All effluent will be collected in a sealed underground pipe network by a gravity system consisting of a 150mm diameter uPVC pipe laid underground at maximum gradients of 1 in 100 from the canteen and discharged to a packaged treatment plant with treated effluent percolated to ground through a polishing filter.

A site suitability assessment has been carried out on the site in June 2019 in accordance with EPA Code of Practice for Wastewater Treatment and Disposal Systems Serving Single dwellings (October 2009). The site assessment was undertaken by Trinity Green Environmental Consultants and the report on this assessment is included in **Appendix 3.1 in Volume III** of this EIAR.

The assessment considered the suitability of the site for a development with three workers full time on site and up to five drivers periodically on site using the canteen and welfare facilities (worst case maximum of 10 workers full time). Based on this number of employees the analysis is based on the following design criteria:

- 40 litres/worker and 5 litres/driver Hydraulic Loading.
- 25 grams BOD/worker and 10 grams BOD/driver Biological Loading.
- This equates to a total PE of 3.

The report recommends that, based on this PE and the site conditions, the installation of a packaged aeration system and to polish the effluent through a soil polishing filter using a pressurised effluent distribution system.

As the watertable is in excess of 2mbgl, the base of the distribution gravel can be at 500mm bgl. A layer of 200mm washed gravel is placed on the surface of the prepared area. Distribution system (32mm diameter) is placed on this and covered with 100mm gravel. This is covered with geotextile and finished with 200mm soil. Based on a PE of 3 and hydraulic load of 400 litres, the T-value is in excess of 50 so the maximum loading rate is 3 litres/m². There is therefore a requirement for 150m² soil polishing filter.

The design specification (Oakstown BAF 6 PE wastewater treatment system) for the proposed treatment system is included in **Appendix 3.2 in Volume III** of this EIAR. The Oakstown BAF 6 PE is designed to provide proven, cost effective primary and secondary wastewater treatment in robust steel reinforced concrete tanks. The primary sedimentation chamber has a 2.2m³ capacity to allow anaerobic digestion to occur naturally while letting sludge settle on the tank floor. Once primary treatment has taken place the effluent is further degraded in the aeration chamber where oxygen enriched wastewater provides ideal conditions for aerobic bacteria to thrive. Before pumping to the percolation area, the clear water is left to further settle in the clarifier chamber to eliminate any remaining settleable solids.

3.7.2.4.5 Surface Water Drainage

The new hard stand at the site compound includes the new access road up to the wheelwash, the refuelling area and the car parking area. To cater for the storm water generated by this additional hard stand, a dedicated storm water management system is included in the design. This sustainable drainage system incorporates the following elements:

- Capture the storm water generated from all hardstanding areas through a network of gullies and underground pipe network;
- Treatment of the storm water by means of a hydrocarbon interceptor which is designed to mitigate any potential for discharge of polluting substances from the site.



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- Discharge of the treated storm water to a suitably sized soakaway at greenfield run off rates.

The surface water design for the access road has been carried out in accordance with requirements of BS 752; the Greater Dublin Strategic Drainage Study (GSDSDS) and the 'Recommendations for Site Development Works for Housing Areas' – published by the then Department of the Environment

To comply with the GSDSDS and best practice design, it is proposed to limit the discharge from the area to greenfield runoff rates through the use of flow control unit. The principal behind SuDs is to reduce the quantity of discharge from developments to pre-development flows and also to improve the quality of run-off from proposed developments.

Implementing the design standards of the GSDSDS, the surface water drainage system takes into account the recommendations of the GSDSDS and utilises SuDs (sustainable urban drainage) devices where appropriate. The layout of the site has been designed to collect surface water runoff from the access road and associated hard stand areas within the development. From here the water will be collected and then discharged via a Class 1 bypass interceptor to a soakaway and allowed to exfiltrate to ground at the appropriate greenfield run off rates.

The infiltration rate applied was attributed for the site compound based on the results of the infiltration tests undertaken on site and also the resulting run-off calculated for different duration storms. The peak total run-off volume occurs after six hours, although run-off rates are greater for smaller duration events. The maximum total run-off for the site has been estimated to be 42m³ for a six hour event. Thus, the soakaway will be sized to provide 42m³ storage for surface water run-off.

3.7.2.4.6 Wheelwash

A wheelwash facility will be provided in close proximity to the site entrance but sufficiently distant from the public local road and this will be used during the lifetime of the proposed operation. All Kilsaran aggregate haulage vehicles leaving the site will be required to exit through the wheelwash to reduce the potential for dust and mud being carried to the public roads. The wheelwash will be distant from the public local road to ensure that the undercarriage of haulage vehicles will be 'dnp dry' prior to exiting the site to reduce the likelihood of dust deposition or deposition of material on the public road from soiled water draining from the bodies of the haulage vehicles. Water for the wheelwash will be supplied from the groundwater sump within the pit.

3.7.2.4.7 Weighbridge

All vehicles exiting the site will also be required to pass over a weighbridge which will also be provided at the site entrance. A barrier system will operate at the weighbridge controlling vehicular access to authorised Kilsaran trucks only. The provision of the weighbridge will ensure that all materials leaving the site are tracked and recorded and that vehicles are not overloaded.

3.7.2.4.8 Refuelling Area

A designated refuelling area is to be located adjacent to the site compound to cater for mobile plant on site only. Road haulage vehicles will source their fuel at alternate Kilsaran operations. To that end a double skinned and bunded single chamber tank with storage of green diesel for on-site mobile plant will be provided.

The refuelling area will be concrete hard stand and will drain to a central gully to collect any spillages. The gully will be connected by an underground pipe to the hydrocarbon interceptor.

Some hydraulic oils and waste oils will be stored onsite. These will be contained inside a bunded area and disposed of accordingly using a licensed waste contractor.

The 400 kV Moneypoint-Dunstown power line traverses the application boundary. In terms of Health and Safety, there will be engagement with utility providers regarding exclusion and safe operating distances around electricity infrastructure and the ESB Code of Practice and HSA guidance¹¹ will be adhered to. The hazard zone for the 400kV line is a minimum of 10m (on both sides of the outside electricity line). The exclusion zone for operating plant and machinery and materials near a 400kV line is 8m. Height restriction barriers and equipment will be installed onsite to demark electricity infrastructure for the duration of works.

Vegetation clearance within the proposed extraction area will be undertaken outside of the bird nesting season (1st March to 31st August) or under the supervision of a suitably qualified ecologist.

Overburden is the material that must first be removed before the underlying sand and gravel reserve can be accessed and extracted. This will be done on a periodic basis by a dedicated stripping crew, to limit the areas of topsoil/overburden stripping exposed at any one time. The typical proposed operational equipment will consist of a dozer, excavator and two dump trucks.

Overburden stripped to obtain access to the sand and gravel resource will be either utilised directly for construction of screening mounds or placed in the overburden storage area. The location of the topsoil and overburden storage areas are to the east, north and west of the site as shown in **Figure 3.4**. Stockpiles will be laid out to provide a local undulating terrain similar to the existing topography to minimise visual impact.

3.7.3.4 Silt Lagoons

The traditional site treatment of process water (from aggregate washing plants) and surface run-off to reduce suspended solids is by means of settlement lagoons¹². It is proposed that a minimum of three closed circuit silt disposal lagoons will be provided in the south eastern corner of the extraction application area. Refer to **Figure 3.6** for greater details of the proposed silt lagoons.

The theory behind the design of the silt lagoons is the application of Stoke's Law. The primary purpose of the silt lagoons is to remove suspended solids derived from the washing process and will operate as a closed system, which allows for the re-cycling of water for use back in the processing plant. The design of the settlement lagoons has been undertaken in accordance with the EPA guidance *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (2006).

In terms of the water balance on site, the key criteria are outlined below:

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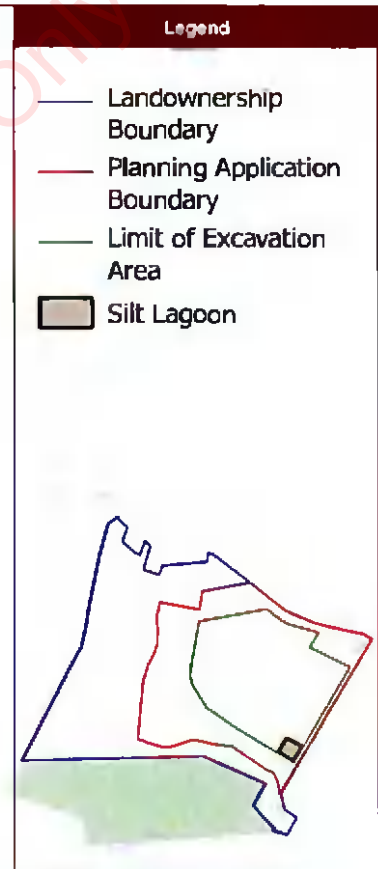
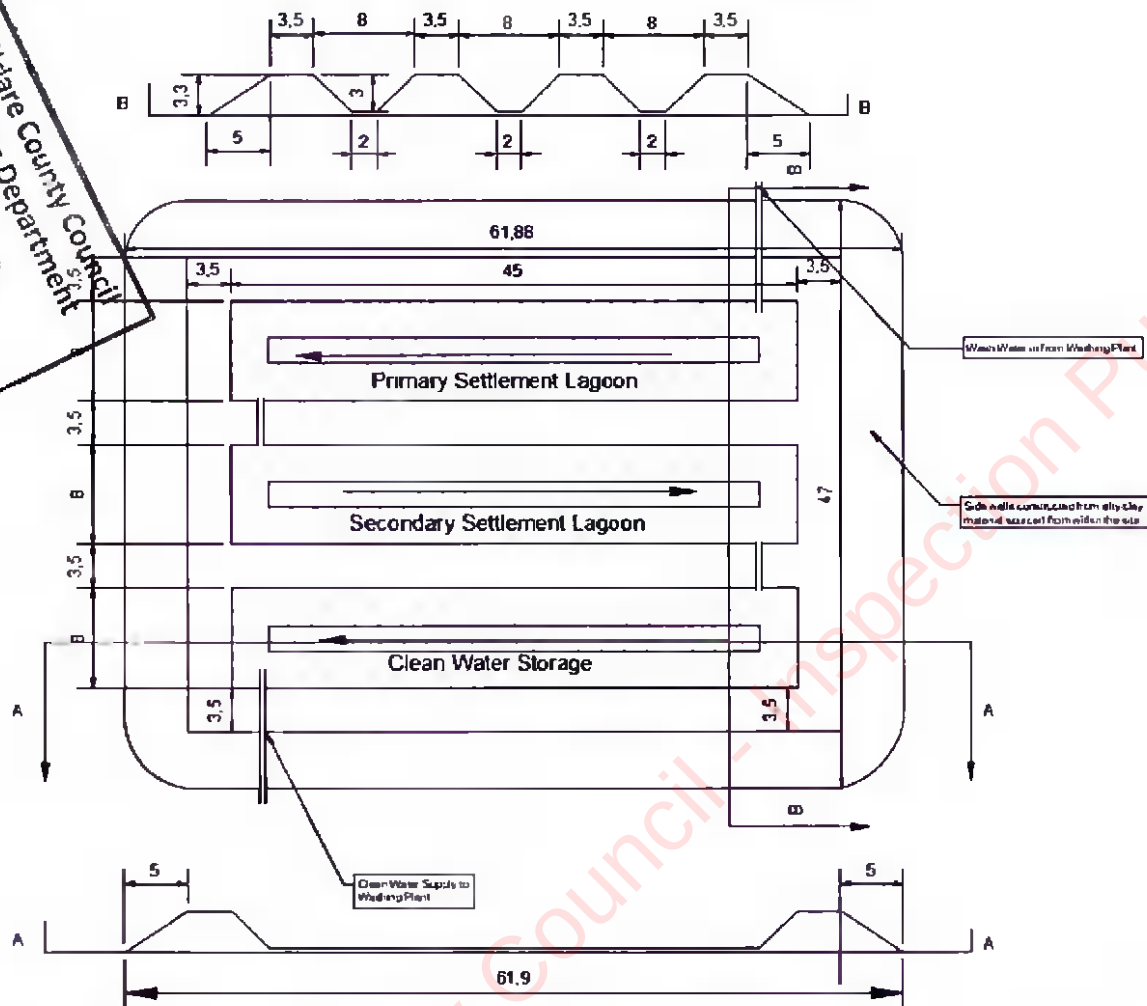
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- The proposed washing plant uses water at a rate of circa 136m^3 per hour. This water is initially sourced from a groundwater sump which is excavated at the project outset within the pit.
- Over a typical 10 hour working day with the plant at an operating capacity of 85% (i.e. 8.5 hours per day), this washing plant will generate circa $1,156\text{m}^3$ of wash water per day. This water is discharged through a pipe directly to the first of the three silt disposal lagoons operated in series.
- With a target hydraulic retention time of 11 hours for settlement of medium silt residue, the three lagoons need to have a capacity of circa $1,496\text{m}^3$ or approximately 500m^3 for each of the lagoons. Lagoons will be designed to ensure a minimum of 1m in depth to maximise settlement capacity.
- Settled water from the third lagoon (clear water lagoon) is pumped directly to the washing plant to meet the ongoing water demand for that plant.
- This cycle operates at a water deficit with water lost by evapotranspiration and on the surface of the washed stone product. There is an ongoing requirement to top up the cycle with circa 5% (circa 6.8m^3 every hour) and this is sourced from the sump.
- **There is strictly no discharge from the lagoons to the environment.** The purpose of the lagoons is to allow settlement and to maintain as much working water as possible within the balance.

The silt lagoons will be constructed from overburden material from the stripping phase. The lagoons will be rectangular in shape with parallel sides in the directions of flow. The floor and sides of the lagoon will be as smooth as practicable to minimise turbulent flow. The base of the silt lagoons will be raised off the pit floor and will be sealed with impermeable clay material sourced from within the site. Similarly, the side walls of the silt disposal lagoons will be constructed from silty/clay material, which will be sourced from within the site and will in effect seal the lagoons.

The lagoons will be cleaned on a periodic basis (as a minimum every 3 to 6 months) with the settled silt stockpiled for potential use as a restoration material within the site.

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Project **Kilsaran Racefield**

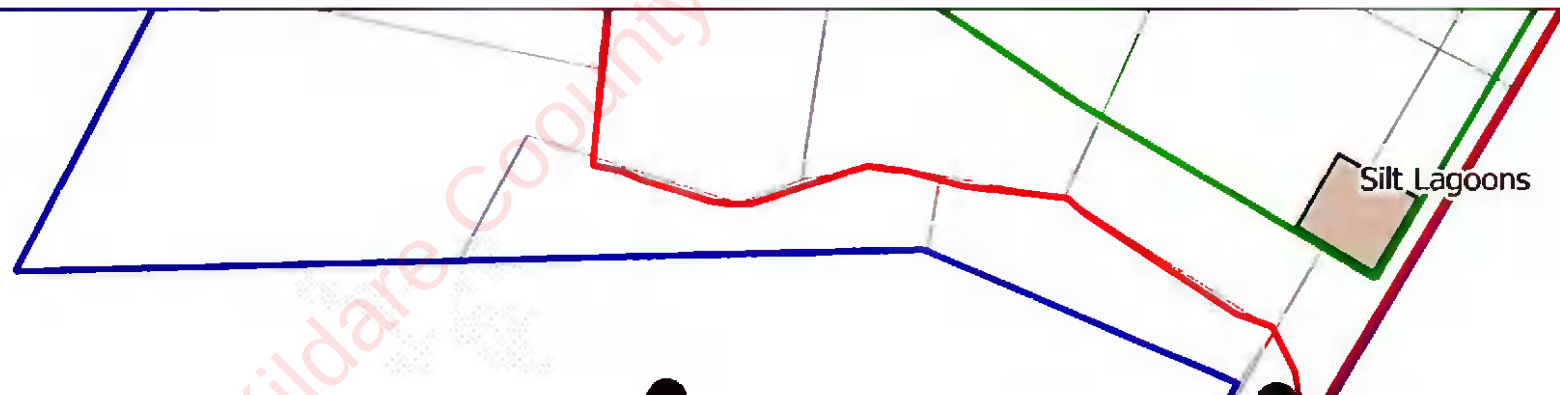
Figure 3.6:
Silt Lagoons

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Issue Details		
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3.7.3.5 Resource Extraction

The proposed extraction area is estimated to hold approximately three million tonnes of sand and gravel reserve, of which 1.7 million tonnes is located above the watertable, while the remaining 1.3 million tonnes is located below the watertable. There will be no blasting associated with the proposed sand and gravel extraction process.

Once the topsoil and overburden has been removed the sand and gravel material will be extracted via dry and wet working methods. A wheeled front-end loader will be used to excavate material above the watertable using the dry working extraction method of load, haul and dump. The material excavated will be directly fed by the same loader into the mobile processing plant which will be located within the pit void. The depth of dry workings varies due to the rolling topography of the site. The maximum dry working depth is c.9.5m from below ground level.

A long-reach excavator will follow from behind in the footprint of the dry workings and extract material below the watertable to maximum target depth of approximately 7m to 8m. The excavator will work from a position on the shore adjacent to the new waterbody. There will be no requirement to dewater the working areas of the site as the material will be extracted 'wet' and so the watertable will remain undisturbed.

Material excavated in the wet working method will be stockpiled and allowed to drain, prior to being loaded into the processing plant by the front-end loader. Both dry and wet extraction methods will progress across the site as a combined operation.

For the wet working process, the use of a long-reach excavator versus a dragline was considered. However due to the size and depth of the deposit, it is considered that a long reach excavator is the most appropriate option.

Figure 3.7 provides a summary of the extraction working methods that will be undertaken at the proposed application site.



Figure 3.7: Extraction Process

3.7.3.6 Processing Operation

The processing of the sands and gravels, into aggregate products, will consist of crushing, washing and screening by mobile processing plant, which will be located within the pit void. The proposed aggregate processing plant (crusher, screener, washer and associated generator) is shown in Figure 3.8

The generator will be refuelled locally by an off-site mobile double skinned fuel bowser sourcing fuel from the site compound. There will be spill trays, spill kits and spill procedures in place for this operation and for any maintenance of other mobile plant where lubricants, oils or other materials are employed. The fuel bowser will also carry a spill kit.

Crushing - The crushing operation consists of primary and secondary crushing units designed to reduce the feed material in size to produce a range of sizes of the aggregate material. This process will be carried out via a mobile primary and secondary crushing plant.

Washing - The washing section of the plant will initially be supplied with water from groundwater via a borehole or sump. This washing plant will be operated with a silt disposal lagoon system to minimise the need for excessive extraction of groundwater and to eliminate the need to discharge process water from the site. The primary purpose of the silt lagoons is to remove suspended solids derived from the washing process and will operate as a closed system, which allows for the re-cycling of water for use in the processing plant.

Screening - Following washing of the aggregate, the material will be passed over a number of screening decks which grades and feeds the material into stockpiles of varying nominal aggregate.

Material once processed will be placed in stockpiles. The stockpiles will be situated in various locations within the extraction application area and will consist of varying grades of aggregate. The stockpiles will be of sufficient size to ensure that there is adequate material to meet market demand (in the event of plant failure or breakdown) and ensure excessive amounts of material are not stored to minimise nuisance to neighbours associated with dust from dry periods.

Material will be loaded from the stockpiles onto Kilsaran aggregates haulage vehicles using the loading shovel and weighed at the weighbridge before exiting the site. In dry weather conditions, electric trailer covers (App/Remote control) will be utilised to cover vehicles to prevent dust nuisance on local roads.

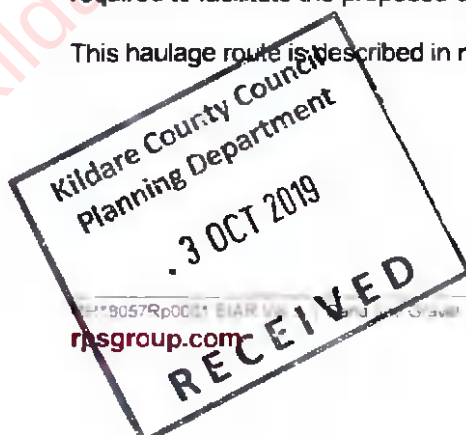
Operations at the pit will adhere to the Health and Safety Authority Safe Quarry Guidelines in relation to the Safety Health and Welfare at Work (Quarries) Regulations 2008 and this will limit the potential for unplanned events such as instability of pit faces or instability in adjacent lands.

3.7.3.7 Designated Haul Route

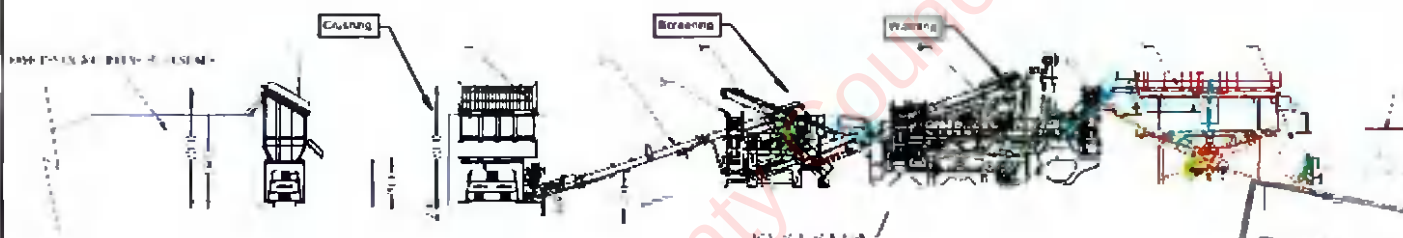
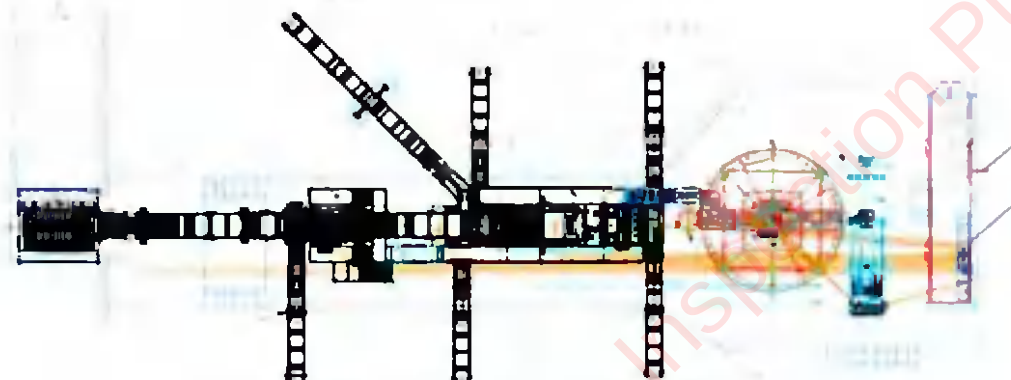
The haulage routes from the site will be via the existing L-8006/L-8007 local roads with the main route onto the R418 at Ballyshannon Crossroads. Vehicles exiting the facility will be directed to turn right onto the L-8006 local road and travel to the Ballyshannon Crossroads where they will turn north onto the R418 and continue north to Junction 2 of the M9. Returning traffic will use the same route, travelling no further westwards on the L-8006 than the site entrance.

It is proposed to construct two passing bays along the northern side of the L-8007 haul route to facilitate the safe manoeuvre of vehicles along this haul route. The proposed passing bays will comprise extending the paved road width by 1.0m for a 20m distance at locations approximately 500m and 1km from the junction with the R418. In addition, pavement condition surveys has been undertaken along the section of the L-8006 and L-8007 to be used as a haul route to determine the need and nature of any pavement interventions required to facilitate the proposed development.

This haulage route is described in more detail in Chapter 10 Traffic & Transportation.



Item	Qty	Unit	Description	Material
1	100	m	100mm x 100mm x 10mm	Steel
2	100	m	100mm x 100mm x 10mm	Steel
3	100	m	100mm x 100mm x 10mm	Steel
4	100	m	100mm x 100mm x 10mm	Steel
5	100	m	100mm x 100mm x 10mm	Steel
6	100	m	100mm x 100mm x 10mm	Steel
7	100	m	100mm x 100mm x 10mm	Steel
8	100	m	100mm x 100mm x 10mm	Steel
9	100	m	100mm x 100mm x 10mm	Steel
10	100	m	100mm x 100mm x 10mm	Steel

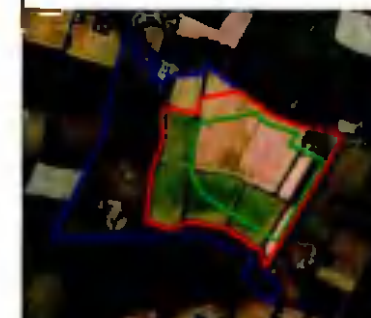


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Legend

Boundaries

- Landownership
- Planning Application
- Limit of Excavation Area



Client: **Kilsaran build**

Project: **Kilsaran Racefield**

Title:

Figure 3.8:
Materials Processing



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3.7.3.8 Safety & Security

The site boundary will be inspected on a regular basis and maintained as required under the Mines and Quarries Legislation. The existing trees and hedgerows on the northern site perimeter will be retained, and if necessary reinforced, for the duration of the workings. Any gaps in the existing boundary which would provide uncontrolled access to the site will be blocked by a suitable means and reinforced with further planting as necessary and / or fenced.

Topsoil storage and screening mounds will be provided along the northern boundary of the site, along the perimeter with the local road.

In order to prevent unauthorised vehicular access, the proposed site entrance will have a secure and lockable gate in place. Kilsaran have heavily invested in a modern fleet of vehicles and trailers, coupled with new technology, to aid, assist and to minimise harm to its drivers. Some of Kilsaran's fleet management solutions include but are not limited to: Vehicle and Load Safety, driver communications and performance data (real-time), GPS tracking, CCTV/Visual Aid and Dash-Cameras. Kilsaran also have very robust, cloud-based driver/operator plant and vehicle checking software, Phone/Tablet App based fault reporting systems, electric trailer covers (App/Remote control) and fuel usage/monitoring systems.

The site will be operational until 18:00 hours and in winter month's additional lighting will be required where work continues during hours of darkness within permitted site operational hours (up to 2 hours during the height of winter). Therefore, lighting will be provided around the ancillary buildings and facilities such as the prefabricated offices and the weighbridge. Any such lighting will be directed downwards and inwards towards the site. In addition, lighting will be provided on vehicles and mobile processing plant items to ensure safe working practices.

As most sand/gravel extraction activity takes place below surrounding ground level, there will be minimal associated light pollution as the processing plant will be located on the pit floor. Therefore, no lighting will be directed outside of the site.

3.7.3.9 Operating Hours

The proposed hours for operations (extraction, processing and haulage) at the site will be 08:00 hours to 18:00 hours Monday to Friday only with loading to commence from 07:00 hours. Operations on Saturday will be from 08:00 to 14:00 hours. No operations will be carried out on Sundays or Public Holidays.

3.7.3.10 Employment

The proposed development will secure direct employment of up to 3-4 people (Operations Manager and three plant operatives) for the duration of the extraction development i.e. 12 years with additional indirect employees such as Kilsaran HGV drivers who will access the site. In addition, there will be a number of indirect employees such as maintenance contractors.

3.7.4 Environmental Controls

Extraction, processing and ultimately restoration activities at the application site require a number of environmental controls to eliminate or minimise the potential nuisance to the public arising from the extraction and processing operations. All environmental controls implemented will be in line with the relevant EPA guidance *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (2006). The environmental control measures to be implemented at the site are outlined in the following sections.

3.7.4.1 Surface Water

Sediment runoff from the pit void will be controlled by the following measures:

- A maximum of three closed circuit silt disposal lagoons will be provided in the south eastern corner of the extraction application area. The purpose of the silt lagoons is to remove any suspended solids and to operate as a closed system, which allows for the re-cycling of water for use in the processing plant. The lagoons also minimise the need for excessive extraction of groundwater and to eliminate the need to discharge process water from the site.

- Use of silt screens or turbidity curtains to prevent the release of sediments to the watercourse.

3.7.4.2 Dust

In order to control dust emissions, the following measures will be implemented:-

- All HGV's exiting the site will be routed through the proposed wheelwash. This will minimise the transport of fines by HGVs over the access / egress road and the public road network;
- All dry loads (fines materials) leaving the site will be covered with the electric trailer covers;
- The processing plant utilises water to suppress dust at the crushers and once the feed material passes through the washing plant the material is wet;
- Areas of bare or exposed soils will, insofar as practicable, be kept to a minimum.

3.7.4.3 Traffic

Vehicular access will be controlled by the following measures:

- A new site access will be provided directly from the L-8006. The new access will intersect a section of the L-8006 where the horizontal alignment is predominately straight, which will maximise forward visibility of the access along the L-8006;
- The site entrance will also be provided with a secure and lockable gate, a 20m set-back off the carriageway to allow a car or truck to pull in off the public road should the gate be closed;
- The proposed development is intended as a source of raw materials for Kilsaran's own concrete manufacturing facilities. As such, the company will have complete control over the haulage fleet, transport routes and driver behaviour;
- Fleet management will be utilised to avoid conflicts with traffic at Ballyshannon National School. The proposed development HGV arrival and departure times will be scheduled to not coincide with early morning drop off and afternoon collection times at Ballyshannon National School.

3.7.4.4 Environmental Monitoring

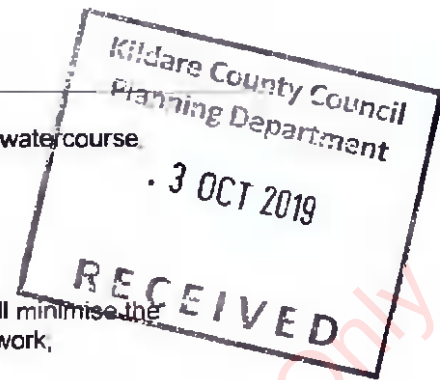
In line with best practice in the EPA guidance *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (2006) the following environmental monitoring will be undertaken for the duration of the construction/operation phase of the proposed development:

- Annual groundwater monitoring at a series of borehole locations to be agreed with KCC for a standard suite of parameters. Typically, this will include one upgradient well and two downgradient wells.
- Quarterly surface water monitoring at the Eaglehill Stream and any additional monitoring location agreed with KCC.
- Quarterly noise monitoring survey during daytime hours at the nearest noise sensitive locations.
- Continuous dust deposition monitoring as monthly averages using Bergerhoff gauges at four perimeter locations.

Monitoring will be undertaken to verify the stated control measures are effective and to inform the requirement to modify or substitute these measures.

3.8 Proposed Restoration

Following cessation of extraction after the 12 year period the restoration of the site will commence for a two year period. The proposed restoration of the pit will not involve any infilling at the void space but the site will



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be restored as an ecological resource through the development of a mix of terrestrial and aquatic habitats to ensure a diverse ecosystem.

The development of the habitat will be in accordance with best practice and guidelines such as the *Wildlife, Habitats & the Extractive Industry*, (Notice Nature, Guidelines for the Protection of Biodiversity with the Extractive Industry www.noticenature.ie). The outline design details of the restoration plan are listed as follows and an indicative restoration layout is shown in Figure 3.9:

- At the centre of the pit the standing groundwater will remain in place to allow for freshwater aquatic habitat to establish and to allow for the development of wet grassland species.
- The pit face at the north (south facing) will be retained to facilitate nesting birds and burrowing insects.
- The pit slopes to the east will be graded and stepped to facilitate development of wildlife ledges for amphibian species.
- Some graduation of sloping on other pit faces will be undertaken at the water edge to allow for ease of access between terrestrial and aquatic habitat.
- The hedgerows removed during site clearance will be substituted with restoration of additional hedgerow around the pit void coupled with improvement of existing poor quality hedgerow within the land ownership of Kilsaran.
- All planting and seeding will be strictly confined to native species. A varied mix of shrubs, trees and plants will be employed which are reflective of those in the surrounding environ.
- Planting will be in clusters to provide adequate habitat and promote diversity.
- Seeding of grasses and plants to use a variety of species to develop a diverse ecosystem.
- Plant species will include some pollinator plants to maximise biodiversity in addition to providing visual attraction. The plan includes seed and berry rich plants, and those that would provide nectar for bees and insects. These in turn, would provide food for birds and bats.
- Bird enhancement areas will be developed to attract roosting birds to the site.
- Installation of bat boxes for bat roosting.
- The stockpiles of topsoil at the northern site perimeter will be reseeded for use as wildlife mounds to develop shelter and make these areas attractive to wildlife.
- Where required the existing topsoil and overburden will be employed to facilitate grading and profiling to ensure that no material importation is required.

Once the excavations are complete and the size and topography of the void space are known, an updated restoration plan will be prepared by Kilsaran and agreed with the KCC Biodiversity Officer prior to implementation.



3.9 Risks of Major Accidents and/or Disasters

This section presents an assessment of the likely significant adverse effects on the environment arising from the vulnerability of the proposed development to risks of major accidents and/or natural disasters.

The assessment of the vulnerability of the proposed development to major accidents and natural disasters is carried out in compliance with the EIA Directive which states the need to assess:

'the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned.'

The underlying objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects which *'because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment'*.

Based on the requirements of the EIA Directive, this section seeks to determine:

- The relevant major accidents and/or natural disasters, if any, that the proposed development could be vulnerable to;
- The potential for these major accidents and/or natural disasters to result in likely significant adverse environmental effect(s); and
- The measures that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

The requirement to carry out an assessment of the vulnerability of the proposed development to major accidents and natural disasters is set out in the EIA Directive (2014/52/EU).

The EIA Regulations (S.I. 296 of 2018) require a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to the development. The Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018) state that there are two key considerations under this requirement, namely:

- The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment; and
- The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters).

This section identifies both the potential for the proposed development to cause, and vulnerability to, disasters/accidents. The resultant environmental impacts are identified in the various environmental chapters of this EIAR.

This chapter was prepared with reference to the following documents as follows:

- Department of Housing, Planning and Local Government, 2018, Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment;
- European Commission, 2017, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2001/92/EU) as amended by 2014/52/EU);
- EPA, 2017, Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements;
- EPA, 2014, Guidance on Assessing and Costing Environmental Liabilities;

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- DoEHLG (2010), A Guide to Risk Assessment in Major Emergency Management;
- Government of Ireland (2018), 2018 A National Risk Assessment – Overview of Strategic Risks;
- Kildare Co. Co Major Emergency Plan, (2010).



3.9.1 Natural Disasters

Ireland's geographic position means it is less vulnerable to natural disasters such as earthquakes or tsunamis, which might pose risk to projects of this nature and scale in other locations. However, in recent times there has been an increase in the number of severe weather events in the country, particularly those leading to flooding and flash flood incidents.

According to the OPW Flood Maps, there are reports of recurring flood events at Ballyshannon. An area engineer meeting minutes in 2005 reported that *'Localised hollow on the road is flooded every year after heavy rain. The water flows off the land. The council has undertaken remedial work and may be resolved.'* With regards natural disasters, severe weather conditions pose one of the most common risks to Ireland and to the proposed development.

Other extreme weather events also have the potential to significantly impact on operations and the frequency of such events at the nearest meteorological met station (Casemount) are outlined below. These statistics are based on the 1981–2010 averages for Casemount and it should be noted that these frequencies are anticipated to increase as a result of climate change.

- | | |
|--|-----------|
| • Absolute Maximum Temperature: | 31°C |
| • Absolute Minimum Temperature: | -15.7°C |
| • Greatest Daily Total Rainfall: | 97.5mm |
| • Maximum Gust: | 82knots |
| • Mean Days with Snow or Sleet per Year: | 14.6 days |
| • Mean Days with Thunder per Year: | 6.3 days |

Vulnerability of the site to extreme weather includes a number of factors as follows:

Extreme rain event – increased surface water run-off and requirements for attenuation and management of storm water to mitigate the potential for surface water or groundwater impact. Refer **Chapter 7 – Water (Hydrology and Flooding)** of this EIAR for details on how such an event has been mitigated through the design and operations. A 20% margin for additional rainfall from climate change has been factored into the drainage design.

Extreme weather event (e.g. heavy snow, hurricane, etc.) – such an event would likely result in a temporary shutdown of operations on site and hence no residual impact is predicted.

Extreme cold event – potential for freezing of standing water across the site impacting on the handling systems and stockpile management where materials are 'bound' by the extreme temperatures. No residual impact on the environment is predicted.

Drought and/or prolonged high temperature – potential for reduced capacity to implement dust mitigation measures and fugitive dust releases causing impacts on neighbouring communities. Refer **Chapter 8** of this EIAR for details on how such an event has been mitigated through operations. No other residual impact on the environment is predicted.

Prolonged or extreme high winds – as above, there would be potential for increased need to implement dust mitigation measures (depending on levels of associated rainfall) and fugitive dust releases causing impacts on neighbouring communities. Refer **Chapter 8 – Air Quality & Climate** of this EIAR for details on how such an event has been mitigated through operations. No other residual impact on the environment is predicted.

As a consequence of the above the proposed operation is considered climate resilient and no anticipated residual impact from such natural events is predicted.

There are 20 Industrial sites within County Kildare, which are subject to Industrial Emissions Directive ('IE') and Integrated Pollution Control (IPC) Licences from the EPA. There are 15 sites within County Kildare which are subject to Waste Licences from the EPA.

IPC/IE Sites:

- **Schloetter (Ireland) Limited P0087, Newbridge**
- **Procter & Gamble (Manufacturing) Ireland Limited P0297, Newbridge**
- **Curragh Tintawn Carpets Limited P0772, Newbridge**
- **Glanbia Foods Society Limited P0810, Athy**
- **Irish Ropes Limited P0242, Newbridge**
- **Future Pigs Limited P0420, Nurney**
- **Kildare Chilling Company P0170, Kildare**
- **Dublin Products Limited P0041, Dunlavin, Wicklow**

Intel Ireland Limited is an Upper Tier Seveso Establishment (March 2019) in accordance with Council Directive 1986/18/EEC on the control of major-accident hazards involving dangerous substances. This classification as a 'Seveso site' identifies the facility as an industrial establishment where dangerous substances are used or stored in large quantities. The occurrence of a major emission, fire or explosion resulting from a Seveso site has the potential to give rise to a major accident or disaster, immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances. This Seveso site is located some c.30km from the proposed development. Based on the above, the proximities show that all establishments are a significant distance from the site and hence the site is not vulnerable to accidents from these operations.

In terms of existing development, there is a commercial coniferous plantation, Clonmoyle Forest, under the ownership of Coillte which forms the southern boundary to the site. Any future potential afforestation or deforestation works undertaken at this commercial forest by Coillte will be carried out in accordance with Coillte Environmental Management Systems (EMS) but have the potential for significant adverse environmental impact.

A search was conducted of planning applications (projects) within the vicinity of the proposed development, using the Kildare County Council planning portal map viewer (refer Table 3.2) and the Department of Housing, Planning and Local Government EIA portal map viewer. The search was limited to the five year period preceding the date of issue of this report and excluded retention applications (i.e. typically local-scale residential or commercial developments where an impact has already occurred), withdrawn and refused applications. The search returned mostly one-off housing development applications (with associated waste water treatment facilities) and application for agricultural storage sheds (for both produce and machinery).

The following projects are listed on the EIA portal within 10km of the proposed development:

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- Portal ID 2017074 - Application for leave to apply for Substitute Consent under Section 177C(2)(b) of the Planning and Development Acts 2000-2014 for an operating sand and gravel quarry at Ballyshannon, Co. Kildare (circa 4km north east of the site). This application was refused by ABP.
- Portal ID 2019122 - Application for backfilling of a former sand and gravel pit to its former ground level using imported natural inert soil and stone (as waste and/or by-product) at Usk (circa 7.5km south east of the site). This application was lodged to Kildare County Council on the 14th August 2019 (application 19/920) but has been deemed incomplete.
- Portal ID 2018055 – Application for a sand and gravel pit development with extraction above the watertable, associated site facilities and a new site entrance over an area of 19.5 hectares with restoration back to an agricultural afteruse at Ballyhurtim, Dunlavin (circa 9km south east of the site). This application was lodged to Wicklow County Council (application 18/1270) but was refused in January 2019.

A search of the An Bord Pleanála website¹³ was completed to identify any relevant applications, including Strategic Infrastructure Development (SID) and Strategic Housing Development (SHD) in the past three years, or in close proximity to the proposed development. With the exception of a permission for the construction of one assembly room and two new resource rooms and a formal drop off area for cars on the R418 at Ballyshannon National School (ref. 13/674), no other projects are listed in the An Bord Pleanála website for the area.

Table 3.2: List of other recently permitted development in the area

Reference	Decision Data	Address	Description
141042	10/02/2015	Whitehouse	a) Proposed new dormer dwelling, b) new vehicle entrance, c) domestic garage, d) new treatment system
15205	19/08/2015	Whitehouse	Change of house type from that granted Ref. 08/2172 and Ref. 14/364.
18180	17/04/2018	Whitehouse	Change of house type from that granted under Planning Ref. No. 15/205.
15133	22/04/2015	Derrinturn Ballyshannon	Extension of Duration of Planning Ref No. 10/683 for a single storey extension to the side of the dwelling
15418	14/10/2015	Ballyshannon,	Construction of cottage style two storey dwelling and septic tank
1553	25/03/2015	Ballyshannon Demesne	A series of as built amendments to previously approved planning ref. 98/1738.
161000	14/11/2016	Ballyshannon Manor	Extension of Duration Ref. 10/1056 (dwelling)
161206	08/05/2017	Tippeen Lower, Ballyshannon	Construction of a dormer bungalow dwelling incorporating a wastewater treatment system
16182	14/10/2016	Daybreak, Ballyshannon	Retention of existing overground diesel storage tank and all associated works.
1664	13/10/2016	Ballyshannon	Construct a dormer dwelling, replace existing site entrance with new recessed entrance
16949	07/02/2017	Tippeen, Ballyshannon	Retention of existing cottage and entrance previously due for demolition.
17111	17/10/2017	Daybreak, Ballyshannon	Existing timber clad screen around existing overground storage fuel tank
17586	14/07/2017	Ballyshannon	New 26msq single storey extension to the rear of the existing dwelling
17955	17/05/2018	Ballyshannon	Construct a road underpass for agricultural use along with all associated site works.
171163	12/12/2017	Mullaghmoyn East,	Construct (i) Slatted loose shed, (ii) walled silage slab, (iii) loose shed, (iv) walled manure shed
18833	31/08/2018	Mullaghmoyn East,	Extension of Duration of Planning Ref. 121024 for existing timber dwelling house.
171146	23/01/2018	2 Crockaun Commons,	Change of use of building from Class 2 (residential) to Class 8 (Provision of medical/health service)

¹³ Available online at <http://www.pleanala.ie/>. Accessed January 2019

3.11 References

Competitive Analysis of the Construction Materials Sector on the Island of Ireland - an Update; November 2015;

The Irish Concrete Federation (ICF) is the national representative organisation for the Irish aggregates and concrete manufacturing industry. ICF has 90 members operating in approximately 300 locations throughout Ireland and members are involved in the manufacture of aggregates and concrete products for supply to the construction industry;

Submission by the Irish Concrete Federation on the National Marine Planning Framework Baseline Report, December 2018;

Project Ireland 2040, National Development Plan 2018 – 2027 (Government of Ireland, Prepared by the Department of Public Expenditure and Reform, Published February 2018);

Project Ireland 2040 National Planning Framework (Government of Ireland, Department of Housing, Planning and Local Government, Published February 2018);

Health & Safety Authority (May 2019). Code of Practice for Avoiding Danger from Overhead Electricity Lines, 2nd Edition

EPA (2006), Environmental Management in the Extractive Industry (Non-Scheduled Minerals)

Guidelines for the treatment of Badgers prior to the construction of National Road Schemes, NRA.

ICF Archaeological Code of Practice

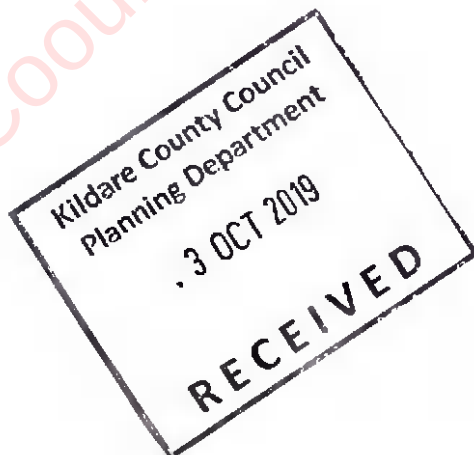
Wildlife, Habitats & the Extractive Industry, (Notice Nature, Guidelines for the Protection of Biodiversity with the Extractive Industry www.noticenature.ie)

EPA, 2014, Guidance on Assessing and Costing Environmental Liabilities;

DoEHLG (2010), A Guide to Risk Assessment in Major Emergency Management;

Government of Ireland (2018), 2018 A National Risk Assessment – Overview of Strategic Risks;

Kildare Co. Co Major Emergency Plan, (2010).





4 POPULATION AND HUMAN HEALTH

4.1 Introduction

This purpose of this chapter is to consider the proposed development having regard to potential impacts that relate to the human population. In order to evaluate the magnitude and significance of likely environmental impacts in relation to population, this chapter of the EIAR considers the proposed land use relative to recent trends in relation to population, human health, employment, economic performance, amenity and the community. The assessment also proposes, wherever possible, appropriate mitigation measures that may be necessary to reduce and remedy, significant adverse effects on these elements of the environment. This section should be read in conjunction with the site layout plans for the site and project description provided in Chapter 3 of this EIAR.

4.2 Assessment Methodology

The requirement to carry out an assessment of potential impacts on Population and Human Health is set out in the EIA Directive (2014/52/EU). The recitals to the 1985 and 2011 Directives refer to 'Human Health' and include 'Human Beings' as the corresponding environmental factor. The 2014 Directive changes the title of this factor to 'Population and Human Health'.

Following the adoption of the 2014 amending Directive, the EPA revised its Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' in August 2017. While not yet formally adopted they do provide some commentary on relevant matters with regard to the scope of assessment under the 'Population and Human Health' environmental heading. The draft Guidelines note relevant topics as follows:

- Employment;
- Amenity (e.g. effects on amenity uses of a site or of other areas in the vicinity – may be addressed under the factor of landscape); and
- Human Health (considered with reference to other headings such as water and air).

The draft guidelines further clarify that,

'The legislation does not generally require assessment of land-use planning, demographic issues or detailed socio-economic analysis. Coverage of these can be provided in a separate Planning Application Report to accompany an application for planning permission. This should be avoided in an EIAR, unless issues such as economic or settlement patterns give rise directly to specific new developments and associated effects (ref. section 3.5.7). These need to be readily identifiable at specific locations in the immediate vicinity of the proposed development. The main purpose of such identification and assessment is to provide the CA [competent authority] with a context for their determination. (Examples would include future warehousing beside a new port; transmission lines in the vicinity of a new electrical sub-station or commercial developments beside a junction on zoned land beside a new road.)'

In determining the scope of this chapter, it was considered firstly whether the proposed sand and gravel extraction facility has the potential for impact on economic or settlement patterns by giving rise directly to specific new developments and subsequent effects thereof. As the proposed development comprises of the extraction of sand and gravel with on-site processing and final restoration of the site to a mix of terrestrial and freshwater wildlife, the development is not considered to be of a type which is likely to impact on economic or settlement patterns.

Accordingly, a detailed assessment of land-use planning, demographic or detailed socio-economic analysis is not considered appropriate or required. It is considered important however to identify the key characteristics of the existing local community to understand the context of the site and consequently the potential for impact on the existing population. As the development will result in the extraction of sand and gravel reserve, all related ancillary site works, on-site processing and transportation does have the potential for some direct economic / employment impacts.

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Finally, given the nature of the proposed development and the potential for increase in traffic movements associated with Kilsaran haulage vehicles entering and exiting the facility via the L-8006/L-8007 local road, this chapter also gives consideration to the identification of any sensitive land use / amenity features in the vicinity that may potentially be impacted.

This chapter therefore discusses impacts to human beings in the context of employment, amenity and human health in the local community.

The 2018 'Guidelines for Planning Authorities and An Bord Pleanála'¹⁴ consider the scope of assessment of human health matters in EIA. The guidelines state that:

'There is a close interrelationship between the SEA Directive and the 2014 EIA Directive. The term 'human health' is contained in both the SEA and EIA Directives and a common interpretation should be given. Accordingly, consideration of human health effects resulting from the construction and operation of a project should focus on health issues arising in the context of the other environmental factors listed in Article 3 of the Directive/ Section 171A of the Act, namely:

- *Population;*
- *Biodiversity, with particular attention to protected species and habitats;*
- *Land, soil, water, air and climate;*
- *Material assets, cultural heritage and the landscape; and*
- *Interaction between the above factors.'*

The guidelines further add that,

'European Commission guidance relating to the implementation of the 2014 Directive, in reference to 'human health' states 'Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population'.

Furthermore, the EPA Guidelines¹⁵ (which also refer to the Commission's SEA Implementation Guidance) advise that 'in an EIAR, the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil, etc.'

On the basis of the above guidance and based on the nature of the proposed development, the potential for impact on human health is described in this chapter based on the findings and assessments of other specialist chapters of this EIAR which are Chapter 7 Water, Chapter 8 Air, Chapter 9 Noise and Chapter 10 Traffic.

4.2.1 Assessment Approach

To inform this chapter, a site visit was carried out in June 2019. The site visit included a walk through the existing site and a windshield survey of the surrounding hinterland. During this visit, particular attention was paid to road conditions, ecological constraints and the location of the nearest dwellings to the subject site.

This enabled an appreciation to be gained of the existing general land uses in the area, the volume of

¹⁴ Department of Housing, Planning and Local Government (August 2018), Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, Department of Housing, Planning and Local Government

¹⁵ EPA (August 2017), Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

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population located nearest to the subject site in addition to an overview of the locality of the host community and its environs.

In addition to the site visit, a number of desk top exercises were undertaken. The desktop analysis included a review of demographic characteristics of the area as ascertained from Census of Population data and other statistics released by the Central Statistics Office (CSO) and the International Labour Organisation. The smallest geographical units distinguished by the CSO are Electoral Divisions for general statistical use (previously called District Electoral Divisions - previously known as Wards). Small Area Population Statistics (SAPS) are availed of when describing some of the smaller settlements within the study area. Demographic trends and employment trends were analysed at state, county, and local levels for the purposes of this EIAR.

Further identification of potentially sensitive local community amenity features and associated land uses in the vicinity of the site was undertaken by a mix of site visits, review of digital mapping, aerial photography and development plan and local area plan mapping (where available).

In general, impacts on human beings were examined as impacts on different groupings of people, rather than specific individuals.

4.2.2 Assessment Criteria

The impact assessment ratings used are based on the definitions set out within Section 3.7 of the 'Revised Guidelines on information to be contained in Environmental Impact Statements' (EPA, draft 2017). Table 4.1 outlines the significance ratings employed in this analysis.

Table 4.1: EPA Impact Significance Ratings

EPA Rating	Characteristics of Impact
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

4.3 Baseline Conditions

The proposed development is located in the administrative area of Kildare and is located within the Electoral Division of Ballyshannon (designated as 06008). The proposed development will be in close proximity to a number of residential receptors to the north, east and south of the site. The baseline is defined as the receiving environment of existing baseline conditions. For the purpose of this assessment, current trends in population and economic growth are expected to continue and as such these have been presented in the following sections with additional referencing to the most up to date CSO data.

4.3.1 Demographic Trends

4.3.1.1 Population

From the results of the 2016 Census and as set out in Table 4.2, the population of the State grew by 3.9% from 4,581,269 to 4,761,865 between 2011 and 2016. The 2016 population of 4,761,865 is the highest recorded population in Ireland since 1861. The Census figures also indicate that the population of the State grew from 4,239,848 to 4,588,252 persons between 2006 and 2011, representing an increase of 8.2%.

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Table 4.2: Population at State, County and Local Level 2006, 2011 and 2016¹⁶

Area	2006	2011	2016	% Change 2006-2011	% Change 2011-2016
State	4,239,848	4,588,252	4,761,865	+8.2	+3.8
Kildare	186,335	210,312	222,504	+12.9	+5.8
Ballyshannon ED	1,626	1,752	1,789	+7.7	+2.1
Small Area Sa2017_087010002	-	395	400	-	+1.3

Kildare County experienced an increase in population of approximately 5.8% between 2011 and 2016; following an increase of 12.9% between 2006 and 2011. With a population of 222,504 in 2016, Kildare has the fifth highest population of all local authority areas in Ireland. The population living within Kildare is now equivalent to 4.67% of the State total (of 4.76 million). In the five years between Census 2011 and Census 2016, Kildare experienced the third highest rate of population growth with an increase of 5.8% (12,192 persons) on the 2011 population (210,312 persons). Nationally, there was an increase of 8.2% over the same period.

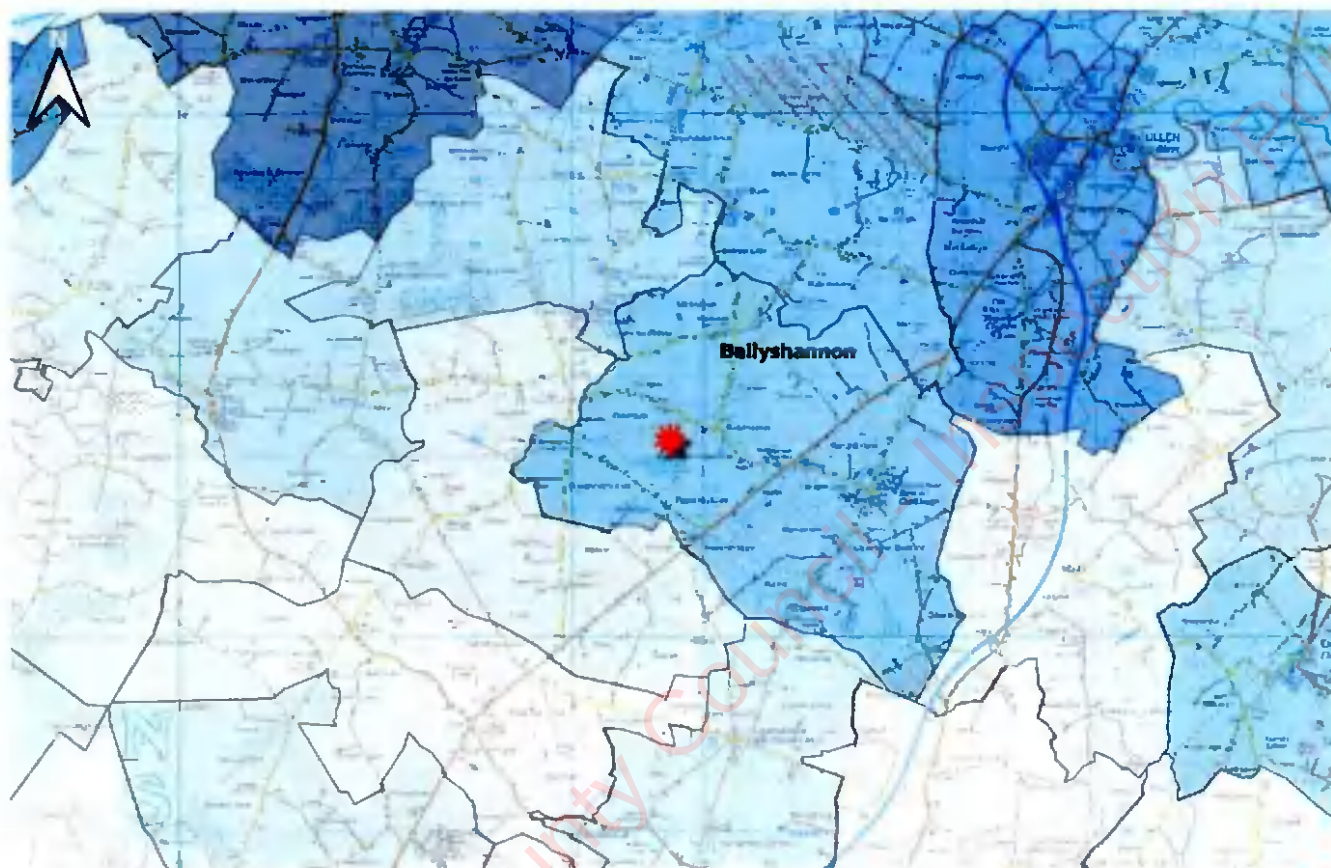
As illustrated in Figure 4.1, the subject lands area located within the 'Ballyshannon' Electoral Division in the Kildare administrative area. According to the Census results, the rate of population increase in Ballyshannon Electoral Division was 7.7% from 2006 to 2011 and 2.1% between 2011 and 2016.

The proposed development lies within one 'small area' (Reference Sa2017_087010002), which falls within the Ballyshannon ED as illustrated in Figure 4.2.



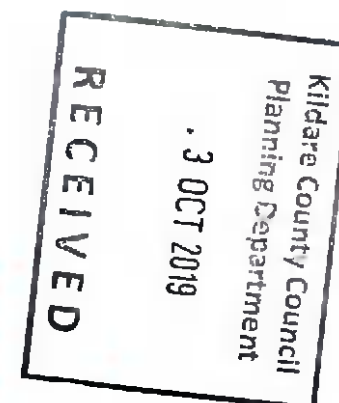
¹⁶ Source: Census of Population 2006, 2011 and 2016

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★ Approximate Location of Subject Site within 'Ballyshannon' Electoral Division

Figure 4.1: Location Map of 'Ballyshannon' Electoral Division



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★ Approximate Location of Subject Site within Small Area

Figure 4.2: Location Map of 'Small Area 087010002' within the ED

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As shown in Table 4.3, based on 2016 CSO data, the average population density of the study area (24.8 people per square kilometre) is lower than that of the State and County Kildare. It is approximately one-third of the average for the State and half of that of County Kildare. It is not unexpected that the area in which the subject site is located shows a lower population density relative to Kildare County, given that the existing surrounding land use is predominately agricultural and there is an obvious absence of any large Growth Towns I and II (as per the settlement hierarchy outlined in the Kildare County Development Plan 2017-2023)

Table 4.3: Area Size, Population and Calculated Population Density¹⁷

Area	Area Size (sq. km)	Population 2016	Population Density (per sq. km)
State	68,466.06	4,761,865	69.5
Kildare	4,711.24	222,504	47.2
Ballyshannon	72.27	1,789	24.8
Small Area Sa2017_067010002	10.5	400	38.1

4.3.1.2 Age Profile

The age profile of the population of the State and Kildare for 2011 and 2016 is highlighted in Table 4.4. This table shows that the proportion of 0-14 year olds decreased in both Kildare and the State as a whole. Kildare experienced a decrease of 0.4% on the 2011 figure, which equates to twice that of the State's average decrease of 0.2%.

The 15-24-year-old age cohort showed an overall decrease in this population in the State as a whole but a slight increase within Kildare. This demographic shows an increase of 0.1% in Kildare and comparatively, a decrease of 0.6% across the State.

The 25-44 age cohorts for Kildare and the State also experienced a drop in population with a decrease of 0.2% and 2.1% in these areas respectively. The drop in population of this age cohort and the aforementioned 15-24 year old cohort on a State level is possibly as a result of emigration and normal population dynamics as the population ages. The relatively steady figures for Kildare within these age groups suggest that most likely due to its proximity to Dublin, it may be becoming a more attractive area for young people to reside.

Unsurprisingly the 65+ age group experienced an increase in population in both areas. This is reflective of an aging population generally.

Table 4.4 shows that there is a higher than average proportion of 0-14 and 25-44 year olds within Kildare which supports the suggestion that there is a large amount of young families within Kildare.

The average age of the population of the state in 2016 was 37.4, up from 36.1 in 2011, a rise of 1.3 years. The Electoral Division of Ballyshannon (06008) had an average age of 34.1 years in 2016 compared with 31.9 in 2011, which was a percentage change of 6.9%.

¹⁷ Source: <http://census.cso.ie/sapmap/>

Table 4.4: Population Structure 2011 and 2016¹⁸

Area/Age	0-14 (%)	15-24 (%)	25-44 (%)	45-64 (%)	65+ (%)
State 2011	21.3	12.6	31.6	22.7	11.7
State 2016	21.1	12.1	29.5	23.8	13.4
Change	-0.2	-0.5	-2.1	+1.1	+1.7
Kildare 2011	24.5	12.5	33.5	21.6	7.9
Kildare 2016	24.1	12.6	30.3	23.2	9.9
Change	-0.4	+0.1	-0.2	+1.6	+2
Ballyshannon 2011	30.2	12.4	28.7	22.2	6.6
Ballyshannon 2016	27.0	14.5	23.0	27.6	7.9
Change	-3.2	+2.1	-5.7	+5.4	+1.3
Small Area (087010002) 2011	28.4	13.7	24.3	25.8	7.8
Small Area (087010002) 2016	26.8	13.0	20.5	29.5	10.3
Change	-1.6	-0.7	-3.8	+3.7	+2.5

4.3.1.3 Home Ownership

According to the CSO 2016 Census data, the percentage of owner-occupied households in the electoral division of Ballyshannon is 78.7%. This has decreased from 79.9% in 2011. For the small area (Sa2017_087010002) the percentage of owner-occupied households is 92.9% which has increased from 91% since 2011.

4.3.2 Employment Trends

The 2016 Census of Population from the CSO was examined to determine trends in relation to employment including the number of persons at work, unemployment levels and the sectoral composition of the population, based upon principal economic status. This data provides the most recent available information in respect of the principal economic status of the inhabitants of the area and it is useful to review this data to identify how the local area has been performing in relative terms compared with the county and state averages.

Table 4.5 shows the overall unemployment rate as measured by the responses to the question on principal economic status in the Census for 2011 and 2016. The table presents figures for the economic status of the labour force of the local study area, the county and the State in 2016. The unemployment rate is calculated by adding the number of persons unemployed to first time job seekers, and then dividing the total by the overall labour force (i.e. total amount of unemployed persons and employed persons).

¹⁸ Source: Census of Population 2011 and 2016

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Table 4.5: Principal Economic Status 2011 and 2016¹⁹

	At work	Looking for first regular job	Unemployed or given up previous job	Overall Unemployed	Labour Force	Unemployment Rate %
State 2016	2,006,641	31,434	265,962	297,396	2,304,037	12.9%
State 2011	1,807,360	34,166	390,677	424,843	2,232,203	19.0%
Kildare 2016	95,947	1,395	10,902	12,297	108,244	11.4%
Kildare 2011	85,587	1,371	17,268	18,639	104,226	21.8%
Ballyshannon ED 2016	743	7	75	82	825	9.9%
Ballyshannon ED 2011	665	6	113	83	784	10.6%
Small Area (087010002) 2016	172	1	12	13	185	7.6%
Small Area (087010002) 2011	159	2	15	17	176	10.7%

It can be seen that the unemployment rate (as measured in the Census) in 2016 had decreased significantly within the State and within Kildare, compared to the 2011 Census. The unemployment rate for Kildare reduced to 11.4% in 2016 compared to 21.8% in 2011. The unemployment rate of 9.9% in the Ballyshannon ED is lower than the average of 21.8% for Kildare in 2016. The unemployment rate for the small area is similar to that of the Ballyshannon ED and has noted a decrease when compared to 2011.

The CSO provides a breakdown of socio-economic groupings in terms of employment which is a useful statistic considering the diverse range of employment within the study area and how that compares with the County and State. Table 4.6 shows the data on such employment groupings of population.

Table 4.6: 2016 Population by socio-economic grouping²⁰

Area	Employers Managers	Higher & Lower Professional	Non-Manual & Manual Skilled	Semi-skilled & Un-skilled	Own Account Workers	Farmers Agricultural Workers	Unknown	Total
State	15%	19%	27%	12%	5%	5%	16%	4,676,648
Kildare	19%	20%	29%	11%	5%	3%	13%	220,923
Ballyshannon ED	24%	17%	27%	8%	9%	5%	11%	1,822
Small Area Sa2017_087010	20%	15%	32%	8%	10%	10%	6%	410

Table 4.6 shows that the highest proportion of workers in the Ballyshannon ED comprise non-manual and manual skilled workers at 27% of the population. This is consistent with Kildare and the entire State where the same category also accounts for the highest proportion of workers at 29% and 27% respectively. The lowest category for the Ballyshannon ED is Farmers and Agricultural workers who comprise 5% of the workforce. This is also similar to Kildare and the State. This is representative of the fact that the subject site lies approximately 2.5km from Calverstown and circa 7km from Kilcullen and is within a

¹⁹ Source: Census of Population 2011 and 2016²⁰ Source: Census of Population 2011 and 2016

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radius of circa 16km from the larger towns of Athy, Kildare (moderate growth town), Naas and Newbridge (large growth towns) which are employment areas.

4.3.2.1 Monthly Unemployment Figures / Quarterly National Household Survey

The Quarterly National Household Survey (QNHS) and the Labour Force Survey are designed to produce quarterly labour force estimates that include the official measure of employment and unemployment in the state (International Labour Organisation or ILO basis). The ILO unemployment rate for the State for the period 2013 - 2018 is summarised in Table 4.7. In Q3, the 2017 the Quarterly Labour Force Survey (QLFS) replaced the Quarterly National Household Survey and included enhancements to the survey methodology.

Table 4.7 indicates, inter alia, that the unemployment rate for the state has been following an overall decreasing trend since 2013. This decreasing trend appears to be continuing, however on a very gradual level throughout 2018.

Table 4.7: ILO Economic Status Unemployment Rate for State 2013-2019

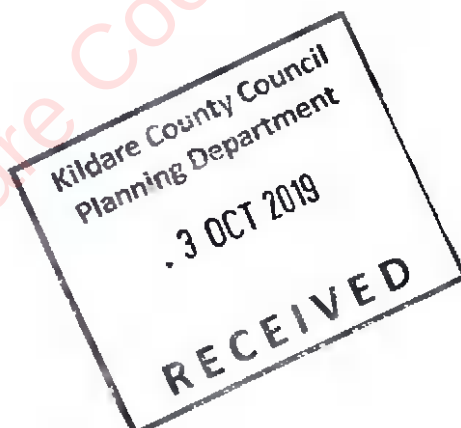
Year	Q1 (%)	Q2 (%)	Q3 (%)	Q4 (%)	Average (%)
2013	13.7	13.9	13.0	11.7	13.1
2014	12.0	11.8	11.3	9.9	11.3
2015	10.0	9.8	9.3	8.7	9.5
2016	8.4	8.4	7.9	7.1	8.0
2017	6.8	6.2	6.7	6.4	6.5
2018	5.8	5.8	5.7	5.7	5.8
2019	4.8	-	-	-	-

Note: *Not available at time of writing (June 2019)

4.3.2.2 Persons at Work by Industry

Table 4.8 shows the proportion of persons at work by Industry in the State and in Kildare in 2016 and 2011. This data illustrates the impact of the general macro-economic environment on the different sectors, including the mining and quarrying, remediation activities, construction and transport sectors, all of which relate to the subject proposal.

For the State, the proportion of the people employed in the mining and quarrying sector decreased by a small percentage (not exceeding 0.5%), while the proportion of people employed in the construction sector increased across Kildare and the state from 2011. This reflects the recovery of the building and construction industry over that timeframe.



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Table 4.8: Employment by Industry

Industry	State 2016 (%)	State 2011 (%)	Kilriare 2016 (%)	Kildare 2011 (%)
Agriculture, forestry and fishing	4.44%	5.06%	3.32%	3.70%
Mining and quarrying	0.25%	0.30%	0.37%	0.36%
Manufacturing	10.03%	10.16%	10.20%	10.86%
Electricity, gas, steam and air conditioning supply	0.64%	0.63%	0.62%	0.60%
Water supply, sewerage, waste management and remediation activities	0.51%	0.52%	0.60%	0.56%
Construction	5.08%	4.83%	6.08%	5.50%
Wholesale and retail trade; repair of motor vehicles and motorcycles	13.29%	14.51%	15.67%	15.97%
Transportation and storage	4.04%	4.32%	4.33%	4.60%
Accommodation and food service activities	5.83%	5.73%	4.62%	4.53%
Information and communication	4.49%	3.79%	4.29%	3.71%
Financial and insurance activities	4.53%	5.14%	5.00%	5.50%
Real estate activities	0.45%	0.46%	0.48%	0.55%
Professional, scientific and technical activities	5.66%	5.14%	5.45%	4.93%
Administrative and support service activities	3.54%	3.36%	3.66%	3.49%
Public administration and defence; compulsory social security	5.28%	6.25%	6.40%	7.75%
Education	8.81%	9.26%	9.19%	9.27%
Human health and social work activities	11.15%	10.92%	9.99%	9.69%
Arts, entertainment and recreation	1.70%	1.70%	1.70%	1.74%
Other service activities	2.12%	2.17%	2.03%	2.13%
Activities of households as employers producing activities of households for own use	0.14%	0.11%	0.16%	0.10%
Activities of extraterritorial organisations and bodies	0.04%	0.05%	0.02%	0.02%
Industry not stated	7.97%	5.61%	3.32%	3.70%

4.3.2.3 Affluence and Deprivation

The Pobal Deprivation Index is Ireland's most widely used social gradient metric, which scores each small area (50 – 200 households) in terms of affluence or disadvantage. The index uses information from Ireland's census, such as employment, age profile and educational attainment, to calculate this score. The Ballyshannon ED has a deprivation score of 3.92 and is classified as 'marginally above average'. Similarly, the small area 087010 has a deprivation score of 5.16 and is classified as 'marginally above average' in 2016.

4.3.3 Amenity

The assessment considers the baseline amenity conditions in the study area.

4.3.3.1 Residential Amenity

The human environment in the area consists mainly of residential properties, one off housing along the local roads including the L-8006 and L-8007 (northern boundary), L-8009 (to the south), L-4002 (to the west) and the R418 (to the east). The nearest residential property to the site is a bungalow located along the L-8006 at the northern boundary some 150m from Racefield House.

Ballyshannon Stud is located to the north of the site along Martinstown Road, the L-8007. In addition, there are also some other evidence of private domestic use equine related activities in the area with evidence of horse gallops, paddocks, horse walkers and stables visible from aerial photography.

The site is located in a rural area with no community facilities in immediate proximity. At present there is no church, pre-school or crèche facility within the immediate vicinity. There is a primary school, Ballyshannon

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National School located circa 1.5km east of the site along the R418, 150m to the north of Ballyshannon Cross Roads. Suncroft National School is located circa 2km as the crow flies and 3.5km via the road network. The school is located 1km off the L4002 to the west of the site in the village of Suncroft. The nearest settlements are Calverstown (2.5km) and Kilcullen (c7km).

4.3.3.2 Visiting Community Amenity

Tourism contributes a large share to Ireland's economy with the Fáilte Ireland report 'Tourism Facts 2017 Preliminary' stating that expenditure from tourism equated to approximately €5.3bn in 2017 which was an increase of 4.2% on 2016.

Kildare²¹ had a reported 211,000 overseas tourists and Irish residents took 286,000 trips in 2017²². As explained previously the site lies in a rural area. While there are no tourism attractions in the immediate vicinity of the subject site, the main tourist attraction in the region is the Irish National Stud & Gardens which is located approximately 7km from the site and draws thousands of visitors annually. Within the grounds are the world-famous Japanese Gardens, the Horse Museum and St Fiachra's Garden, created to celebrate the Millennium.

Scenic Route No. 35, is located c1.3km south east of the application area and comprising 'Views of Dun Ailinne from the N78 (R418)- Moortowncastle to Knockbounce. Location - Moortowncastle, Moortown, Old Kilcullen, Glebe North, Knockaulin, Knockbounce'.

4.3.4 Human Health

From the results of the 2016 Census and as set out in Table 4.9, 59.4% of the population in the State reported themselves to be in good health, while conversely 1% reported themselves to be in bad health. This compares closely to a Kildare figure of 63.1% in good health and 1.1% in bad health. The population reporting very good health in the small area 087010 was 67.8% which is above that reported at a State level, while those who reported themselves to be in bad health was below the state and county level. A breakdown of the health of the population is provided in Table 4.9.

Table 4.9: Proportion of the Population In Good Health²³

Area	Very Good (%)	Good (%)	Fair (%)	Bad (%)	Very Bad (%)	Not Stated (%)	Total
State	59.4%	27.6%	8.0%	1.3%	0.3%	3.3%	4,761,865
Kildare	63.1%	26.4%	6.8%	1.1%	0.2%	2.3%	222,504
Ballyshannon ED	68.5%	23.3%	5.5%	0.8%	0.1%	1.7%	1789
Small Area Sa2017_087010	67.8%	24.5%	6.0%	0.5%	0%	1.3%	400

In the Ballyshannon ED, 10.9% of the population reported themselves as having a disability and 4.3% of the population classified themselves as a carer in the 2016 census. Similarly, for the small area, 12.3% of the population reported themselves as having a disability and 4.5% classified themselves as a carer in the 2016 census.

During the community engagement undertaken by Kilsaran in the study area, details of any particularly sensitive receptors were collated for analysis and assessment within this EIAR. It was established there is a resident located in the property group to the north west of the site that suffers from respiratory illness. As

²¹ The CSO publishes a combined figure for Kildare and Carlow as the sample size is insufficient to produce a robust result by individual county.

²² Fáilte Ireland, 2017 Topline Tourism Performance by Region

²³ Source: Census of Population 2016

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such, the potential health implications for people residing in this area have been considered in the analysis with this sensitive receptor in mind.

4.4 Impact Assessment

The assessment of impacts on population and human health refer to the assessment of those factors under which human health effects might occur, this is also as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil, etc.

It is considered the following impacts will be of potential significance to population and human health during the construction and operational phase of the proposed development:

- An increase in baseline noise levels resulting from on-site activities;
- Possible dust emissions;
- Traffic disruption and associated congestion; and
- Noise, air quality and congestion impacts as a result of construction traffic and movements.

Notes that for the proposed development there is no clear construction and operational phases as the enabling (construction of the new entrance, site compound and soil stripping, etc.) will be undertaken in conjunction with the sand and gravel extraction. In this regard, these phases are considered together in this analysis.

4.4.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. There will be negligible ongoing impact to human beings and human health with limited potential for impact.

The existing population demographics, employment levels and health impacts will remain unaltered from those presented for the baseline scenario. Any change or evolution on these statics would be in line with similar rural parts of County Kildare.

4.4.2 Construction/Operation Phase

4.4.2.1 Population

This phase of the proposed development will not have any significant direct impacts on the population structure of the hinterland of the site. There may be a resultant increase in the temporary population of the area as a result of the employment of workers from outside the area that may choose to reside in the immediate local area during the extraction phase. This may potentially result in some additional trade for local accommodation and services.

It is expected that the majority of the workforce will travel from existing places of residence to the construction site rather than reside in the immediate environs of the site. However, some local employment from within the wider local area is expected.

The proposed development does not include residential element and will not result in an increase in the permanent population of the area.

4.4.2.2 Employment

The enabling phase of development involves the removal of some vegetation, topsoil and overburden and the introduction of perimeter berms and site facilities. These works will occur over a short time period (26-52 weeks) and so the effects on employment and the economy within the area due to this phase will be very slight.

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The extraction phase of the proposed development will proceed over an approximate period of 12 years and will generate low levels of employment directly on-site. It will also benefit support industries such as building suppliers, catering, etc. There will also be a need to bring in specialist workers on a regular basis that may increase this working population at times. Specialists are only likely to stay for shorter periods depending on the nature of the work. The employment of the workforce will have a slight beneficial impact on services within the local area.

The extraction phase therefore is considered to have the potential to have a slight temporary, beneficial impact on the economy and employment of the local and wider area.

4.4.2.3 Community

The construction stage will have reasonably insignificant effects on the local community as it will occur over a short period of time and does not involve the increased vehicular traffic associated with haulier traffic which is generated during the extraction phase. The extraction phase of the proposed development will result in the creation of a material extraction site in a new area over phases that will have a potential negative impact on the immediate local environment, businesses and the few residents living locally in the immediate vicinity.

The following temporary local impacts during the operational phase have the potential to affect the local residential community:

- Increased vehicular traffic on the haul route L-8006/L-8007 and R418; and
- Increased noise and dust generation from both traffic and on site operations.

Mitigation measures will be implemented such as noise mounds/berms, dust suppression and traffic management so as to minimise the operations effect on the community. Potential impacts in respect of traffic, air and noise etc. are examined further in the respective sections of this EIAR.

The increased traffic flows as a result of the operation of the proposed development are circa 15.2% of the existing traffic on the L-8006 (refer Chapter 10). As such, these volumes have potential to give rise to adverse impacts for the existing residential community in the area. A full and detailed appraisal of the impacts of the proposed development on roads, traffic and transportation aspects are included in Chapter 10 of this EIAR including details on how traffic will be managed to mitigate the impact.

Operational noise has been mitigated through a number of measures to mitigate noise nuisance in the area. These measures include the following:

- Restricted working hours with no night time, Sunday or bank holiday working;
- Location of plant, such as the processing area, as far away as practicable from sensitive properties;
- Location of plant within the pit to allow the pit walls to act as natural noise attenuation for residents in the area.
- Installation of topsoil and overburden berms along the northern and eastern site perimeters to act as noise barriers for the communities in these areas.

With this mitigation built in at design stage, this phase therefore is not considered to have a significant noise impact on the community. Further details are presented in Chapter 9.

There is potential for dust nuisance for the community from all construction related activity and given the nature of sand and gravel extraction, there is a risk of dust nuisance at the site of the proposed development. To this end a series of good working practices have been incorporated into a dust minimisation plan that are listed in Chapter 8. Furthermore, the proposed processing operation is a wet operation which will essentially mitigate the potential for dust impact at source. With this practice and these measures implemented the predicted potential for dust nuisance for the community is negligible.



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4.4.2.4 Human Health

Subsequent chapters of this EIAR have analysed the impact from the proposed development on specific environmental factors such as traffic, noise, vibration, air quality and water quality all of which can have an impact on human health. These assessments have been prepared and carried out in accordance with various parameters and thresholds in their relevant fields which have been set (amongst other reasons) to ensure there is no negative impact to human health. It is not intended to repeat the baseline information for each of these fields of study within this chapter, and the reader is therefore directed to read the chapters listed below for an in-depth assessment of each of those topics. A brief summary is provided below however for the same fields of study and their implications for human health.

- Chapter 10 Traffic and Transportation
- Chapter 9 Noise
- Chapter 8 Air Quality and Climate
- Chapter 7 Water - Hydrology Flooding

In relation to traffic, a Stage 1 Road Safety Audit has been undertaken of the new site access and the haul route. This survey was undertaken by a suitably qualified road safety auditor who is independent of the design team. This audit report is included in **Appendix 10.2 of Volume III** of this EIAR. The road safety audit concludes that on the basis of the design of the entrance and the associated traffic movements predicted, the entrance and road will comply with all required safety standards. As such, the potential risk to human health from traffic sources associated with the proposed development is not considered significant.

Noise has the potential to affect health in a variety of ways, some of the effects can be auditory and occur as a direct impact of the noise. Direct auditory effects usually result in damage to the ear, in particular damage to the inner ear, from intense and prolonged exposure. Such risks are usually associated with occupational health or prolonged exposure to loud music and managed through good working practice and the provision of appropriate personal protection equipment to construction workers. Such auditory effects do not present a risk to local communities. Community effects are more typically associated with non-auditory health effects that may be associated with exposure to environmental noise. Examples of non-auditory health effects include:

- Annoyance;
- Mental health;
- Cardiovascular and physiological;
- Cognitive performance (tasks and academic); and
- Night-time effects (sleep disturbance).

As outlined earlier, the risk of community noise impact has been largely mitigated at the design stage through the use of earthen berms at the site perimeters and the location of plant. **Chapter 9** of this EIAR shows the predicted noise levels associated with both road haulage and on site activities and indicates that noise levels will be within the acceptable guidelines. As a consequence, there is no predicted significant impact to human health from community noise associated with the proposed development.

While sand and gravel dust does not present the same physical risk to health as fine particulate matter (i.e. cardiovascular and respiratory impact of PM₁₀ and PM_{2.5}), it can modify behaviour and impact upon the more intangible aspects of health, namely quality of life and wellbeing. In this case the works have the potential to cause temporary and localised impacts through dust nuisance at the nearest sensitive receptors. The NRA Guidelines on Air Quality (May 2011 Revision) state that, at major sites, there is a risk that dust may cause an impact at sensitive receptors within 100 metres to the source of the dust generated.

Chapter 8 of this EIAR notes that there is only one property located within 100m of the site's proposed excavation area. This is the property to the immediate north of the site boundary and this property has

potential for health impact from dust. However, it is noted that with the dust mitigation measures proposed, the prevalence for wet processing of sands and gravels and the installation of a physical barrier (berm) adjacent to this property the resultant health impact from dust at this property will be negligible.

As noted in the baseline section, there is a property owner within the group of properties to the north west of the site who suffers with respiratory illness. This property is circa 400 metres from the proposed excavation area and at this distance there will be negligible impact for residual dust impact and therefore negligible impact to human health with the proposed mitigation in place.

In term of water quality, there are a number of groundwater wells identified in the region of the proposed development as shown in Chapter 8 of this EIAR. These wells may be used as potable water for human consumption or water sources for livestock. In both cases there is a potential for contaminated water to enter the food chain and impact on human health. It is noted that all wells identified are upstream of the proposed development and therefore there is no flow pathway available whereby contamination at the Racefield site could give rise to human health impact through ingestion of contaminated water. As such, the potential for impact to human health through water quality impact at the site is negligible.

4.4.3 Restoration Phase

4.4.3.1 Population

The restoration plan does not involve infilling. The site will be restored as an ecological resource (refer Chapter 5 Biodiversity). For this reason, the majority of the work in restoring the site will be focused on the banks of the water body within the pit void. This work is specialist and not very labour intensive and therefore the population will not be affected by this phase of the project.

4.4.3.2 Employment

The restoration phase does not involve infilling and so restoration work, and therefore need for employment, is negligible. The treatment of the banks of the waterbody may provide a very slight, short-term source of employment for specialist landscapers.

4.4.3.3 Community

Due to the fact that the site will be retained as a wetland as opposed to an operational sand and gravel extraction facility or infilled land, the overall amenity value of the subject lands will be enhanced for the local community. The local community could benefit on a visual level improving the aesthetics of the surrounding land and therefore potential increasing the value of nearby residential areas. This has the potential to have a slight positive, long-term effect on the community.

4.4.3.4 Human Health

There are no residual impacts to human health associated with the restoration phase of the proposed development.

4.5 Mitigation Measures

4.5.1 Construction and Operational Phase

The proposed development does not have the potential to result in any significant negative impacts on the resident or working population structure during the course of construction. Any perceived negative impacts on the immediate local population will be short term and temporary in nature. Remedial measures will assist in minimising any potential disturbance and/or inconvenience to the existing resident, working and visiting communities.

Standard mitigation that will be applied to mitigate community disruption would typically include the following:

- Spreading the road surface near the entrances to the subject site with water when necessary to limit dust emissions;

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- Prompt removal of any material spillage at the site entrances to prevent dispersion along the public road due to wind/rain action and subsequent re-suspension due to passing vehicles.
- HGVs importing/exporting loose materials to/from the construction areas to be covered as required during dry weather where a dust risk exists; and
- Establishing channels of communication between Kilsaran, KCC and resident communities.

Furthermore, car parking will be provided within the site for all operatives and wheel-wash facilities will be provided on site to minimise dirt/dust being transferred from the site to the public roads by vehicles.

Best practice measures will also be adopted to ensure that noise impacts from operations are minimised to protect local amenity. Prior to the commencement of each phase of works, Kilsaran shall prepare a detailed method statement for the project. This will include an assessment of potential noisy operations and outline the noise mitigation measures proposed.

Impacts on employment will be potentially positive if only slight within the immediate local area. Therefore, no mitigation measures are considered necessary.

4.5.2 Restoration Phase

No adverse impacts are identified during the restoration phase. Therefore, no mitigation measures are required.

4.6 Residual Impact

4.6.1 Construction and Operation Phases

The extraction phase of the development is predicted to have a slight beneficial effect in terms of the potential to generate a range of employment opportunities.

Given the scale of the proposed development, certain temporary adverse local impacts are expected to occur during the operational period. These impacts would pose a potential nuisance such as an increase in daytime noise levels in the locality, albeit within guidelines, and would include the impacts of such factors such as dust and construction traffic.

The extraction phase of the development is predicted to have no negative effect in terms of capacity on the surrounding road network. The effects of noise and dust emissions arising as a result of project traffic will be minimised by the implementation of the appropriate controls on site during this phase.

The application of the mitigation measures detailed above and in each of the additional specialist sections of this EIAR, as appropriate, will ensure that people and properties located in close proximity to the subject site will not experience significant long-term adverse impacts during the proposed development.

4.6.2 Restoration Phase

The nature of the already established land use of the subject site will alter as a result of the proposed development, from its current status as agricultural land, to an operational gravel extraction facility, to its eventual state as an open wetland. No residual impacts are identified during the restoration phase.

4.7 References

Department of Housing, Planning and Local Government (August 2018), Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, Department of Housing, Planning and Local Government

EPA (August 2017), Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

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Census of Population 2011 and 2016, available at: <http://census.cso.ie/sapmap/>, Central Statistics Office

Quarterly National Household Survey (QNHS), Central Statistics Office.

Labour Force Survey, Central Statistics Office

Quarterly Labour Force Survey (QLFS), Central Statistics Office.

Faite Ireland, 2017 Topline Tourism Performance by Region



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5 BIODIVERSITY

5.1 Introduction

This chapter provides an assessment of the potential impacts of the proposed gravel extraction on the ecological environment, i.e. living organisms, their habitats, and their interaction; collectively known as biodiversity. This Chapter should be read in conjunction with the site layout plans for the site and project description provided in Chapter 3 of this EIAR.

5.2 Legislation, Policy and Guidelines

Legislation, policy and guidelines relevant to the assessment of biodiversity are outlined in this Section. The reader is referred to Chapter 1 for reference to the Environmental Impact Assessment Directive 2014/52/EU.

5.2.1 European Union

5.2.1.1 Habitats Directive and Birds Directive

The 'Habitats Directive' (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) is the main legislative instrument for the protection and conservation of biodiversity within the EU. The Habitats Directive lists habitats and species that must be protected within Special Areas of Conservation (SAC) on Annexes I and II, respectively. Additionally, the Habitats Directive identifies plant and animal species on Annex IV which are subject to strict protection anywhere they occur. The Habitats Directive sets out the protocol for the protection and management of SAC.

The 'Birds Directive' (Council Directive 2009/147/EC on the Conservation of Wild Birds) provides a network of sites in all member states to protect birds at their breeding, feeding, or roosting areas. The Birds Directive identifies in Annex I species that are rare, in danger of extinction or vulnerable to changes in habitat and which require special protection (so called 'Annex I' species). Special Protection Areas (SPAs) are designated under the Birds Directive to protect a range of bird populations including those of Annex I species.

Together, SACs and SPAs form a pan European network of so called 'European sites' for nature conservation (also known as Natura 2000 sites).

5.2.1.2 Water Framework Directive

The Water Framework Directive (WFD) 2000/60/EC provides a framework for the protection and improvement of rivers, lakes, marine and ground waters in addition to water dependent habitats. The aim of the WFD is to prevent any deterioration in the existing status of water quality, including the protection of 'good' and 'high' water quality status where it exists.

The WFD requires member states to manage their water resources on an integrated basis in order to achieve at least 'good' ecological status. In Ireland this is achieved through the River Basin Management Plan for Ireland 2018-2021 (DoHGLP, 2018).

The proposed development site is located within the Barrow Catchment Management Unit. The River Basin Management Plan outlines all the actions required to improve the water quality, with county councils and Irish Water playing an important role in the implementation of the plan.

5.2.2 National Legislation

The primary national legislation in the Republic of Ireland providing for wildlife protection are the Wildlife Acts of 1976 to 2018, as amended (hereafter 'The Wildlife Acts').

All bird species are protected under the Wildlife Acts from offences including intentional killing or injury, and disturbance during the breeding season. The protection extends to the eggs, young, and nests of birds. The Wildlife Acts provide protection to species not protected by the Habitats Directive (e.g. badger *Meles*, two amphibian species, one butterfly species (small blue *Cupido minimus*), common lizard *Zootica vivipara*).

These species are all similarly protected from intentional killing or injury. The breeding or resting sites of all these species are also protected (from wilful disturbance).

Where used in this Chapter, the term 'invasive species' refers to those species listed in the third schedule of the European Communities (Bird and Natural Habitat) Regulations 2011 and 2015 (hereafter 'the Regulations'). The Regulations make it an offence to '*plant, disperse, allow or cause to disperse, spread or otherwise cause to grow*' any of the scheduled species.

A number of vascular (i.e. flowering plants) and non-vascular plant species (i.e. non-flowering or 'lower plants') are afforded legal protection under the Flora (Protection) Order, 2015 (hereafter 'The Flora Protection Order'). It is an offence to cut, pick, collect, uproot or otherwise take, injure, damage, or destroy any specimens of the species listed under the Flora Protection Order.

5.2.3 Policy

This section lists policy, at national level and below, of particular relevance to biodiversity:

- National Biodiversity Action Plan 2017-2021 (DoCHG, 2017);
- County Kildare Biodiversity Plan 2009-2014 (KCC, 2009); and
- Kildare County Development Plan 2017-2023 (KCC, 2017)

5.2.4 Guidance

The methodology used to assess the potential impact of the proposed development on important ecological features, and to develop relevant mitigation measures had regard for Draft EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017), in addition to CIEEM's Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018). Whilst drafted in the context of transport infrastructure, the National Roads Authority's (NRA) Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) also provide useful guidance in the context of impact assessment, particularly in relation to the valuation of important ecological features. Other guidance (e.g. for field surveys) is referenced throughout this chapter as relevant. In addition, the following guidance documents have been employed in the assessment of biodiversity:

- Irish Concrete Federation Environmental Code (ICF, 2005);
- Guidelines on Environmental Management in the Extractive Industries published by the Environmental Protection Agency (EPA, 2006);
- Guideline Document C532 Control of Water Pollution from Construction Sites (CIRIA, 2001);
- Guideline Document C650 Environmental Good Practice on Site (CIRIA, 2005); and
- Oil Storage Guidelines (BPG CS005²⁴).

5.3 Methodology

5.3.1 Zone(s) of Influence and Study Areas

The 'zone of influence' (Zoi) for a project (or 'spatial extent of the impact' as described in Annex III(3) of the EIA Directive) is the area over which ecological features may be subject to significant impacts as a result of the proposed project and associated activities.

²⁴ Available online at: http://www.epa.ie/licences/lic_eDMS/090151b28059cd58.pdf Accessed July 2019

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The Zol is likely to extend beyond the boundary of a proposed development, for example where there are hydrological links extending beyond the site boundaries. Activities associated with the construction, operation, decommissioning (and where applicable, restoration) phases should be separately identified (where relevant).

The Zol will vary for different ecological features depending on their sensitivity to an environmental change. It is therefore appropriate to identify different Zol for different features. The features affected could include habitats, species, and the processes on which they depend. Zol are specified for different features, and types of potential impact.

It is also important to acknowledge, as per draft EPA guidance (EPA, 2017) *'that the absence of a designation or documented feature does not mean that no such feature exists within the site'*. As such, Zol should be identified for all features potentially occurring within the proposed development site, in addition to any known to occur.

As recommended by CIEEM (2018), professionally accredited or published studies are used to determine Zol. Having considered the proposed development, the Zol has been estimated for habitats and flora and fauna species and their habitats.

In the context of determining the Zol for potential pollution effects from the proposed development, a conservative approach has been adopted assuming that the Zol includes all areas downstream of the proposed development, which are within the same water catchment.

Desktop survey areas for the proposed development corresponded, as a minimum, to the Zol of potentially significant effects for each important ecological feature. Field surveys were constrained in cases by land access and/or by resources. Field studies for the Zol for potential pollution effects, which included the entire downstream surface water catchment, were not carried out.

In this chapter, the study area for cumulative effects includes the extent of the Zol from the proposed development site.

5.3.2 Consultation

The following organisations were consulted by email in relation to the proposed development:

- Development Applications Unit (DAU), Department of Culture, Heritage and the Gaeltacht;
- Heritage Officer of Kildare County Council;
- Inland Fisheries Ireland (IFI); and
- Geological Survey of Ireland (GSI)

Consultation undertaken for the proposed development is summarised in Table 1.4 and detailed in Appendix 1.1 of Volume III of this EIAR.

5.3.3 Desk Study

A desk study was completed to assess the potential for all protected species to occur, given their ecological requirements. Desktop studies had particular regard for the following sources:

- Surface and ground water quality status, and river catchment boundaries available from the online database of the Environmental Protection Agency (EPA) online interactive mapping tool²⁵;

²⁵ Available online at <https://gis.epa.ie/EPAMaps/default>. Accessed July 2019.

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- Information on ranges of Annex II species populations in Volume 1 of NPWS' Status of EU Protected Habitats and Species in Ireland (NPWS, 2013a), and associated digital shapefiles obtained from the NPWS Research Branch;
- Information on ranges of bird populations from Bird Atlas 2007–11 (Balmer *et al.*, 2013), excluding birds of prey whose ranges were determined with reference to Hardey *et al.* (2013);
- Mapping of protected site boundaries and Conservation Objectives for relevant sites available online from the NPWS;
- Distribution records for protected species and habitats held online by the National Biodiversity Data Centre (NBDC)²⁶ and the NPWS²⁷;
- Conservation status of species in the Irish context from relevant Irish Red Lists; (e.g. Marnell *et al.*, 2009 for mammals, Regan *et al.*, 2010 for butterflies, King *et al.*, 2011 for fish and amphibians; Lockhart *et al.*, 2008 for bryophytes, Fitzpatrick *et al.*, 2006 for bees; and, Wyse Jackson *et al.*, 2016 for vascular plants);
- Details of protected species and habitats within the County Kildare Biodiversity Plan 2009-2014 (KCC, 2009);
- National and regional surveys of semi-natural habitats, including grasslands (O'Neill *et al.*, 2013), saltmarsh (McCorry and Ryle, 2009; Devaney and Perrin, 2015), and woodland (Perrin *et al.*, 2008);
- Information in wetlands available from the map of Irish Wetlands²⁸
- Boundaries for catchments with confirmed or potential freshwater pearl mussel (FWPM) *Margaritifera margaritifera* populations in GIS format available online from the NPWS, and
- AA Screening Report and Natura Impact Statement (NIS) (RPS, 2019) for this project.

5.3.4 Field study

All surveys had regard for relevant guidance including, but not limited to, the NRA's Ecological surveying techniques for protected flora and fauna during the planning of national road schemes (NRA, 2009), which provides useful information on appropriate survey seasons and methods for many of Ireland's protected species.

5.3.4.1 Habitat and Flora

Surveys were carried out in Spring and Summer 2019 to classify habitats using the Heritage Council's classification system (Fossitt, 2000), and map habitats following the associated mapping methodology (Smith *et al.*, 2011). The information gained from the survey was used to describe habitat features, and to direct further habitat and species-specific survey work to inform this assessment. 'Target Notes' were recorded as necessary on maps in the field to identify the location of additional important ecological features.

Habitat surveys were carried out to record dominant species, indicator species for different habitat types or conditions, rare or declining species identified on relevant Red Lists (Wyse *et al.*, 2016) and invasive

²⁶ Assessing records up to 10 years old (from date of search), for an area of 5 km from the proposed development site. Available online at: <https://maps.biodiversityireland.ie/Map>, Assessed 16/04/2019.

²⁷ Available online at www.npws.ie. Accessed July 2019.

²⁸ Available online at <http://www.wetlandsurveysireland.com/wetlands/map-of-irish-wetlands---map/> Accessed July 2019.

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Vascular plant nomenclature follows that of the Botanical Society of Britain and Ireland (BSBI) 'Complete list of taxon names from the BSBI's database'. As such, any name changes, including through outlined in Stace (2019), are not included. Bryophyte nomenclature follows the British Bryological Society (Atherton et al., 2010).

5.3.4.2 Bat

5.3.4.2.1 Preliminary Ground Level Roost Assessment

A preliminary ground-level roost assessment was carried out during daylight hours, using close focusing binoculars, to identify features with suitability for roosting bats in trees and/or structures. This survey was conducted on the 12th February 2019 on trees within the Zol of the proposed development.

Trees were studied and assessed for the presence of features with suitability for roosting bats including cavities, frost cracks, trunk and branch splits, rot holes, and hollow sections of trunk and branches. The results of this assessment were used to grade trees and as having Negligible, Low, Moderate, or High suitability for roosting bats in accordance with the Bat Conservation Trust's (BCT) Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).

5.3.4.2.2 Commuting and Foraging Habitats

A site walkover was completed on the 12th February 2019 to assess the potential suitability of the proposed development site for bats, based on the presence of habitat features within the landscape. This assessment followed the BCT guidelines (Collins, 2016), which categorises the suitability of commuting and foraging habitats into negligible, low, moderate, and high, based on a combination of habitat features, connectivity, and professional judgement.

5.3.4.2.3 Bat Activity

Bat activity surveys were conducted within the proposed development site. A pre-determined transect route was walked a total of three times over three nights (two dusk surveys and one pre-dawn survey) in May, July and August 2019, during suitable weather conditions. Bat activity surveys were carried out in accordance with good practice guidelines (Collins, 2012; Kelleher & Marnell, 2006), where dusk activity surveys commenced at sunset and ended a minimum of two hours after sunset, and pre-dawn activity surveys commenced two hours before sunrise and ended at sunrise.

Two surveyors listened for bats using full-spectrum detectors (Echo Meter Touch 2 and Anabat Scout) with headphones/speaker. The surveyors walked a fixed transect with nine Listening Points (LPs), where they detected statically for a five-minute interval. Direct observations of bat activity (e.g. direction of flight and foraging or commuting behaviours) were recorded during the transect surveys. The entire transect was walked in a single direction once for each survey. The transect was walked in opposite directions in each subsequent survey. Weather details likely to influence bat activity (e.g. temperature wind and rain) were recorded at the beginning and end of each survey.

One 'static' (i.e. passive/stationary/automated) bat detector (Anabat Swift) was deployed to capture bat activity along a hedgerow within the footprint of the proposed development, where bat activity was expected based on an initial habitat suitability assessment. The static detector was deployed for a total of 7 nights between 21st August and 27th August 2019 in suitable weather conditions.

Bat recordings were analysed using Anabat Insight (version 1.8.6). To remove background noise trigger and smoothness levels were set to 6 and 13, respectively. A pre-set filter was then used to search for bat calls. Bat identification on call data was conducted using *British Bat Calls: A guide to Species Identification* (Russ, 2019).

5.3.4.3 Badger

The site and wider Zol were systematically searched for evidence of Eurasian badger *Meles* on the 12th of February 2019. The badger survey methodology recorded usage of holes, and direction of tunnelling in accordance with Scottish Badgers (2018) and Harris et al. (1989). Any signs of badger activity were noted, including the presence of setts, foraging evidence, access runs, tracks and prints.

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Guidance from the NRA (2005a) states that activities such as piling may cause disturbance to badger setts (triggering licencing) at distances of up to 150 m from the source. Although piling is not proposed for this proposed development, areas up to 150 m from the potential source of disturbance were searched for badger setts.

5.3.4.4 Otter

Watercourses, drainage ditches and wetland habitats within the proposed development site and wider Zol were assessed for otter *Lutra lutra*. The survey methodology had regard for guidance of the NRA (2006a) and included searches for breeding or resting sites within up to 150 m to account for the potential effect of disturbance from extraction. Evidence of otter including spraints, footprints, or feeding remains was also recorded, where present.

5.3.4.5 Breeding birds

Breeding bird assessments of the proposed development site were carried out in May, July, and August 2019. The survey methodology employed was a scaled down version of the British Trust for Ornithology's (BTO) Common Bird Census (CBC) technique (Bibby *et al.*, 2000; Gilbert *et al.*, 1998), which aimed to capture a snap-shot of breeding bird activity within the proposed development site and immediate environs. This method required a competent observer to make monthly visits, slowly walking transects through the site, recording all birds seen or heard. Species encountered were mapped and coded using standard BTO species codes with categories of breeding evidence then assigned. No attempts were made to locate nests as the survey methods are generally sufficient to determine probable or confirmed breeding. The survey identified all bird species as Low, Medium or High Conservation Concern as per the latest Birds of Conservation Concern in Ireland listing (Colhoun and Cummins, 2013).

Survey visits were conducted during the morning to coincide with the peak bird activity period and were not made during adverse weather conditions. Transects were chosen to ensure all parts of the survey area were passed within 50m or less. This was reversed between visits. Areas which were more likely to hold breeding birds, such as waterbodies and hedgerows were included along the route wherever possible. All bird species encountered within the survey area and immediate environs were recorded, including those in flight over the proposed development site.

Dedicated surveys for wintering birds was not deemed necessary due to habitat suitability and results from the desk study.

5.3.4.6 Amphibian and Reptile

Common frog *Rana temporaria* occupies a broad habitat range in Ireland. Searches were made of watercourses and wet habitats for spawn during the spawning season on the 12th February 2019.

Relative to common frog, smooth newts *Lissotriton vulgaris* have more specific habitat requirements, using slow moving or standing water, which contains broad-leaved aquatic vegetation (on which to lay eggs), but has few or no fish (who predate smooth newt larvae). Suitable smooth newt habitats were searched for during the baseline surveys.

Ireland's only native reptile, the common lizard (*Zootoca vivipara*), occupies many south-facing habitat types including damp tussocky grassland, scrub covered hillsides, dunes or banks, woodland tracks, peat bogs, and dry grasslands and heathlands. Suitable common lizard habitats were searched for on the date.

5.3.4.7 Invertebrate

During walkover surveys of the proposed development site and wider Zol, the potential was also noted for habitats of protected invertebrate species to occur including marsh fritillary *Euphydryas aurinia* and small blue *Cupido minimus*. In the case of these two butterfly species, searches were made of suitable habitats for the larval food plants of marsh fritillary (devil's bit scabious *Succisa pratensis*), and small blue (kidney vetch *Anthyllis vulneraria*).

Freshwater pearl mussel *Margaritifera margaritifera* and *M. durrovensis* surveys were not conducted as there are no records of this species from within the Kildoon or Tully stream or the River Barrow.

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A review of the National Biodiversity Data Centre maps indicates that there are no records of white-clawed crayfish *Austropotombius pallipes* within the Kildoon stream. The nearest record is from the River Barrow c. 5 km downstream of the site. A freshwater crayfish survey or habitat assessment was not conducted as part of this field study.

On the 19th June 2019, RPS ecologists carried out Q-value surveys (macroinvertebrates) at four sites within the Kildoon stream and details are included in **Appendix 5.1 of Volume III**.

5.3.4.8 Other Protected and Notable Species

During walkover surveys of the site and wider Zol, the potential was also noted for habitats of other protected fauna species to occur including hedgehog *Erinaceus europaeus*, stoat *Mustela erminea*, pygmy shrew *Sorex minutus*, red squirrel *Sciurus vulgaris*, and Irish hare *Lepus timidus hibernicus*.

5.3.4.9 Fish

On the 19th June 2019, RPS ecologists carried out a survey at four sites within the Kildoon stream. The suitability of habitat for the following Annex II protected species was also assessed; salmon and lamprey species. In addition, habitat was assessed to include a further salmonid species, brown trout (*Salmo trutta*) and is referred to as salmonid habitat. Q-value surveys (macroinvertebrates) were conducted at all four sites. The full report of the aquatic ecology baseline study is included in **Appendix 5.1 of Volume III** of this EIAR.

5.3.5 Impact Assessment Methods

5.3.5.1 Baseline Conditions

Key aspects of the baseline environment identified in draft EPA guidance include context, character, significance, and sensitivity. With reference to biodiversity, the baseline description should describe only 'important ecological features', as detailed by CIEEM (2018).

5.3.5.2 Important Ecological Features

Having defined the relevant baseline conditions within the Zol of the proposed development, it is important to value the ecological features therein, in advance of commencing the assessment of potential impacts.

The methodology used to value ecological features complies with the relevant principles underpinning impact assessment under the revised EIA Directive, however, it also has regard for the geographic frames of reference outlined in the NRA Guidelines for Assessment of ecological potential impacts of national road schemes (NRA, 2009). In conjunction with relevant terminology from draft EIA guidelines (EPA, 2017), the geographic frames of reference outlined by the NRA (2009) are employed in this chapter.

It is possible that features which are in and of themselves of negligible ecological value (e.g. improved grassland of negligible floristic value) may be of significant value in the resource they provide to other features (e.g. a significant resource of invertebrates breeding in the grasslands, which are an important food for local badgers). In some cases, therefore, habitats of negligible value may nevertheless be considered of greater importance due to their value to protected species.

'Important Ecological Features', as termed in CIEEM (2018), are defined here as those ecological features which are valued at Local Importance (Higher Value) or above. Ecological features below this value are not carried forward to impact assessment.

5.3.5.3 Potential Impacts

The potential impacts of the proposed development (both positive and negative) are predicted for all important ecological features. Where types of potential impact are not predicted to result in likely significant effects, these are not included (e.g. fauna collisions on internal site roads deemed unlikely to occur due to reduced traffic volumes and/or enforced speed limits). In accordance with the EPA (2017) and CIEEM (2018) guidelines, potential impacts are characterised by considering parameters shown in Table 5.1.

Table 5.1: Descriptions of potential impact parameters (adapted from CIEEM (2018), NRA (2009) and EPA (2017) guidelines)

Term	Description
Quality of effects (i.e. positive vs negative)	Positive potential impact –a change that improves the quality of the environment or slows an existing decline in the quality of the environment. Negative potential impact –a change which reduces the quality of the environment e.g. destruction of habitat, removal of species foraging habitat.
Magnitude or extent	The size of the area, number of sites. Proportion of a population, or other measurable unit significantly impacted by an effect.
Duration	Duration should be defined in relation to ecological characteristics (such as a species' lifecycle) as well as human timeframes. The EPA provides definitions for a wide range of effects for the following units of time in order of increasing duration: momentary, brief, temporary, short-term, medium-term, long-term, permanent Note: In this Chapter, discussion focuses only on effects which are likely to be significant, and as such momentary, brief, or temporary effects are typically not defined.
Frequency and timing	Frequency refers to how often the effect will occur. (e.g. once, rarely, occasionally, frequently, hourly, daily or constantly). Timing differs from frequency and is of particular relevance to biodiversity effects; the timing of an activity may result in a significant potential impact if it coincides with critical life-stages or seasons e.g. bird nesting season. Outside this period, similar actions may not cause significant impacts.
Probability	Draft EPA Guidance (2017) categorises potential effects as either likely or not likely. Only likely (and significant) impacts are assessed in this Chapter.
Significance	Significance of effects is usually understood to mean the importance of the outcome of the effects (the consequences of the change).

5.3.5.4 Determining Impact Significance

According to the EPA (2017), significance of effects is usually understood to mean the importance of the outcome of the assessment and is determined by a combination of objective (scientific) and subjective (social) concerns.

The EPA further notes that: *'While guidelines and standards help ensure consistency, the professional judgement of competent experts plays a role in the determination of significance. These experts may place different emphases on the factors involved. As this can lead to differences of opinion, the EIAR sets out the basis of these judgements so that the varying degrees of significance attributed to different factors can be understood'*. With this in mind, the geographic 'frame of reference' applied to determining impact significance by the NRA (2009) in Ireland and CIEEM (2018) in Ireland and the UK, has been adopted in this report in tandem with the EPA's qualitative significance criteria. Table 5.2 compares the qualitative versus geographic approaches to determining the significance of effects.



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Table 5.2: Equating the Definitions of Significance of effects using a Geographic vs. Qualitative Scale of Reference

Geographic Scale of Significance (NRA, 2009; but similar to CIEEM, 2018 ²⁹)	Qualitative Scale of Significance of Effects (EPA, 2017)
Negligible or Local Importance (Lower Value)	Imperceptible. An effect capable of measurement but without significant consequences
No significant effects No effects predicted to significant ecological features.	Not significant. An effect which causes noticeable changes in the character of the environment but without significant consequences
Local Importance (Higher Value) County Importance; National Importance, International Importance	Slight An effect which causes noticeable changes in the character of the environment without affecting its sensitivities Moderate An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends Significant An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment Profound An effect which obliterates sensitive characteristics

The geographic frame of reference can be a 'good fit' to assessments of biodiversity impacts because it allows clear judgements to be made about the scale of significance, with reference to published estimates for the population size of a given species at county, national and/or international scales or areas of habitats at such scales. The proportion of a known feature impacted 'at county scale' (i.e. 1% of the known or estimated population in a given county) is measurably different from that impacted 'at national scale' (i.e. 1% of the known or estimated national population).

5.3.5.5 Cumulative Impacts

Cumulative impacts may result from the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects (EPA, 2017). As stated in Section 3.10, the scope for cumulative effects includes the planning applications to the Local Authority (Kildare County Council), Strategic Infrastructure Development (SID) and Strategic Housing Development (SHD) within the previous three-years. Cumulative impacts may be particularly important as many ecological features are already exposed to background levels of threat or pressure and may be close to critical thresholds where further impact could cause irreversible decline.

5.3.6 Limitations and Assumptions

The receiving environment (i.e. baseline condition) may naturally vary through seasons and between years (NRA, 2008).

²⁹ The categories for different scales of geographic impact significance follow those applied in the NRA (2009) in preference to CIEEM, which includes the weakly defined administrative unit 'regional'

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The field study was completed during several site walkovers within the same calendar year (2019). Although the timings of the surveys were considered to have been completed during the optimal periods (NRA, 2008), variation among years has not been incorporated into the survey design. This limitation is acknowledged and incorporated into the assessment.

Sources of desk study information are neither exhaustive nor necessarily easily available, and a reasoned effort was made to obtain ecological data in the public domain to inform the description of the receiving environment (baseline condition) and its assessment. Additional information, not in the public domain, is likely to exist, but could not be obtained or assessed here. This limitation is acknowledged and incorporated into the assessment.

5.4 Baseline Conditions

5.4.1 Site Overview

The site is situated in Racefield, Ballyshannon, Kilcullen, Co. Kildare (Irish Transverse Mercator 677608, 705058) approximately 2.5km from Calverstown and c7km from Kilcullen. The site is currently in agricultural use as pasture and arable lands and is comprised of eight agricultural fields delineated by hedgerow. The field pattern in the surrounding area is irregular, variable in scale and is delineated by hedgerows with varying degrees of management and mature trees. A coniferous forest plantation, Clonmoyle Forest under the ownership of Coillte adjoins the southern boundary to the site.

5.4.2 Sites Designated for Nature Conservation

The review of designated sites considered nationally and internationally protected sites in the wider area including any potentially linked hydrologically (Figure 5.1). The lands in which the proposed development site is located have no formal designations.

The closest European site to the proposed development is The River Barrow and River Nore SAC (site code 2162), which is located circa 3.9km to the west of the proposed development. This SAC is downstream, via the first order Eaglehill Stream and the third order Kildoon stream, of the proposed development. The proposed development is located with the same Catchment Management Unit (CMU) as The River Barrow and River Nore SAC.

The nearest Ramsar site is the Pollardstown fen (site code 474), located c. 10 km north of the proposed development.

The nearest Natural Heritage Area (NHA)/proposed Natural Heritage Area (pNHA), and Nature reserves to the proposed development site are the Curragh (Kildare) pNHA (392) (located c. 5.5 km northeast); the Pollardstown Fen Nature Reserve (located c. 10 km north).

An Appropriate Assessment (AA) Screening Report and Natura Impact Statement (NIS) have been prepared separate to this EIAR, to assess the potential for likely significant effects and adverse effect on the integrity on European sites. The NIS (RPS, 2019) concluded that there was no likely significant effects on any European sites arising from the proposed development, either alone or in combination with other plans or projects. European sites are not considered further in this report.

The reasons for designation of all sites discussed in this section are presented in Table 5.3.

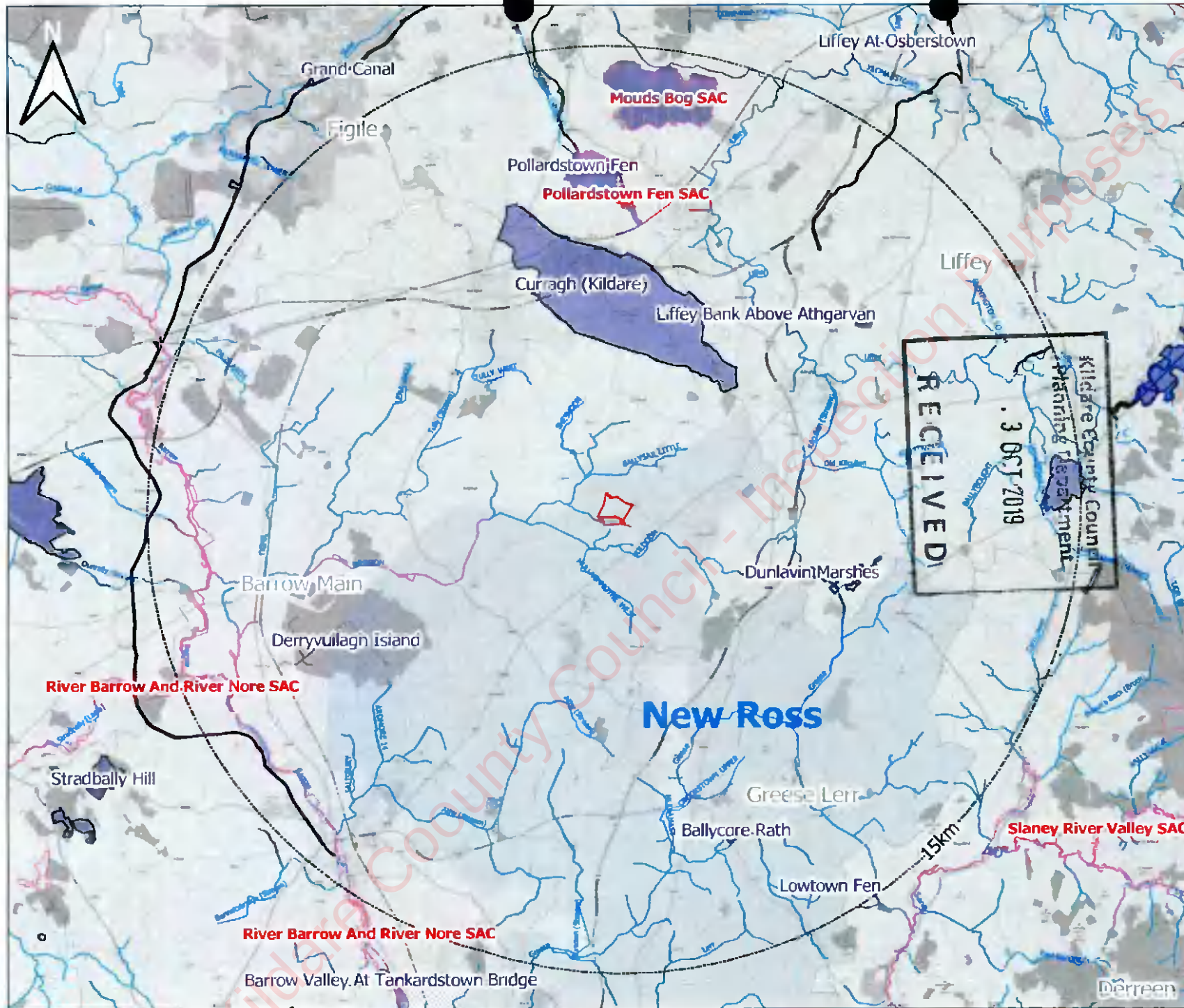
5.4.3 Desk Study

Protected and rare fauna species returned from the desk study within a 5 km radius of the proposed development site are detailed in Table 5.4.

5.4.4 Habitats

Habitats detailed during the field study within the ZOI of the proposed development site and wider ZOI are illustrated in Figure 5.2, which includes the relevant habitat codes from Fossitt (2000). A summary of each habitat is provided within this section.

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Legend

- Proposed Development
- Initial ZoI
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Potential Natural Heritage Area (pNHA)
- New Ross Groundwater Body
- River Water Bodies
- Water Management Units

Source NPWS (August 2019)

Client: Kilsaran build

Project: Kilsaran Racefield

Title: Figure 5.1: Sites Designated for Nature Conservation

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Checked: XX	File Ref:
Approved: XX	Scale: 1:175,000 @ A4
Date: 06/09/2019	Projection: IRENET95 / ITM

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Table 5.3: Sites with statutory designations for nature conservation

Designated Site (and code), Distance to Proposed Development	Key Reasons for Designation *
European Sites	
River Barrow and River Nore SAC (2162), 3.9 km west and downstream.	Estuaries [1130]; Mudflats and sandflats not covered by seawater at low tide [1140]; Reefs [1170]; Salicornia and other annuals colonising mud and sand [1310]; Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]; Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]; Water courses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i> vegetation [3260]; European dry heaths [4030]; Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]; Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]; Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]; Alluvial forests with <i>Ainus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]; <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]; <i>Margaritana margaritifera</i> (Freshwater Pearl Mussel) [1029]; <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]; <i>Petromyzon marinus</i> (Sea Lamprey) [1095]; <i>Lampetra planeri</i> (Brook Lamprey) [1096]; <i>Lampetra fluviatilis</i> (River Lamprey) [1099]; <i>Alosa fallax fallax</i> (Twait Shad) [1103]; <i>Salmo salar</i> (Salmon) [1106]; <i>Lutra lutra</i> (Otter) [1355]; <i>Trichomanes speciosum</i> (Killamey Fern) [1421]; <i>Margaritana durrovensis</i> (Nore Pearl Mussel) [1990].
Pollardstown Fen SAC (396), c. 10km north and downstream.	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210]; Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]; Alkaline fens [7230]; <i>Vertigo geyeri</i> (Geyer's Whorl Snail) [1013]; <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014]; <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016].
Mouds Bog SAC (2331), c. 12.7 km north east, upstream	Active raised bogs [7110]; Degraded raised bogs still capable of natural regeneration [7120]; Depressions on peat substrates of the <i>Rhynchosporion</i> [7150].
Slaney River Valley SAC (781), c. 15.6 km south east	Estuaries [1130]; Mudflats and sandflats not covered by seawater at low tide [1140]; Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]; Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]; Water courses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i> vegetation [3260]; Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]; Alluvial forests with <i>Ainus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]; <i>Margaritana</i> (Freshwater Pearl Mussel) [1029]; <i>Petromyzon marinus</i> (Sea Lamprey) [1095]; <i>Lampetra planeri</i> (Brook Lamprey) [1096]; <i>Lampetra fluviatilis</i> (River Lamprey) [1099]; <i>Alosa fallax fallax</i> (Twait Shad) [1103]; <i>Salmo salar</i> (Salmon) [1106]; <i>Lutra lutra</i> (Otter) [1355]; <i>Phoca vitulina</i> (Harbour Seal) [1365].
National Sites	
Curragh pNHA (Kildare) (392) 5.5 km north east.	The Curragh is an unusual site in an Irish and European context in that it has an extensive open plain area of lowland acid grassland, with dry heath in places. These grasslands are grazed but have been unfertilized for hundreds to thousands of years. There are also small areas of wet heath throughout the Curragh and they have been found to be associated with a perched watertable. The Curragh is a unique landscape that has considerable natural heritage significance for the wide diversity of habitats, plants, fungi and animals that it supports.
Dunlavin Marshes pNHA (1772), c. 6km south east.	This site consists of two disjointed strips of fen situated about 2 km north-west of Dunlavin. The site is of national importance due to its wide variety of plant species such as Black Bog-rush (<i>Schoenus</i>

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	nigricans) and Lady's Smock (<i>Cardamine pratensis</i>). Bird species recorded at the site include Snipe, Meadow Pipit and Sedge Warbler.
Liffey Bank Above Athgarvan pNHA (1396), c. 8km north	Approximately 3km North west of Kilcullen, the river Liffey meandering banks have formed an area of steep and unstable ground where a County's rare habitat and plant assemblage has occurred. Such assemblage, typical of disturbed and unstable habitats, is formed by Red Fescue (<i>Festuca rubra</i>), Wild Garden (<i>Thymus polytrichus</i>), Field Forget-me-not (<i>Myosotis arvensis</i>), Weld (<i>Reseda luteola</i>), Great Mullein (<i>Verbascum thapsus</i>), among others, along with patches of scrub. The uncommon plant Common Calamint (<i>Clinopodium menthifolium</i>) has been recorded from this site too.
Pollardstown Fen pNHA (396), c. 10km north and downstream	The largest remaining spring fed fen in Ireland (130 ha) possessing a large number of characteristic fenland species and communities. There are many rare plant species in the area such as Shining Sickle Moss and the rare arctic-alpine moss <i>Homalothecium nitens</i> . Other rare plant species include Narrow-leaved Marsh Orchid Slender Sedge and Marsh Hellebore. Many resident bird species and also winter and summer migrants can be found in the habitat. Among them are regular breeders such as Mallard Teal Coot Snipe Sedge Warbler Grasshopper Warbler and Whinchat. Other species such as Merlin Marsh Harrier and Peregrine Falcon occur regularly as vagrants.
Derryvullagh Island pNHA (1390), c. 10km west	Cultivated in the past, this site presently consists of an intact and well developed semi-natural deciduous woodland, rare in the County. Species include Hawthorn (<i>Crataegus monogyna</i>), Blackthorn (<i>Prunus spinosa</i>), Elder (<i>Sambucus nigra</i>) and Hazel (<i>Corylus avellane</i>). It is located 7km north of Athy and is surrounded by extensive developed raised bog.
Mouds Bog pNHA (395), c. 12.5km north	No online data available. Site overlaps with Mouds bog SAC.
Ballycore Rath pNHA (1751), c. 13 km south east	This site is important as a good example of calcicole grassland, rich in many of the species that typically occur in such situations. The presence of the woodland, river and marsh adds to the diversity of the site.
Newtown Marshes (1759), c. 14km east	This site, located about 2 km west of Hollywood, consists of a series of marshes and ponds. One of the larger bodies of water contains Common Reed and Willow Scrub (<i>Salix</i> spp.). Floating species present are Duckweed (<i>Lemna minor</i>) and Starwort. The area is of interest ornithologically as it holds a breeding colony of Black-headed Gulls.
Liffey Valley Meander Belt pNHA (393), c. 14km northeast	Located on the north bank of the river Liffey, c. 1km west of Kildare, this site is of scientific interest due to the rare presence in the County of this type of Ash woods and marshy areas. Records of important chironomid communities in this meandering and broad flood plain provide further scientific interest.
Lowtown Fen pNHA (1764), c. 14km, south	This site is located approximately 5km northwest of Baltinglass and consists of an overgrown kettle hole, surrounded by grazed pasture. Although drainage of the area has been attempted a concentric zonation of fen vegetation occurs – Common Reed (<i>Phragmites australis</i>), Water Mint (<i>Mentha aquatica</i>), Whorl-grass (<i>Catabrosa aquatica</i>), Lesser Spearwort (<i>Ranunculus flammula</i>), among others. Several species of orchid also occur, as Fragrant Orchid (<i>Gymnadenia conopsea</i>), Frog Orchid (<i>Coeloglossum viride</i>) and the

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scarce Marsh Helleborine (*Epipactis palustris*) adds to the site's scientific importance.

Grand Canal pNHA (2104) 15 km west
and 10km north east at the nearest
point

The Royal Canal is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Tarranbarry. The canal NHA comprises the central channel and the banks on either side of it. The rare and legally protected Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection Order 1987) is present at one site in Dublin, between locks 4 and 5. A stonewort (*Tolypella intricata*) is also found in the Royal Canal, the only site in Ireland where it is found.

Hollywood Glen pNHA (2053), c. 15 km
south east

No online data available

RAMSAR Site

Pollardstown Fen RAMSAR (474)

c. 10km north

The largest remaining spring-fed fen in Ireland. Habitats include semi-natural fen, damp grassland, woodland, and open water. The open water attracts waterbirds in regionally important numbers. The fen supports an important assemblage of invertebrate fauna and contains a complete palaeoecological record dating back to the last glaciation. Interpretive material and an observation hide are available.

Nature Reserve

Pollardstown Fen Nature Reserve,

c. 10km north

The largest remaining spring fed fen in Ireland (130 ha) possessing a large number of characteristic fenland species and communities. There are many rare plant species in the area such as Shining Sickle Moss and the rare arctic-alpine moss *Homalothecium nitens*. Other rare plant species include Narrow-leaved Marsh Orchid Slender Sedge and Marsh Helleborine. Many resident bird species and also winter and summer migrants can be found in the habitat. Among them are regular breeders such as Mallard, Teal, Snipe, Sedge & Grasshopper Warblers, and Whinchat. Other species such as Merlin Marsh Harrier and Peregrine Falcon occur regularly as vagrants.

*indicates a priority habitat



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Table 5.4: Protected and rare species returned from the desk study search within 5 km of the site.

Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences (Birds ³⁰ ; Invertebrates ³¹ ; Mammals ²)
Birds					
Barn Swallow <i>Hirundo rustica</i>		Amber List	22	31/12/2011	Summer visitor throughout Ireland. Range of habitat preferences, flocks gather at wetland sites in autumn.
Black-headed Gull <i>Larus ridibundus</i>	✓ _d		9	31/12/2011	Resident along all Irish coasts, wintering inland also. Breeding nests on the ground in wetland areas, i.e. bogs, marshes, man-made lakes. Widespread across agricultural fields, and urban areas.
Common Kestrel <i>Falco tinnunculus</i>		Amber List	13	31/12/2011	Widespread resident throughout Ireland. Nests in trees, buildings or in cracks in cliffs. Will use old crow's nests. Found in wide variety of open habitats including coasts, moor land, farmland, wetlands, roadside verges and town parks.
Common Kingfisher <i>Alcedo atthis</i>	✓ _a		4	31/12/2011	Resident on Irish streams, rivers and canals. Wintering in lakes and coasts during extended poor weather.
Common Linnet <i>Carduelis cannabina</i>		Amber List	23	31/12/2011	Widespread resident throughout Ireland. Breed in a variety of habitats, including rough grassland, uplands and in coastal areas with gorse.
Common Snipe <i>Gallinago gallinago</i>		Amber List	12	31/12/2011	Summer and winter visitor to Ireland. They forage across a variety of wetland and damp habitats. Nests on the ground, usually concealed in a grassy tussock, in or near wet or boggy terrain.
Common Starling <i>Sturnus vulgaris</i>		Amber List	31	31/12/2011	Widespread garden bird, Irish resident. Foraging in grassland in parks, gardens and farmland, and trees. Also found in urban environments as well as woodland and farmland.
Common Swift <i>Apus apus</i>		Amber List	6	31/12/2011	Common summer visitor throughout Ireland. Nests in small recesses in buildings, both occupied and derelict. Less frequently in holes in trees or caves in uplands or coastal areas.
Eurasian Curlew <i>Numenius arquata</i>	✓ _d	Red List	7	31/12/2011	Winter visitor to Irish wetlands. Breeding throughout Ireland in floodplains, boglands, meadows, rough pasture and heather.
Eurasian Sparrowhawk <i>Accipiter nisus</i>		Amber List	17	31/12/2011	Widespread in woodland, farmland with woods, larger parks and gardens. Nests in trees. Breeds throughout Ireland and ventures into urban gardens.
Eurasian Teal <i>Anas crecca</i>	✓ _d	Amber List	5	31/12/2011	Resident & winter migrant. Wetland preferences in covered freshwater lakes, pools and small upland streams away from the coast. Wintering in coastal lagoons and estuaries and inland marshes, lakes, ponds and turloughs.
Eurasian Tree Sparrow <i>Passer montanus</i>		Amber List	8	11/07/2017	Local resident in the east of Ireland, scarce along the south and west coasts. Largely associated with cereal production. Nests in cavity in building, especially under eaves or holes formed by missing brickwork.
Eurasian Woodcock <i>Scolopax rusticola</i>		Red List	5	30/11/2016	Resident & winter visitor to Ireland. Habitat preferences include woodland and areas of dead leaves and low vegetation, scrub and some open areas (bracken and heather-covered hills).

³⁰ Available online at www.birdwatchireland.ie/IrelandBirds. Accessed March 2019

³¹ Available online at <https://species.biodiversityireland.ie/>. Accessed March 2019

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Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences (Birds ³¹ ; Invertebrates ³¹ ; Mammals ²)
European Golden Plover <i>Pluvialis apricaria</i>	✓ _{ad}	Red List	4	31/12/2011	Widespread distribution during wintering in coastal and inland habitats. Summer populations restricted to uplands in NW Ireland with heather moors, blanket bogs, and acidic grasslands
European Greenfinch <i>Carduelis chloris</i>		Amber List	20	31/12/2011	Irish resident widespread in hedgerows, parks and gardens.
European Robin <i>Erithacus rubecula</i>		Amber List	33	31/12/2011	Widespread garden bird, Irish resident. Breeds throughout Ireland nesting in well-concealed areas in a bank, ivy or cavity in tree or wall
Great Spotted Woodpecker <i>Dendrocopos major</i>		Amber List	2	31/12/2011	Recent colonist to broadleaf forests in eastern Ireland. Breeding in oak woodlands with some coniferous woods nearby.
Grey Heron <i>Ardea cinerea</i>	✓ _d		12	31/12/2011	Common resident at wetlands, estuaries and along rivers throughout Ireland
Grey Wagtail <i>Motacilla cinerea</i>		Red Listed	8	31/12/2011	A widespread resident along fast flowing streams and rivers throughout Ireland, and nests under bridges. Some winter in coastal areas with large seaweed supply
House Martin <i>Delichon urbicum</i>		Amber List	13	31/12/2011	Common summer visitor throughout Ireland. Nests usually sited underneath the eaves of a house. Also nests on cliffs
House Sparrow <i>Passer domesticus</i>		Amber List	29	31/12/2011	Widespread garden bird, Irish resident. Breeds throughout Ireland - mainly around farm buildings and built-up areas. Nests in cavity in building, especially under eaves or holes formed by missing brickwork.
Jack Snipe <i>Lymnocyptes minimus</i>		Amber List	2	31/12/2011	Summer and winter visitor to Irish wetlands. Feeds in dense grass and low cover.
Lesser Black-backed Gull <i>Larus fuscus</i>	✓ _d	Amber List	5	31/12/2011	Summer populations are distributed across the Irish coastline including off shore islands, islands in inland lakes, sand dunes and coastal cliffs. Winter visitors to more inland lakes
Little Egret <i>Egretta garzetta</i>	✓ _a		2	31/12/2011	Resident along coasts and rivers throughout Ireland. A variety of wetland habitats are used including shallow lakes, riverbanks, lagoons, coastal estuaries and rocky shoreline.
Little Grebe <i>Tachybaptus ruficollis</i>	✓ _d	Amber List	4	31/12/2011	Resident on vegetated ponds and lakes throughout Ireland. Wintering habitat extends to include ephemeral wetlands and are often encountered on sheltered coasts, estuaries and coastal lakes and lagoons
Mallard <i>Anas platyrhynchos</i>	✓ _d		13	31/12/2011	Widespread in almost all available wetland habitats in Ireland. Nest sites vary, mostly in ground where hidden in vegetation
Meadow Pipit <i>Anthus pratensis</i>		Red List	23	31/12/2011	One of the commonest bird species in Ireland, favouring rough pastures and uplands. Breeds in bogs, uplands and areas of scrub and pasture. Winters in lowland areas.
Mistle Thrush <i>Turdus viscivorus</i>		Amber List	24	31/12/2011	Widespread garden bird, Irish resident. Breeds mainly in hedgerows and gardens. Nest in trees, bushes, ivy, brambles and sometimes conifers.
Mute Swan <i>Grus olor</i>		Amber List	6	31/12/2011	Resident at wetlands throughout Ireland
Northern Lapwing <i>Vanellus vanellus</i>		Red List	11	31/12/2011	Irish resident and summer visitor across wetlands, pasture and rough land adjacent to bogs. Breed on open farmland and bare fields.

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Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences (Birds ¹ ; Invertebrates ³¹ ; Mammals ²)
Peregrine Falcon <i>Falco peregrinus</i>	✓ad		5	10/11/2016	Widespread resident in Ireland favouring coastal sites and cities with high vantage points
Sand Martin <i>Riparia riparia</i>		Amber List	8	31/12/2011	Widespread summer visitor throughout Ireland. Breed in burrows dug into river banks or quarries
Sky Lark <i>Alauda arvensis</i>		Amber List	19	31/12/2011	Common resident throughout Ireland in uplands and areas of farmland, especially cereal. Breeds in a variety of habitats including cultivated areas, ungrazed grasslands and upland heaths. Winters in flocks on stubble fields, grasslands and coastal areas.
Spotted Flycatcher <i>Muscicapa striata</i>		Amber List	7	31/12/2011	A widespread summer visitor to broadleaf woodlands, well-vegetated hedgerows, parks and gardens
Stock Pigeon/Stock Dove <i>Columba oenas</i>		Amber List	11	31/12/2011	A widespread resident throughout Ireland favouring areas of cereal cultivation. Breeds in lowlands of eastern and southern Ireland, almost invariably near agricultural areas, especially cereal. Nests in holes in trees
Stonechat <i>Saxicola torquata</i>		Amber List	3	31/12/2011	Widespread resident in scrubland throughout Ireland, mainly near the coast. Scarce in the midlands. Favours Gorse and upland bracken
Whooper Swan <i>Cygnus cygnus</i>	✓ad	Amber List	1	31/12/2011	Winter visitor to wetlands and nearby open farmland throughout Ireland. Breeding in open shallow water, by coastal inlets, estuaries and rivers
Yellowhammer <i>Emberiza citrinella</i>		Red List	26	31/12/2011	Declining resident mainly in the east and south of Ireland. Strongly linked with the cultivation of cereals
Invertebrates					
Marsh Fritillary <i>Euphydryas aurinia</i>	✓br	Vulnerable	9	31/12/2010	Broader habitat usage in Ireland compared to Britain, found on wet grasslands, coastal grey dunes, machair and cutover bog. Roosting adults may sometimes be found on flowerheads. They bask and feed on various flowers, but especially on Meadow Thistle (<i>Cirsium dissectum</i>), and to a lesser extent Tormentil (<i>Potentilla erecta</i>)
Small Heath <i>Coenonympha pamphilus</i>		Near Threatened	4	04/07/2018	Generalist, found on unimproved dry grassland, coastal grey dunes and machair. Adults favour areas of grassland with low sward height and abundant flowers and isolated scrub. Roosting adults are occasionally found on flowerheads
Wood White <i>Leptidea sp.</i>		Near Threatened/Least Concern*	1	05/06/2018	Specialist on grassy forest clearings and limestone pavement. In dull weather adults may be found resting on flowerheads
Gipsy Cuckoo Bee <i>Bombus bohemicus</i>		Near Threatened	1	09/05/2017	Widespread and found in a range of habitat types
Red Tailed Bumble Bee <i>Bombus lapidarius</i>		Near Threatened	57	05/08/2018	Found in a wide range of habitats, including parks and gardens. Has declined from the agricultural landscape
Megachile (Megachile) <i>centuncularis</i>		Near Threatened	2	20/08/2016	Not common. Majority of known populations are from parks and gardens
Moss Carder- bee <i>Bombus muscorum</i>		Near Threatened	8	09/08/2017	Found in a range of flower-rich habitats, including parks and gardens

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Species Name	Legislative Protection*	Red List Status	Record Count	Date of Last Record	Habitat Preferences (Birds ; Invertebrates ³³ ; Mammals ²)
Mammals					
Eurasian Badger <i>Meles meles</i>	✓ _e		20	03/09/2014	Varied habitats including grassland, woodland and Bog often near hedgerows or treelines and streams (Small, 1995).
Eurasian Red Squirrel <i>Sciurus vulgaris</i>	✓ _e	Near Threatened	1	31/12/2011	Conifer-dominated woodland with a mixture of age classes and species together with some berry-bearing shrubs to ensure a continuous food supply (NPWS/EHS, 2008)
Irish Hare <i>Lepus timidus</i> subsp. <i>hibernicus</i>	✓ _e		6	02/08/2017	Varied habitat preferences including bog, moor, heath, marsh, and pastoral farmland (Reid et al., 2007)
Leisler's bat <i>Nyctalus leisleri</i>	✓ _{ce}	Near Threatened	1	08/05/2009	Woodland species but it is also to be found in parkland, along treelines, pasture and riparian habitats, over lakes, beaches and dunes and above streetlights in urban areas. Not as dependent on linear features like hedgerows as our other bat species
Pine Marten <i>Martes martes</i>	✓ _e		4	19/01/2017	Habitat specialists and require forest or scrub cover to exist in a landscape. In the west of Ireland they may have adapted to relatively open habitats due to historical clearance of woodland habitat.
Common Pipistrelle sp. <i>Pipistrellus pipistrellus</i>	✓ _{ce}		1	08/05/2009	The species forages along linear landscape features such as hedgerows and treelines as well as within woodland. Crevice dweller, but sometimes enters roof voids. Does not normally require light-sampling areas. Hibernates in a variety of places, which may be quite exposed. Frequently in cavities in buildings, rarely underground (Kelleher and Marnell, 2008).
Soprano Pipistrelle <i>Pipistrellus pygmaeus</i>	✓ _{ce}		1	08/05/2009	The Soprano forages along linear landscape features such as hedgerows and tree lines as well as within woodland however it has a notable preference for riparian habitats and it too has adapted to modern dwellings and lives in similar locations beneath roofing felt etc. Crevice dweller, but sometimes enters roof voids. Does not normally require light-sampling areas. Hibernates in a variety of places, which may be quite exposed. Frequently in cavities in buildings, rarely underground (Kelleher and Marnell, 2006)
West European Hedgehog <i>Erinaceus europaeus</i>	✓ _e		2	03/09/2014	It is considered to be present in all lowland habitats where there is sufficient food to eat and ground cover for nesting, and commonest where grassland abuts mixed woodland and scrub. It appears to avoid coniferous woodland, blanket bog and other wet areas.

* a = Annex I Birds Directive, b = Annex II Habitats Directive, c = Annex IV Habitats Directive, d = Special Conservation Interest bird species (within SPA), e = Wildlife Act (excluding birds), f = County Kildare Biodiversity Plan 2009-2014

³² Available online at www.birdwatchireland.ie/IrelandsBirds. Accessed March 2019

³³ Available online at <https://species.biodiversityireland.ie/>. Accessed March 2019



5.4.4.1 Grassland

GA1 Improved Agricultural Grassland

Improved grassland habitats were found along the most eastern and southern borders of the Proposed Development lands, of which some were grazed by cows. There is a noticeably higher proportion of Perennial Rye-grass *Lolium perenne*, indicative of higher nutrient levels and low species diversity. Less commonly found were Cocksfoot *Dactylis glomerata* and other grasses including Yorkshire fog *Holcus lanatus*, *Agrostis* spp., and *Poa* spp. More diverse grassland habitat yielded multiple species including Ribwort plantain *Plantago lanceolata*, Meadowsweet *Filipendula ulmaria*, Ragwort *Senecio jacobaea*, Broad-leaved dock *Rumex obtusifolius*, Red clover *Trifolium pratense*, Creeping buttercup *Ranunculus repens*, Alsike clover *Trifolium hybridum* and White clover *Trifolium repens*. Spear thistle *Cirsium vulgare*, Creeping thistle *Cirsium arvense* and Stinging nettle *Urtica dioica* were found sprayed locally throughout accompanied by other weed species. To a lesser extent, Knapweed *Centaurea nigra*, Self-heal *Prunella vulgaris*, Daisy *Bellis perennis*, Dandelion *Taraxacum officinale* agg. and Stitchwort *Stellaria* spp. were also noted. Summary details are provided in Table 5.5.

Table 5.5: Differential features of Improved Grassland within the site

Grassland Code	Sward height (cm)	Differential Features
GA1-A	20-60	Most diverse. Ungrazed grassland.
GA1-B	0-40	Strip grazing with three visible grazing strips: resting, grazing and recovering.
GA1-C	0-20	Recently grazed and re-seeded. Nettles sprayed.
GA1-D	15-20	Previously grazed. Thistles sprayed. Borders plantation.
GA1-E	15-20	Previously grazed. Thistles sprayed. Borders plantation.
GA1-F	15-20	Previously grazed. Thistles and docks sprayed. Remnants of calcareous grassland beside spring to the south.

5.4.4.2 Cultivated and Built Land

BC1 Arable Crops

A total of three arable crops were encountered during the habitat survey, rapeseed *Brassica napus*, turnip *Brassica rapa* and barley *Hordeum vulgare*. There were eight fields within the proposed development site that were cultivated and managed for the production of arable crops. Rapeseed was the most commonly cultivated and found to the south and west of the site, followed by Barley to the north and east, and Turnip to the southeast. All arable crop habitats showed little or no understorey plant diversity.

5.4.4.3 Woodland and Scrub

WL1 Hedgerows

Hedgerows were the most abundant non-grassland or cultivated habitat found within the proposed development site. Physical characteristics of the hedgerows varied across the proposed development site (Table 5.6); however, hedgerows were generally unmanaged. Species composition was relatively constant with varying mixes of hawthorn *Crataegus monogyna*, blackthorn (Sloe) *Prunus spinosa*, ash *Fraxinus excelsior*, elder *Sambucus nigra*, hazel *Corylus avellana*, sycamore *Acer pseudoplatanus*, and occasional small-leaved Elm *Ulmus minor*, pedunculate oak *Quercus robur*, English elm *Ulmus procera*, and Grey Willow *Salix cinerea* and other willow *Salix* spp.

The understorey and margins of the hedgerows supported an abundance of bramble (blackberry) *Rubus fruticosus* agg., Ivy *Hedera helix*, hedge bindweed *Calystegia sepium*, cleavers *Galium aparine* and dog rose *Rosa canina* with frequent stinging nettle *Urtica dioica*, curled dock *Rumex crispus* and broad-leaved dock *Rumex obtusifolius*, and occasional cow parsley *Anthriscus sylvestris*, Privet *Ligustrum vulgare*, honeysuckle *Lonicera periclymenum*, and hogweed *Heracleum sphondylium*. Gooseberry *Ribes uva-crispa* and Spindle *Euonymus europaeus* were both recorded only once.

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Table 5.6: Differential features of Hedgerows within the site

Hedgerow Code	Approximate Height Range (m)	Approximate width Range (m)	Differential Features
WL1-A	2-3	2-3	Negligibly managed all sides. Small leaved Elm is pronounced. North of electricity line Elm is dominant. South of line Ash is dominant.
WL1-B	8-10	2-3	Two small 20 m gaps. North of electricity line Elm is pronounced. South of line Ash is dominant.
WL1-C	1-2	2-3	No real hedge, like an infilled ditch.
WL1-D	8-10	2-3	Stockproof. Spindle, Gooseberry and Hogweed.
WL1-E	6-8	2-3	Willow spp.
WL1-F	4-6	2-3	Occasional taller trees.
WL1-G	4-6	2-3	-
WL1-H	3-4	2-3	Sparse and broken, in drainage ditch.
WL1-I	10+	1-4	With drainage ditch. Honeysuckle and wild privet.
WL1-J	4-6	2-3	Mostly defunct. Large gaps between single trees.
WL1-K	6-8	5+	Double hedge.
WL1-L	8-10	2	Not stock proof, earth mounds in areas. One mature pedunculate oak tree.
WL1-M	8-10	1-2	Pedunculate oak on Eastern section of hedgerow. Stockproof. Little to no verge vegetation. Wild privet.
WL1-N	E(8-10); W(3-6)	2-3	Approximate height varies.
WL1-O	2-4	2-3	Past management. Noticeable from low height.
WL1-P	<2	1	-
WL1-Q	8-10	1-2	Slightly gappy.
WL1-R	8-10	2-3	Willow present.
WL1-S	10-15	2-3	Frequent elm, with mature trees throughout.

WL2 Treelines

This habitat is distinguished from WL1 hedgerows by their linear representation along with a poorly developed understory and a typical height range of greater than 5m (Fossitt, 2000). Treelines were present in the vicinity of Racefield House in the north east of the proposed development site. The entrance to the dwelling was dominated by a line of beech *Fagus sylvatica*, while the northern boundary of the dwelling with the L-8006 was dominated by a line of Spruce *Picea sitchensis*.

WD4 Conifer Plantation

A Coillte-owned plantation delineates much of the southern boundary of the proposed development site. It is characterised largely by Sitka spruce *Picea sitchensis* and offers little by way of floristic diversity. Along the stream/woodland boundary, Sitka is replaced by a linear boundary feature comprising Scots Pine (*Pinus sylvestris*) and some riparian scrub including Ivy (*Hedera helix*), Gorse (*Ulex europaeus*), willow (*Salix* spp.) and brambles.

5.4.4.4 Freshwater

A number of drainage ditches, located in the west and south of the proposed development site, flow into the first order Eaglehill Stream, adjoining the southern boundary of the proposed development site.

FW2 Depositing / Lowland Rivers

The proposed development area gently slopes toward the forestry and the stream to the southern boundary. The Eaglehill Stream flows along the southern edge of the forestry plantation boundary. The stream is at most 1.5m wide and between 10 and 20cm in depth. During the aquatic survey, water flow was not obvious at one sampling spot (Site 1 the uppermost sampling station to the east of the plantation forestry – refer Appendix 5.1 of Volume III). There is little to no riparian zone on the left bank as it leads directly into the stream for the most part. The ditch has been deepened forming a 2m high bank with a conifer plantation. Riparian vegetation on the right bank consisted of thistle (Asteraceae), gorse (*Ulex europaeus*), willow (*Salix* spp.), brambles (*Rubus fruticosus*) and coniferous forestry and some Scots pine (*Pinus sylvestris*). Gorse and willow were present on the left bank in patches. Further downstream the stream is characterised by a 1m scrub buffer on the left and right bank. Riparian vegetation consists of Ivy (*Hedera helix*), Gorse (*Ulex europaeus*), willow (*Salix* sp.), brambles and Scots Pine.

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The stream substrate was entirely silt and instream habitat was poorly developed, characterised by a single vegetated pool owing to the stagnant condition of the water. Aquatic vegetation consisted of foals water cress (*Apium nodiflorum*) (95%), starwort (*Callitriche* spp.) (4%), lesser water parsnip (*Berula erecta*) (<1%) and duckweed (*Lemna minor*) (<1 %).

FW4 Drainage Ditches

Drainage ditches were not common within the fields occupied by the proposed development, although ditches were not uncommon in the wider landscape. A single drainage ditch was noted located within one hedgerow where there were large gaps between single trees. This is not uncommon, drainage ditches and hedgerows are often found in intimate association. This habitat was found as an area of wet ditch with slow moving water supporting both wetland and grassland species.

The water within the ditch although stagnant was characterised by the following species including water mint *Mentha aquatica*, rush *Juncus compactus*, marsh thistle *Cirsium palustre*, and Common spotted-orchid *Dactylorhiza fuchsii* subsp. *fuchsii*. Field horsetail *Equisetum arvense* was also seen in abundance. Lady's bedstraw *Galium verum*, bird's-foot trefoil *Lotus corniculatus*, common tormentil *Potentilla erecta*, Common St. John's Wort (perforate) *Hypericum perforatum*, greater willow herb *Epilobium hirsutum*, rough hawkbit *Leontodon hispidus*, knapweed *Centaurea nigra*, creeping cinquefoil *Potentilla reptans*, and tufted vetch *Vicia cracca* were also present on the drain banks.

A series of drainage ditches were noted to the west of the application boundary with potential connectivity to the surface water network including the Eaglehill Stream. These ditches are mapped and discussed in greater detail in Chapter 7.

FP1 Calcareous Springs

Springs are typically discrete, rarely forming extensive habitats. Nonetheless, the presence at the surface is indicative of a subterranean hydrological and hydrogeological resources that supplies them with mineral-enriched waters. During the surveys, calcareous formations (tufa) were noted on the bank of the Eaglehill Stream, c. 220 m south of the proposed development site. The spring was not vegetated with bryophytes or herbs typical of Annex I petrifying springs.

Protected Flora/Species of Conservation Concern

No plants protected under the Flora Protection Order 2015 were recorded during the desk study or field study. All vascular plants recorded within and adjacent the site were of 'Least Concern' or were unlisted on the Irish Red List (Wyse Jackson *et al.*, 2016).

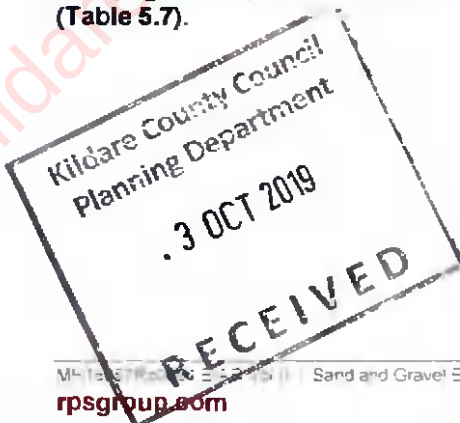
5.4.5 Invasive Plants and Animals

No 'scheduled' invasive species were recorded within the footprint or ZOI of the proposed development site during the desk study or during subsequent field surveys.

5.4.6 Bat

5.4.6.1 Preliminary Ground Level Roost Assessment

The preliminary ground level roost assessments identified twelve habitats with features suitable for roosting bats (Figure 5.3.). The visual assessment ranked the trees with potential to support bat roost features (Table 5.7).



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Table 5.7: Features suitable for Roosting Bats identified during the Preliminary Ground Level Roost Assessment.

Map Code	Tree Species	Feature Location and Description	Suitability
BT1	Beech	Second beech tree in from gate. North facing feature – high (5m from ground) Branches overlap and cross creating elongated crevice.	Low (estimated due to height accessibility)
BT2	Beech	Third beech tree in from gate. North-west facing feature – high (5m from ground) Branches overlap creating elongated crevice.	Moderate-low
BT3	Hawthorn	Singular mature Hawthorn in centre of field. North facing feature – broken branch. Entrance curve up and eastwards.	Moderate-low
BT4	Ash	Three Ivy covered Ash trees – some mature ivy.	Low (estimated due to ivy coverage)
BT5	Ash	East facing feature at c. 2 m from ground. Knot hole creating vertical small cavity – unlikely suitable for maternity but potential for hibernation.	Moderate
BT6	Ash	Knot hole 1 – West facing at c. 4 m. Knot hole 2 – North facing at c. 5 m.	Low Low
BT7	Ash	Mature Ash with mature ivy >10 cm thickness. West side of drainage ditch.	Low (estimated due to ivy coverage)
BT8	Hawthorn	Hawthorn Tree on north side of ditch. South-west facing feature c. 1.3m from ground – broken branch.	Low
BT9	-	Entire hedgerow with ivy covered mature Hawthorn trees. Potential: Unknown due to ivy coverage – Low - Break in middle of field - negligible.	Low
BT10	Elder	Mature tree. West facing feature at c. 1m. Knot hole c. 4-5 cm diameter. Additional knot hole below but too exposed.	Moderate
BT11	Elder	Mature Elder with South facing feature c. 5 cm diameter knot hole c. 5 m high.	Low
BT12	Elder	Mature Elder with ivy coverage. West facing feature at c. 1.5m height. Broken branch feature with small c. 3 cm opening.	Low

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5.4.6.2 Commuting and Foraging Habitats

All hedgerows were assessed for bat commuting and foraging suitability. The hedgerows near the eastern and southern boundaries were classified as moderate-high value, whilst the hedgerows within the interior of the site were mostly classified as being of moderate or low value to commuting and foraging bats (Figure 5.3).

A suitability index developed by Bat Conservation Ireland (Lundy *et al.*, 2011) identifies the proposed development site within a moderate suitability quintile (22.89) for all bat species combined (Table 5.8). The highest suitability index scores were recorded for Leisler's bat, common pipistrelle, soprano pipistrelle and brown long-eared bat.

Table 5.8: Suitability Index for Different Bat Species (as per Lundy *et al.*, 2011)

Scientific name (Common Name)	Suitability index
<i>Nyctalus leisleri</i> (Leisler's bat)	41
<i>Pipistrellus pipistrellus</i> (common pipistrelle)	37
<i>Pipistrellus pygmaeus</i> (soprano pipistrelle)	32
<i>Plecotus auratus</i> (brown long-eared bat)	30
<i>Myotis nattereri</i> (Natterer's bat)	24
<i>Myotis daubentonii</i> (Daubenton's bat)	18
<i>Myotis mystacinus</i> (whiskered bat)	15
<i>Pipistrellus nathusii</i> (Nathusius' pipistrelle)	9
<i>Rhinolophus hipposideros</i> (lesser horseshoe bat)	0
All Bats	22.89

5.4.6.3 Bat Activity

The dates, timing, and weather conditions for the three bat activity surveys are detailed in Table 5.9. Four species of bat (common pipistrelle, soprano pipistrelle, Leisler's bat and brown long-eared bat) were recorded using the proposed development site for foraging and/or commuting during the three bat activity surveys. Bat activity was greatest in the east of the proposed development site (Figure 5.5).

Table 5.9: Dates, Timings and Weather Conditions for Bat Activity Surveys

Date	Sunset/ Sunrise Time	Start Time of Survey	End Time of Survey (100%)	Cloud Cover	Precipitation	Wind (0-7)	Temperature (°C)
22/05/2019	21:33	21:30	01:00	100	None	1	13
31/07/2019	21:23	21:23	01:55	15	None	0-3	16
21/08/2019	06:18	03:30	06:45	40	None	0-1	12

Data from the static bat detector located within a hedgerow over the seven night period from 21st to 27th August 2019 indicated that this area of the proposed development site was most significant as a foraging and commuting resource for Leisler's bat (61% of passes) and common pipistrelle (47% of passes), with relatively few records of foraging soprano pipistrelle (5% of calls) and unidentified *Myotis* species (1% of passes). Table 5.10 summarises the key findings of the static bat detector.

Table 5.10: Static Bat Detector Results

Species	Number of Passes	% of Total Passes
<i>Nyctalus leisleri</i> (Leisler's bat)	91	61
<i>Pipistrellus pipistrellus</i> (common pipistrelle)	47	32
<i>Pipistrellus pygmaeus</i> (soprano pipistrelle)	5	3
<i>Pipistrellus pipistrellus/pygmaeus</i> (common/soprano pipistrelle)	4	3
<i>Myotis</i> spp	1	1
Total	148	100

5.4.7 Badger

The study area (includes all lands under the ownership of Kilsaran) was systematically searched for evidence of badger in February 2019 and September 2019. Signs of badger activity were noted, including the presence of one active sett, foraging evidence, access runs, tracks and prints (refer to Table 5.11 and 5.12). Table 5.11 identifies all burrows and openings identified on site that have potential as a badger sett but illustrates that only one (BS3) is an active sett and this is located outside the planning application boundary. The following evidence was noted on site and is illustrated in Figure 5.5:

- Badgers using site for commuting/foraging as identified fresh footprints and snuffle holes identified along mammal trails;
- Eleven potential badger setts were noted during the survey;
- Eight discrete signs of badger evidence (e.g. snuffle holes, paths, footprints, bedding and latrine (well defined depression where badger regularly defecate, typically on the boundary of their territory) were also recorded.

Table 5.11: List of identified potential badger features (actual setts highlighted in grey)

Map Code	Description	Additional Evidence	Monitoring Evidence, September 2019
BS1	Entrance Aspect: East Tunnel Direction: ~West Tunnel wider than tall No soil heap Infilled - >75% detritus Disused hole – potential outlier Within Hedge row habitat West side of stream – no access from proposed development site	Evidence of previous trail from hole down to stream – not recently used (leaf litter cover)	Opening not considered big enough to support badger, although the inner part of the hole is bigger than the opening itself. Partial subsidence of soil and lack of recent activity This hole is not suitable for badger. Proximity to water filled ditch and steepness of slope is not conducive to badger access from proposed development site.
BS3	Entrance Aspect: West Tunnel Direction: South-east Tunnel wider than tall Soil heap present and un-vegetated – fresh soil Not infilled - <25% detritus and no cobwebs Well used hole with potential bedding near – potential main/maternity use West side of stream – no access from LMA	Fresh soil but no prints Quite exposed at gate crossing with persecution evidence from dead fox in tree nearby – badger size but could be fox den Associated with BS11	Original single hole still showing signs of current activity. Considerable spoil heap, with layer of fresh unconsolidated soil atop, with some discarded bedding interspersed. Plentiful prints about. A recently established narrow opening with considerable fresh excavated spoil approximately two metres north of original BS3 opening. Active Badger Sett.
BS4	Entrance Aspect: East Tunnel Direction: West Tunnel wider than tall No soil heap – fresh soil leading down to stream	Fresh markings in soil leading down to river – no prints visible	Original badger-size hole relocated and one of two rabbit holes. The trail leading down from opening to the watercourse was devoid of vegetation but no fresh soil. Compacted ground with no prints or

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	Not infilled - <25% detritus Well used hole - potential main West side of stream - no access from LMA	2 additional smaller holes nearby - unlikely to be badger	scrapes marks indicative of recent activity at this site. An additional hole was located atop the ditch along a farm access track (outside study area). Hole dimensions are typical of badger, but not an active badger sett and no recent activity
BS5	Entrance Aspect: South Tunnel Direction: East Tunnel wider than tall Present and vegetated soil heap Partially infilled - 25-51% detritus Disused hole - potential outlier	NA	Uncertain if original hole was relocated, as the tunnel opening was southwards facing, but the tunnel was orientated northwest into the hedge line. It was obscured by overhanging grass and ivy. However, the hole had been "sticked" (one acceptable ecological method to monitor for activity), both of which were still standing. Not an active badger sett and no recent activity
BS6	Entrance Aspect: North Tunnel Direction: South-west Tunnel wider than tall Present and partially vegetated soil heap Some leaf litter within - <25% detritus No cobwebs Disused hole	Very exposed at edge of agricultural field BS6-10 likely same set/den area in double hedgerow with persecution evidence - 3 bullet shell casings found near hole entrances	Despite the crop in this field having been recently harvested, both adjacent holes BS6 and BS7 were obscured by vegetation - mostly brambles with trapped leaf litter. No evidence of excavation or bedding. No clear signs of trails along field boundary, but a number of occasional small openings into hedge line with some evidence of narrow, discontinuous trails in double ditch. Not currently an active badger sett.
BS7	Entrance Aspect: North Tunnel Direction: South-west Tunnel wider than tall Present and vegetated soil heap Some leaf litter within - 51-75% detritus No cobwebs Disused hole - partially infilled	BS6-10 likely same set/den area in double hedgerow with persecution evidence - 3 bullet shell casings found near hole entrances Associated evidence of potential bedding near hole with 1 bullet casing (BE8)	
BS8	Entrance Aspect: South Tunnel Direction: West Tunnel wider than tall - large hole Present and partially vegetated (bryophytes) soil heap Some leaf litter within - 51-75% detritus No cobwebs Some signs of use - partially infilled	BS6-10 likely same set/den area in double hedgerow with persecution evidence - 3 bullet shell casings found near hole entrances	In addition to the original three holes, a further single adjacent hole was noted, obscured in part by bramble at base of hawthorn but also due to subsidence or possibly infilling with stones had occurred. Difficult to access. Despite some evidence of narrow discontinuous trails within the dense overhanging double ditch vegetation, no evidence of badger activity inside the double ditch. Some discontinuous mammal trails in grassland field to immediate south of this hedge line. Not currently an active badger sett.
BS9	Entrance Aspect: South Tunnel Direction: West Tunnel wider than tall Present and unvegetated soil heap Some leaf litter within - 51-75% detritus No cobwebs Some signs of use - partially infilled	BS6-10 likely same set/den area in double hedgerow with persecution evidence - 3 bullet shell casings found near hole entrances	
BS10	Entrance Aspect: South Tunnel Direction: North-east Tunnel wider than tall Present and unvegetated soil heap Some leaf litter within - 26-51% detritus No cobwebs Some signs of use	BS6-10 likely same set/den area in double hedgerow with persecution evidence - 3 bullet shell casings found near hole entrances	
BS11	Entrance Aspect: West Tunnel Direction: North Tunnel wider than tall Present and unvegetated soil heap Some leaf litter within - 26-51%	Associated with BS3	This single hole is likely connected to BS3 by virtue of proximity along a linear hedge line. Characterised by well-defined and consolidated spoil heap, with some old bedding noted, it does not

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detritus
No cobwebs
Some signs of use
No clear claw marks but scratching
evident

appear to be the main entrance to the
sett (BS3)

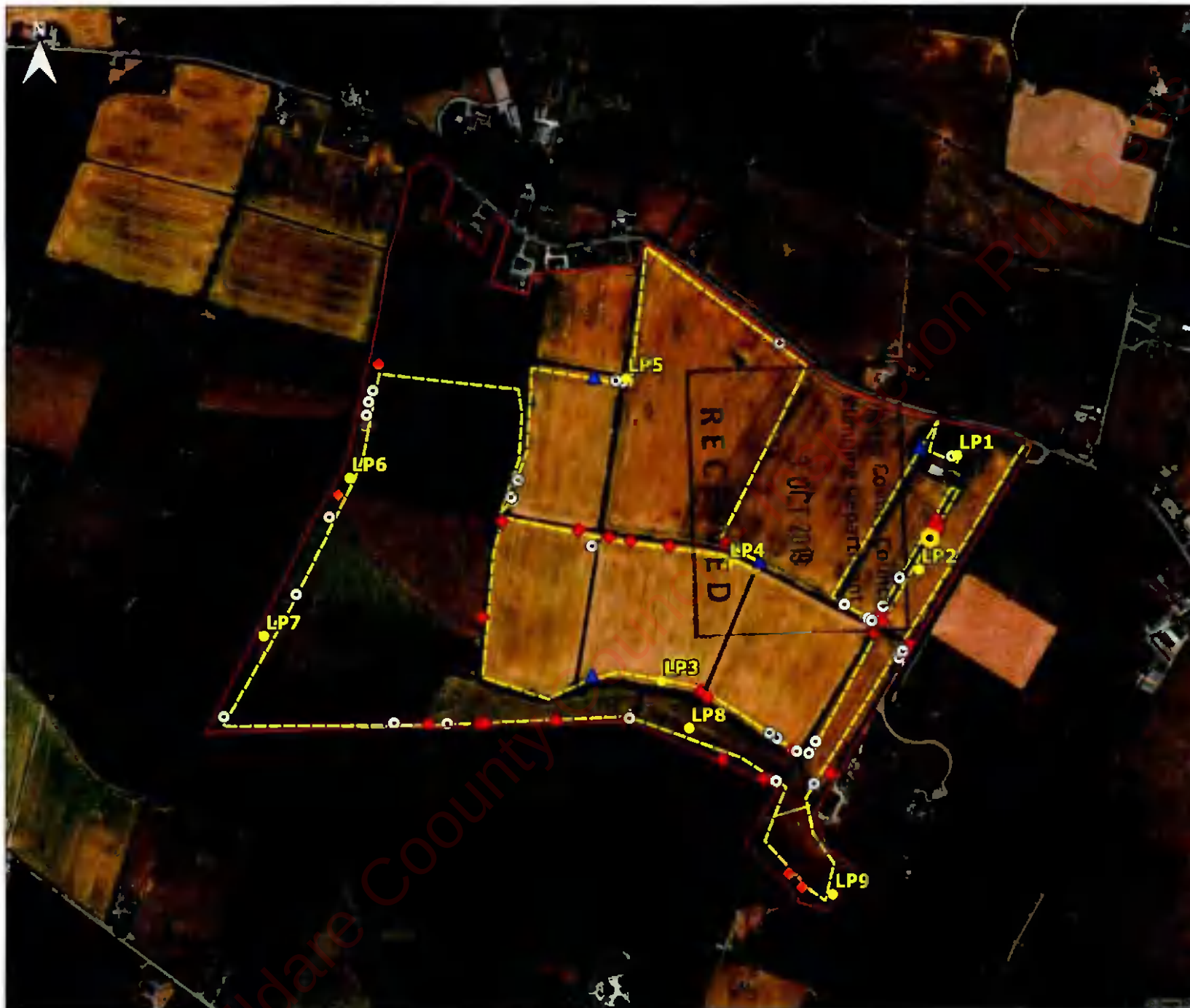
Table 5.12: Description of Badger Evidence Recorded

Map Code	Description
BE1	Recent Badger footprints. Mammal trail runs adjacent to hedgerow through length of field
BE2	Three snuffle holes
BE3	Mammal trail runs into plantation woodland
BE4	Partial mammal trail
BE5	Mammal trail runs into wet ditch and back up other side
BE6	Badger footprints along hedgerow
BE7	Snuffle holes
BE8	Bedding potential with bullet shell casing. Likely associated with BS6-10
BE9	Latrine x 2 and snuffle hole

5.4.8 Otter

No evidence of otter was found within the proposed development site or wider area along the Eaglehill Stream. This widespread species is nevertheless presumed to forage and/or commute along the downstream river network.





Legend

Proposed Development

Bat Survey Transect

● Listening Point (LP)

Bat Activity Results

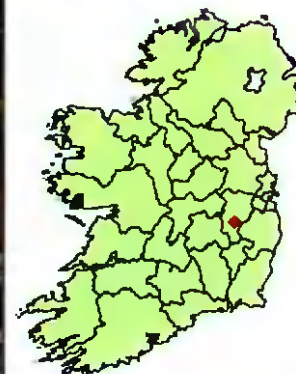
◆ Survey I (dusk; 22/5/2019)

○ Survey II (dusk; 31/7/2019)

▲ Survey III (dawn; 21/8/2019)

★ Static Bat Detector

Source: PPWS (August 2019)



Kilsaran
build

Kilsaran Racefield

Figure 5.4
Bat Activity

rps

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Issue Details

File Identifier	MS18037-RPS-00-XX-DR-2-00-1932
Status	Model File Identifier
ICR	NA
Drawn	JMM
Date	06/01/2019
Checked	MH
Scale	1:7,500 (A4)
Approved	PC
Map projection	WGS84 / UTM

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Legend

- Landownership Boundary
- Potential Badger Set
- Badger Evidence
 - Bedding
 - Mammal Trail
 - Snuffle Holes

Client

Kilsaran
build

Project

Kilsaran Racefield

Title

Figure 5.6:
Badger Evidence and
potential Setts

Issue Details

Drawn: DG	Project: MH18057
Checked: XX	File Ref:
Approved: XX	MH18057QG0001S3
Scale: 1:7 000 @ A4	Projection:
Date: 15/09/2018	IRENET95 / ITM

Notes:

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5.4.9 Breeding Birds

Monthly breeding bird survey visits were undertaken between May and July 2019 during favourable conditions for survey and conducted during the morning to coincide with the peak bird activity period. Refer to Table 5.13 for survey dates and weather conditions.

Table 5.13: Breeding Bird Survey Dates, Timing and Weather Conditions

Date	Start Time	End Time	Cloud cover	Wind	Visibility	Precipitation
02/05/2019	07:10	12:10	2/8	F2-3	>2 km	None
04/06/2019	06:15	11:15	4/8	F2-3	>2 km	None
15/07/2019	05:20	10:20	2/8	F3-4	>2 km	None

A total of 35 bird species were recorded within the survey area, including 10 species of conservation concern (refer Table 5.14). Eight of the 10 red and amber listed species (Colhoun and Cummins, 2013) were considered to be "probable" or "confirmed" breeders within the site; namely Yellowhammer, Meadow Pipit, Goldcrest, House martin, Swallow, Mistle thrush, Starling and Robin. Linnet was classified "possible" breeders with the remaining red and amber listed species classed as "non-breeders".

Table 5.14: Breeding birds, no. of individuals, status and highest breeding evidence.

Common Name	BTO Code	Survey 1	Survey 2	Survey 3	Approx. no. of Breeding Pairs/Territories	Highest Breeding Evidence*	Conservation Status*
Blackbird	B.	29	26	32	15	Br - FF	
Blackcap	BC	5	6	5	5	Po - S	
Blue tit	BT	9	8	17	8	Br - FL	
Bullfinch	BF	4	2	2	2	Pr - P	
Buzzard	BZ	3	2	2	1	Pr - T	
Chaffinch	CH	17	14	19	10	Br - FL	
Chiffchaff	CC	0	1	1	1	Po - S	
Coaltit	CT	5	4	9	3	Br - FL	
Collared Dove	CD	2	2	2	1	Pr - T	
Dunnock	D.	7	8	7	5	Pr - A	
Feral pigeon	FP	0	0	16	0	N - F	
Goldfinch	GO	4	4	7	2	Pr - T	
Goldcrest	GC	6	3	4	3	Pr - T	Amber
Greenfinch	GR	4	2	2	1	Pr - T	
Great tit	GT	4	5	8	4	Br - FL	
Hooded crow	HC	3	2	2	1	Br - NY	
House Martin	HM	5	10	11	3	Br - NY	Amber
Jackdaw	JD	8	5	10	3	Br - FL	
Linnet	LI	2	0	0	1	Po - H	Amber
Long-tailed Tit	LT	2	2	0	1	Pr - P	
Magpie	MG	2	1	2	1	Pr - A	
Mistle Thrush	M	2	1	1	1	Pr - P	Amber
Pheasant	PH	5	3	4	1	Po - H	
Robin	R.	17	16	21	10	Br - FF	Amber
Rook	RO	18	23	16	0	N - F	
Song Thrush	ST	5	4	4	2	Pr - P	
Starling	SG	4	6	11	3	Pr - P	Amber
Swallow	SL	22	25	17	8	Br - NY	Amber
Swift	SI	0	0	4	0	N - F	Amber
Treecreeper	TC	2	2	0	1	Pr - P	
Willow warbler	VW	2	4	4	2	Pr - P	
Woodpigeon	WP	36	28	47	12	Br - ON	
Wren	WR	13	11	14	9	Br - ON	
Yellowhammer	Y	5	4	6	3	Br - FF	Red

* Non-breeder (N) Flying over (F) Possible breeder (Po): Observed in suitable nesting habitat (H): Singing male (S) Probable breeder (Pr): Pair in suitable nesting habitat (P): Permanent territory (T): Agitated behaviour (A): Confirmed breeder (Br): Recently fledged young or downy young (FL): Adults entering or

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leaving nest-site indicating occupied nest (ON); Adult carrying faecal sac or food for young (FF); Nest with young seen or heard (NY).

*Birds of Conservation Concern in Ireland 2014 2019 (Colhoun and Cummins, 2013)

5.4.10 Other Protected Mammals

Although there is potentially some suitable habitat for Irish hare none were observed during the field study. The species is considered common and widespread in Ireland and not currently of conservation concern (Marnell *et al.*, 2009).

There were no visual sightings or field signs of hedgehog observed during field surveys, however, these are nocturnal, and field signs are less frequently observed than for other mammals. Hedgehogs are presumed to occur within grassland and scrub/woodland within the ZOI of the proposed development. Breeding is from May to October (Hayden and Harrington, 2001) and it is considered possible that there may be numerous territories within the proposed development site. There are no known national or county population estimates for the species in Ireland where they are common and assigned a conservation status of Least Concern (Marnell *et al.*, 2009).

Pygmy shrews were not recorded but their presence cannot be ruled out. The species nests in long grasses in dense vegetation (including damp conditions) or under rocks or logs, occurring wherever adequate insect food supplies exist. This species breeds from April to October. Given the minimum territory size of 200 m² (Hayden and Harrington, 2001) and the absence of extensive rank grassland within the site, it is considered likely there may be some peripheral territories within the site. There are no known national or county population estimates for the species in Ireland as it is common and widespread and assigned a conservation status of Least Concern (Marnell *et al.*, 2009).

Other non-protected species for which there was evidence on site included Rabbit *Oryctolagus cuniculus* and Fox *Vulpes vulpes* and Rat *Rattus* spp. These species are not afforded wildlife protection and are not assessed further.

5.4.11 Amphibians and Reptiles

Frog - The presence of frog spawn was identified in early spring. As part of the aquatic survey during the summer months, tadpoles were present alongside riparian grassland near the Eaglehill Stream. No adult frogs have been encountered, however, adult frogs are considered likely to be present within the proposed development site.

Smooth newt were not recorded during surveys, although this would be expected without targeted surveys. However, owing to the nature of the proposed development site, there is little standing water and no open water pools or wet grassland. The conditions are not considered conducive for smooth newt within the proposed development site.

Common lizard was not observed during surveys. Sightings and field signs are rare outside of formal, targeted surveys, but optimal habitat (e.g. woods/scrub with basking sites on south facing slopes) is present within the proposed development site, for instance in the south facing scrub woodland inside the northern boundary.

5.4.12 Invertebrates

No specific butterfly surveys were conducted and no notable species were noted while completing the field study. In terms of protected species, marsh fritillary *Euphydryas aurinia* colonies can occur in a wide variety of habitats including some of which were encountered at the proposed development site. However, the presence of its food plant Devil's-bit Scabious, *Succisa pratensis*, an essential habitat component to its lifecycle, was not recorded from the proposed development site.

Several other species of butterflies and bees were noted from the desk study, none were recorded on site, these included the small heath *Coenonympha pamphilus* and wood white *Leptidea* sp., as well as several

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bee species including the gipsy cuckoo bee *Bombus bohemicus*, red tailed bumblebee *Bombus lapidarius* and Moss Carder bee *Bombus muscorum*.

During the aquatic survey, no freshwater pearl mussels individuals were recorded. The localised variant None freshwater pearl mussel has a very limited distribution and does not occur in the same catchment as the proposed development site. The desktop study identified that tributaries of the main River Barrow channel are designated under the Freshwater pearl mussel Regulations (SI 355/2018). These channels are not directly hydrologically connected to the proposed development site or the adjacent Eaglehill Stream.

A review of desk study records indicates that the nearest record for white clawed crayfish is at Tully Stream just before the Barrow confluence, c. 14 km downstream of the proposed development.

Four sites were sampled for aquatic invertebrates along the Eaglehill Stream in respect of the proposed development (see Appendix 5.1 in Volume III). Of these four locations, water quality results (Q-values) could only be assigned at one survey site (Site 4) as all other sites were in a first order stream/drainage ditch. Although a Q-value was assigned at Site 4 this is indicative and to be used as guideline only as the Ballysax Little is a second order stream. The Q-value was not developed for headwaters. Poor water quality (Q3) was assigned.

5.4.13 Fish

The Eaglehill Stream is a heavily modified drainage ditch along its entire length from source to where it confluent with the Ballysax Little (circa 2km in total). Upstream near the source there is little flow and heavy macrophyte growth was observed. Low flows were evident within the Eaglehill Stream and the reach appears to be suffering from drainage activities, siltation and cattle poaching.

Four sites were sampled along the Eaglehill Stream in respect of the proposed development (Appendix 5.1 in Volume III). At Sites 1-3 within the Eaglehill Stream, no spawning or juvenile salmonid/lamprey habitat were observed and the habitat conditions were not supportive for crayfish. An undersized pipe near the Ballysax Little confluence forms a barrier to any upstream migration of salmonids or lamprey.

Conditions improved only slightly in the Ballysax Little (sampling Site 4 downstream of the proposed development) which is a larger stream. Poor to None salmonid/lamprey spawning and juvenile habitat were observed at Site 4, conditions are more likely to support juvenile brown trout here with shallow water and limited pools present to support larger adult trout. Fair crayfish habitat was also observed. The Ballysax Little stream also appears to be suffering from sedimentation issues as observed during the site surveys.

5.4.14 Summary Valuation of Significant Ecological Features

Significant ecological features are considered to be those valued at 'Local Importance (Higher Value)' or higher as per NRA (2009) definitions. Ecological features valued at Local Importance (Lower Value) or of negligible value were not considered significant features and were not carried forward for impact assessment. Table 5.15 summarises all significant ecological features identified within the Zol of potentially significant impacts.

Table 5.15: Summary valuation of significant ecological features and identification of features scoped out from EIAR

Features	Ecological Features	Highest Ecological Valuation within Zol of Proposed Development	At Risk of Significant Negative Impact	Scoped into Impact Assessment
Designated sites	European sites (SPAs and SACs)	International	Yes	Yes
	RAMSAR	International	No	No
	National sites (NHA/pNHA)	National	No	No
Habitats and flora	GA1 Improved Agricultural Grassland	Local (Lower)	No	No
	BC1 Arable Crops	Local (Lower)	No	No
	WL1 Hedgerows	Local (Higher)	Yes	Yes

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Features	Ecological Features	Highest Ecological Valuation within Zol of Proposed Development	At Risk of Significant Negative Impact	Scoped into Impact Assessment
Fauna	WL2 Treelines	Local (Lower)	No	No
	WD4 Conifer Plantation	Local (Lower)	No	No
	FW2 Depositing / Lowland Rivers	Local (Higher)	Yes	Yes
	FW4 Drainage Ditches	Local (Lower)	No	Yes (due to connectivity to European site)
	FP1 Calcareous Springs & FP2 non Calcareous springs	National	Yes	Yes
	Protected Flora/Species of Conservation Concern	Local (Lower)	No	No
	Rare flora	-	No	No
	Invasive Plants	-	No	No
	Invasive alien animals	Local (Lower)	No	No
	Bats (roosting)	Local (Lower)	No	No
	Bats (commuting and foraging)	County	Yes	Yes
	Badger	Local (Higher)	Yes	Yes
	Otter (no evidence but presumed to forage downstream)	Local (Lower)	No	No
	Breeding Birds (including those of medium or high conservation concern)	Local (Higher)	Yes	Yes
	Wintering birds	Local (Lower)	No	No
	Hedgehog and pygmy shrew (presumed present*)	Local (Higher)	Yes	Yes
	Stoat, red squirrel, pine martin	Local (Higher)	No	No
	Common frog (Spawn and tadpoles confirmed present)	Local (Higher)	Yes	Yes
	Smooth newt	Local (Higher)	No	No
	Common lizard*	Local (Higher)	No	No
	Invertebrates – pearl mussel	Unknown	No	No
	Invertebrates – white clawed crayfish	Local (Higher)	No	No
	Other invertebrates	Local (Lower)	No	No
	Fish (including lamprey, Atlantic salmon, trout)	Local (higher)	Yes	Yes

*Populations of species including lizard, hedgehog, and pygmy shrew, have been presumed present due to the broad habitat preferences of these species, and the difficulty in confirming presence in the course of typically acceptable EIAR survey effort.

5.5 Impact Assessment

5.5.1 Do-Nothing Scenario

In the absence of the proposed development, no significant changes in habitats or habitat condition are likely to occur. The potential value of the lands to species of conservation value such as badgers, bats and birds would continue. Trees, scrub, and woody vegetation would further mature and may sustain storm damage to provide greater suitability for bats or breeding birds. Current threats to mobile fauna species visiting the lands would continue.

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5.5.2 Mitigation Inherent in the Proposed Development

Potential impacts in this chapter are assessed after consideration of the following 'inherent mitigation' which has been incorporated into the design of the proposed development:

- Avoidance of direct impacts to the Eaglehill Stream where neither instream nor bankside works are proposed;
- Avoidance of direct impact to localised spring habitat within the southern boundary of the proposed development;
- Clearance of limited internal field boundaries outside nesting season;
- Enhancement of the wildlife value of the existing agricultural site through the development of a biodiversity pond. Along with some planting and physical structures to accommodate wildlife access, it will be allowed to regenerate naturally so that a largely undisturbed vegetation mosaic would develop over time;
- Protection of the peripheral hedgerows and plantation woodland from loss of vegetation and excessive light spill, noise, and dust from the proposed development to the benefit of bats, birds, and other wildlife through replanting of native broad leaved woodland; and
- The environmental controls, as outlined in Section 3.7.4.

5.5.3 Introduction to Impact Types

The proposed development could have a range of potential impacts upon ecological features during the construction/operation and restoration phases. A distinction is often made between direct and indirect impacts. Direct impacts occur where the changes to an ecological feature are directly attributable to an action associated with a given development, such as habitat loss. Indirect impacts usually arise as a 'knock on' effect of a development and would include aspects such as disturbance to bat activity as a result of habitat loss or changes to the hydrological conditions that might support ground-water dependant habitats.

5.5.3.1 Construction/Operation Phases

In the absence of mitigation measures, the combined construction/operation phase has the potential to disturb a range of habitats and protected species for the duration of the proposed developments lifetime. Significant potential impacts to biodiversity include habitat loss, noise and visual disturbance to hibernating, breeding, or feeding populations of protected fauna species, and the potential for suspended solids, oils, fuels or other contaminants to be carried into local watercourses.

5.5.3.2 Restoration Phase

In the absence of mitigation measures and with the exception of the peripheral vegetation, the reduction in site activity could provide positive benefit to biodiversity. However, the bulk of the excavated site would be of little immediate benefit to biodiversity with parts of the site being developed as a biodiversity pond. It is likely that the active restoration phase would extend a number of years until such time that the proposed biodiversity enhancements mature resulting in a potential residual positive impact for biodiversity.

5.5.4 Construction/Operation Phase

5.5.4.1 Designated Sites

There is one European site with hydrological connectivity to the proposed development. Potential impact from construction and operations relates to the potential for site works to cause sedimentation in the Eaglehill Stream with an ultimate impact to the River Nore and River Barrow SAC, c. 3.9 km downstream.

A separate Natura Impact Statement (NIS) (RPS 2019) in support of Appropriate Assessment has been carried out to determine the potential for adverse effects on the integrity of European sites as a result of the proposed development. It has been concluded in the NIS, that the proposed development, either individually

or in combination with other plans or projects, will not have adverse effect on the integrity of any European site(s), given the implementation of mitigation measures outlined in the NIS.

5.5.4.2 Habitats and Flora

The proposed development is largely located within habitats of Local (lower) importance (e.g. agricultural lands), that do not require impact assessment as per NRA guidelines (2009b). There are four habitat types (hedgerow, river, drainage ditch, and calcareous spring) that were valued as Local (higher) ecological features.

The construction/operation phase of the proposed development would lead to the loss of hedgerow within the proposed development site. This loss is deemed to be significant at the Local (lower) level only.

As hydrogeological connectivity between the working area of the proposed development and the calcareous springs has been ruled out in the impact assessment in **Chapter 6**, no significant impact is predicted on this habitat as a result of the construction and operation of the proposed development.

There is potential for significant negative impact to waterbodies (rivers and drainage ditches) as a result of the proposed development construction and operation through the potential for increased sedimentation which may occur when site clearance and excavation works are ongoing.

5.5.4.3 Fauna

Bats

The hedgerows near the eastern and southern boundaries of the site were classified as Moderate-High value for bat roosts, whilst the hedgerows within the interior of the site were mostly classified as being of Moderate value. The removal and/or disturbance of these internal hedgerows within the interior of the site during construction have the potential for a temporary negative impact which is not considered significant at a local level.

Badger

Evidence of badger activity was noted, typically along the southern and western perimeter of the study area, often limited to peripheral linear vegetation features. There was only one badger sett located within the study area (BE3) and this is located outside the western boundary of the proposed development on the west side of stream with no direct access from the site of the proposed development. Hence, there will be no direct impact to this sett from site clearance works during construction as the adjoining hedgerows will not be cleared.

During operations, the development of the overburden mounds to the east has the potential for indirect disturbance of the sett. However, the separation distances listed in **Section 5.6.1** on mitigation will be applied to these mounds to ensure that there will be no significant adverse residual impact to this sett during these phases.

Badgers also commute and forage across the site and the removal of limited hedgerows and treelines as part of the construction phase of the proposed development area may also impact on dispersal routes for badgers, however, the impact is likely to be temporary negative but not significant at a local level.

Birds

All birds are protected under the Wildlife Acts 1976 (as amended). If vegetation clearance was carried out during the breeding bird season (i.e. 1st March to 31st August), there is the potential for significant negative impacts to local breeding bird populations. During the breeding season noise, vibration, increased human presence and movement of construction vehicles associated with the construction phase of the proposed development has the potential to result in disturbance to local breeding bird populations including noise disturbance. The advance construction for the proposed development will require the removal of some hedgerows and treelines. These habitats have the potential to provide breeding habitat for birds. Removal of these areas of habitat during the breeding bird season could potentially impact on the conservation status of bird species locally. Therefore, a significant effect at a local level is concluded in the absence of mitigation.

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Other protected mammals

The proposed phase of the development will involve the removal of minor areas of hedgerows and treelines at field openings, and the removal of areas of grassland and arable crops, and construction activity in the vicinity of these habitats. In the absence of mitigation, if the species were present then negative impacts could arise via direct mortality or disturbance. It is considered that removal of habitat would be permanent and irreversible, with disturbance from construction being short term and reversible once construction is complete. As a relatively widespread mobile species, it is considered likely that pygmy shrew, hedgehog and Irish hare would re-establish in adjacent habitats and that the proposed development is extremely unlikely to negatively affect the conservation status of the species locally. Therefore, it is unlikely that a significant impact would arise.

Amphibians and reptiles

Frog spawn was noted at a number of areas, but adult frogs have not been recorded on site. The proposed development does not involve the removal of any prime habitat for amphibians, such as ponds, although they may occur in hedgerows and damper areas of grassland within the proposed development site. Although lizards may utilise hedgerows, the removal of hedgerow is relatively limited. It is unlikely that significant negative impacts to reptiles will arise as a result of the proposed development.

Fish

There is potential for significant impact to fish through the increased sedimentation which may occur when site clearance and excavation works are ongoing.

5.5.5 Restoration Phase

5.5.5.1 Designated Sites

Potential impact from restoration relates to the potential for site works to cause sedimentation in the Eaglehill Stream with an ultimate impact to the River Nore and River Barrow SAC downstream. A separate Natura Impact Statement (NIS) (RPS 2019) in support of Appropriate Assessment has been carried out to determine the potential for likely significant effects as a result of the proposed development. It has been concluded in the NIS, that no significant impact is predicted.

5.5.5.2 Habitats and Flora

Habitat Loss/Alteration

Given that the excavations will have been undertaken for circa 12 years, large scale changes or loss of habitat will have been largely completed by the restoration phase. Thus, it is not considered likely that during the restoration of the proposed development that there would be any significant negative impact on habitats within the footprint of the proposed development. It is predicted that as the area restores both naturally and through planting and support works, there will be a development of natural terrestrial and wetland habitats within the site and a potential positive impact for these habitats.

Reinstatement of new hedgerows is proposed during restoration around the perimeter of the pit to somewhat restore hedgerows lost during site clearance. This mitigation will offset the losses incurred but overall a slight net loss in hedgerow habitat from the proposed development will occur. However, this is not deemed to be a significant impact above Local (lower) level.

5.5.5.3 Fauna

Bats

It is not considered likely that during restoration of the proposed development that there would be any significant negative impact on bats. The proposed restoration has the potential to develop suitable bat roosts (both artificial and through planting) with a potential for positive impacts for bats.

Badger

It is not considered likely that during restoration of the proposed development that there would be any significant negative impact on badger. As above, the proposed restoration phase can develop suitable badger habitat across the site at key locations as dictated by the project ecologist on the restoration plan. In this regard, there is a potential positive impact for badgers for this phase.

Birds

The increase in the vegetation mosaic coupled with the proposed landscape planting on the site will potentially provide additional nesting habitat for breeding birds over time as it matures. It is likely that the restoration of the proposed development would result in a positive impact on local breeding bird populations.

Amphibians and reptiles

As the site is left to establish, it is not considered likely that there would be any significant negative impact on amphibians. There is potential for positive impact if suitable habitat develops for amphibians and reptiles in the wetlands provided.

Fish

It is not considered likely that during restoration of the proposed development that there would be any significant negative impact on fish.

5.6 Mitigation Measures

In this section, the minimum mitigation measures to be employed by Kilsaran during the proposed development phases are presented. Key themes underpinning the minimum mitigation requirements are:

- Timing of works to allow for clearance of vegetation outside the breeding bird season;
- Installation of standard measures to include biosecurity measures at site entrances, and sediment control measures based on accepted SuDS features to maintain surface and ground water resource; and
- Preparation and implementation of an Invasive Species Management Plan and the proposed restoration plan to include biodiversity management.

5.6.1 Construction/Operation Phase

5.6.1.1 Pollution Prevention

The following proposed measures will be implemented during the construction/operation phase:

- A proprietary waste water package treatment plant will be installed at the site with soil polishing filter for discharge to the ground.
- The only chemicals to be stored on site for the proposed extraction that will have the potential to cause water pollution are lubricating oils, hydraulic oils and diesel fuel. All of these chemicals will continue to be stored in the following manner:
 - Suitably certified tanks within areas bunded to a capacity of 110% of the tank.
 - Where two tanks are bunded, bund capacity will be 120% of the largest tank.
 - No pipe work will go through the bund at any point to reduce the risk of leakage.
 - Surface water from bunds will be pumped out through a suitable oil interceptor.

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- A wheelwash facility will be utilised throughout the life of the operation, with due maintenance and upgrading as required. This will eliminate the transportation of mud and dust from the development onto the public road. In the unlikely event that a spillage occurs, the applicant will ensure that spilled material is removed from the road surface in a safe and timely manner, as soon as they notice or are notified that a spillage has arisen.
- High absorbency mats and pig tails are available on site to be used in the event of a hydrocarbon spill.

5.6.1.2 Designated Sites

There is no direct impact on the River Nore and River Nore SAC, despite the hydrological connection via the Eaglehill Stream. No specific mitigation measures are likely required in respect of the single European site for which the proposed development is hydrologically connected owing to the measures detailed within this EIAR.

5.6.1.3 Habitats and Flora

Habitat Loss/Alteration

Vegetation clearance from linear features such as hedgerows to facilitate site access, sightlines or from within the excavation area should be planned and undertaken outside of the bird breeding season from 1st March to 31st August.

Every effort should be made to retain all vegetation not directly impacted by the proposed development. All trees and hedgelines along the site boundary that are intended to be retained, both within and adjacent to the site boundary (where the root protection area of the tree extends into the site boundary), will be fenced off at the outset of works in the adjacent working area and for the duration of the works in that area to avoid structural damage to the trunk, branches or root systems of the trees.

Temporary fencing (post and rail) will be erected at a sufficient distance from linear features so as to enclose the Root Protection Area (RPA) of the tree. In general, the RPA covers an area equivalent to a circle with a radius 12 times the stem diameter (measured at 1.5m above ground level for single stemmed trees, or above the root flare for multi-stemmed trees).

Where fencing is not feasible due to insufficient space, protection for the trees will be afforded by wrapping hessian sacking (or equivalent) around the trunk of the tree and strapping stout buffer timbers around each tree.

The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g. hydrocarbons) will not be undertaken within 10m of any retained trees, hedgerows and treelines.

If construction activities are required within the RPA, e.g. excavation work, then a qualified arborist will advise on the best methods for protecting the tree. For example, any excavation works carried out within the RPA will need to avoid damage to the protective bark covering larger roots. This may involve excavation by mini-digger and/or hand as deemed appropriate. Exposed roots will be wrapped in a hessian sacking to avoid desiccation and roots less than 2.5cm in diameter can be pruned back to a side root. The advice of a qualified arborist will be sought if larger roots that influence anchorage need to be severed. Any remedial works required to trees will be carried out by a qualified arborist.

Where tree removal may be required (due to health and safety considerations) in areas not previously identified the qualified arborist will advise on the relevant tree specific mitigation.

Protected Flora

Kilsaran operatives will be trained to maintain a watching brief for the duration of the works for the identification of or unexpected, albeit unlikely, establishment of protected plants. If any such plant were identified, a suitably qualified ecologist will advise on the course of action such as translocation and any licence requirements. No further mitigation measures are proposed.

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Invasive Plants

A precautionary Invasive Species Management Plan shall be developed for the site (**Appendix 5.2 of Volume III**). It shall to identify the biosecurity protocols that will be enacted in the first instance to control IAPS establishment on site, and the likely measures required to ensure the timely and appropriate response for any IAPS that might become established on site. These precautionary measures shall be implemented for and remain valid for the duration of the proposed development.

5.6.1.4 Fauna

Bats

There are no buildings currently planned for demolition on the site so no specific mitigation measures proposed. Similarly, there is no planned removal of any tree identified as being of moderate to high roosting potential

In the event that such a tree removal is required the specific mitigation will require the expertise of a suitably experienced and licensed bat ecologist to advise on a course of action. The following general mitigation measures:

- In the unlikely event that bats are found on the proposed development during any phase of the project, works will immediately cease in that area and the local NPWS Conservation Ranger will be contacted. The bats will be removed by hand by a suitably qualified and licenced bat surveyor, under licence from the NPWS.
- Any existing trees adjacent to the proposed development boundary shall be protected from root damage by machinery by an exclusion zone of at least seven metres or equivalent to canopy height. Such protected trees shall be fenced off by adequate temporary fencing prior to other works commencing as required by NRA guidance (NRA 2006b).
- In general, artificial light creates a barrier for commuting bats so lighting should be avoided where possible. The external lighting required to facilitate evening working during winter and security lighting at the site entrance will be sensitive to the presence of bats in the area. Directional lighting (i.e. lighting which is focussed on work areas and not nearby countryside) shall be used to prevent overspill. This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only. Lighting levels should be the minimum required for health and safety requirements, and vertical light spill at light sources should be below three metres to avoid identified or potential bat flight paths. The location and design of lighting as required shall be cognisant of the recent BCT (2018) guidance and will be approved by the ecologist. Light spill onto any identified habitat feature will not exceed 1 lux.
- Use of low pressure sodium lights will be used in preference to high pressure sodium lights or mercury lamps. If mercury lamps are to be used, ultraviolet (UV) filters will be fitted;

Badger

The following mitigation applies to the active sett identified as BE3 located outside the western perimeter of the site. In the event that any further sett is detected within the area of where site clearance works are to be undertaken, the recommendations set out in the *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes* (National Roads Authority, 2005) will be applied. The mitigation measures that apply in relation to any badger sett within the ZOI are discussed as follows:

- Prior to works commencing within the vicinity of any sett, all site personnel will be given a Toolbox talk where operatives will be briefed on the presence of the sett and the legal protection that badgers and setts are afforded.
- An exclusion zone of 30m shall be maintained around the active sett BE3 in the summer season (extended to 50m during the breeding season defined as November to June inclusive). The buffers will be clearly demarcated around the sett, using barrier tape.

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- The summer exclusion zone reduces from 30m for heavy vehicles to 20m for site vehicles and 10m for pedestrians. Any works within the exclusion zone of the sett will be supervised by a suitably qualified person.
- Works within the exclusion zones should only be carried out during daylight hours so as not to disturb foraging badgers. Night-time working is not proposed.
- The overburden mounds will be sited at a minimum distance of 30m from any identified sett, including BE3 at the western site boundary.
- Chemicals shall not be used nor stored within 20m of any badger sett.

Other protected mammals

Implementation of mitigation for breeding birds will avoid vegetation removal during March to August inclusive. This existing mitigation will simultaneously avoid the majority of the main breeding season for pygmy shrew and hedgehog which run from April to October, and stoat, which breeds in May to June (Hayden and Harrington, 2001).

Amphibians and Reptiles

There will be no instream works or any works undertaken close to any watercourses so no mitigation is proposed.

Fish

No specific mitigation is proposed at this time in respect of aquatic species, save for the implementation of standard practices to ensure that no significant discharge to ditches or the Eaglehill Stream are permitted.

5.6.2 Restoration Phase

5.6.2.1 Designated Sites

No additional mitigation measures are proposed for this phase

5.6.2.2 Habitats and Flora

Habitat Loss/Alteration

The site restoration is characterised by the ecological design that will over time enhance the excavated site within an enhanced biodiversity landscape. This will include the replanting of some hedges that were lost, coupled with supplementing others to improve the biodiversity of linear features. No additional mitigation measures are proposed for this phase.

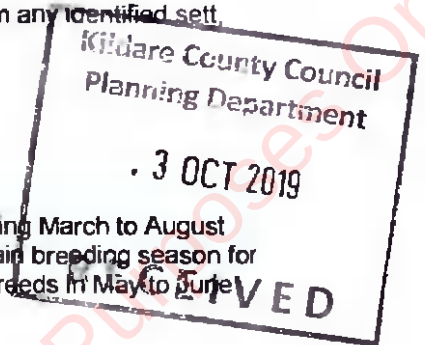
5.6.2.3 Fauna

Bats

Installation of artificial bat boxes at agreed locations across the site to provide alternate bat roosts. Locations and number to be agreed with Kildare County Council.

Badger

No specific mitigation measures for this phase of the works are included. Once the physical restoration works are completed, a large part of the site will be allowed to mature naturally. This 'dereliction' will benefit local badger populations.



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Birds

No specific mitigation measures are proposed at present. Planting will enhance the local vegetation mosaic and potentially provide additional nesting habitat for breeding birds over time as the vegetation matures.

Amphibians and reptiles

Amphibian ledges should be developed within the void pond to assist in the development of amphibian habitat. No other mitigation measures are proposed.

Fish

With the exception of good site practices particularly the prevention of uncontrolled discharge of waters to the Eaglehill Stream, no specific mitigation measures are included.

5.7 Residual Impact

With the successful implementation of mitigation measures outlined, none of the identified potential impacts to biodiversity will be significant above the local geographic scale of significance. A summary of the key residual impacts is presented in Table 5.16. Significant residual impacts at local level are predicted in relation to:

- Permanent net removal of scrub and some hedgerow during site clearance;
- Disturbance or displacement to foraging bats, and nesting birds during both construction and operation; and
- Enhancement of the terrestrial and aquatic habitat range and function following the implementation of the restoration plan.

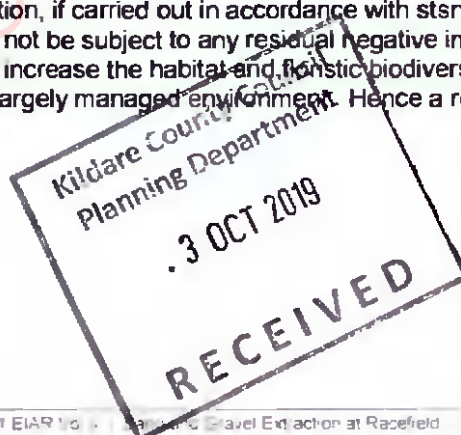
5.7.1 Construction/Operation Phase

The construction phase is considered to be of relative short duration but will nonetheless result in the loss of some linear hedgerow. This residual impact will unlikely be undone until such time that the site restoration measures are undertaken, and supplementary landscaping and reinforcement of linear hedgerow features is completed.

The operation, if carried out in accordance with standard construction measures and implementation of ecological mitigation measures described in Section 5.6 and in other interrelated chapters e.g. Chapter 6 - Soils, Geology and Hydrogeology, Chapter 7 - Water (Hydrology and Flooding) and Chapter 13 Landscape and Visual Assessment, will ensure that the ecology should not significantly alter. The bulk of the disturbance will undoubtedly arise during the operation of the proposed development and notwithstanding the implementation of mitigation measures, the loss of habitat and the alteration/disturbance of the landscape will influence mammals – birds, bats and terrestrial mammals.

5.7.2 Restoration Phase

The restoration, if carried out in accordance with standard construction measures, should ensure that the ecology will not be subject to any residual negative impact. Indeed, the provision of the large water feature is predicted increase the habitat and floristic biodiversity of this site and provide positive refuge for wildlife in a currently largely managed environment. Hence a residual positive impact for biodiversity is predicted for this phase.



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Table 5.16: Assessment of Residual Impacts

Important Ecological Features		Significant Impact Identified			Mitigation Proposed	Significant Residual Impact Identified
		Construction	Operation	Restoration		
Designated sites	European sites (SPAs and SACs)	Yes (-)	Yes (-)	No	Yes	No
Habitats and flora	WL1	Yes (-)	Yes (-)	Yes (+)	Yes	No
	Hedgerows					
	FW2	Yes (-)	Yes (-)	No	Yes	No
	Depositing / Lowland Rivers					
	FW4 Drainage	Yes (-)	Yes (-)	No	Yes	No
	Ditches					
Fauna	FP1	No	No	No	No	No
	Calcareous Springs					
	Bats (commuting and foraging)	Yes (-)	Yes (-)	No	Yes	No
	Badger	Yes (-)	Yes (-)	No	Yes	No
	Breeding Birds	Yes (-)	Yes (-)	No	Yes	No
	Hedgehog and pygmy shrew	Yes (-)	Yes (-)	No	Yes	No
	Frog (Spawn)	No	No	No	Yes	No
	Fish (lamprey, Atlantic salmon, trout)	Yes (-)	Yes (-)	No	Yes	No

5.8 Monitoring

5.8.1 Construction and Operation Phases

Outside of the surface water, groundwater, noise and dust monitoring proposed to verify no significant impact, no additional biodiversity monitoring is proposed for these phases.

5.8.2 Restoration Phase

Once the excavations are complete and the size and topography of the void space are known, an updated restoration plan will be prepared by Kilsaran and agreed with the KCC Biodiversity Officer prior to implementation.

The restoration of the site will ultimately result in the restoration of existing agricultural lands for which site compounds etc. and peripheral access roads were located. However, much of the landscape will be regraded resulting in the creation of a large biodiversity cavity which will be characterised by the open water body.

Any bat boxes that are installed will be monitored for a period of no less than two years post restoration to ensure that 1) they are free from vegetative obstruction, 2) inhabited and 3) being used by bats rather than nesting birds. Where no activity is noted, or where birds are using the boxes, a licenced bat specialist shall relocate the boxes to other locations where based on professional assessment, they would likely be more successful in attracting bats. Any relocation of said boxes should be notified to 1) the KCC Heritage Officer and 2) Bat Conservation Ireland as part of the bat box registration scheme.

Where other feature such as hedgehog boxes etc. are installed, they should be visited at least one year post completion of any landscaping works to check for uptake. If unused these should be relocated to appropriate locations.

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6 LAND, SOILS, GEOLOGY AND HYDROGEOLOGY

6.1 Introduction

This chapter of the EIAR describes the likely effects of the proposed sand and gravel extraction facility at Racefield, Ballyshannon, Co. Kildare on the land, soil, geological and hydrogeological environment. This section should be read in conjunction with the site layout plans for the site and project description provided in Chapter 3 of this EIAR.

This assessment is also informed by the findings of Chapter 5 Biodiversity and Chapter 7 Water in terms of the potential impact of proposed operations to watercourses in the vicinity of the site. Any impact to watercourses, either positive or negative will have direct or indirect effects on the groundwater environment depending on the degree of interaction between surface water and groundwater.

6.2 Assessment Methodology

6.2.1 Legislative and Policy Framework

This chapter has been produced in accordance with the specific legislation and planning framework relevant to the consideration of soils, geology and hydrogeology as described within this chapter. The principal legislation relevant to the chapter is set out in the following primary European legislation:

- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive).
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (daughter to 2000/60/EC) (Groundwater Daughter Directive).
- Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013, amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy.

The implementation of the Water Framework Directive (WFD) has resulted in the repeal and/or replacement of other European legislation of relevance to consideration of the water environment. Most notably, this includes the following:

- The Groundwater Directive (80/68/EEC), repealed in 2013; and
- The Dangerous Substances Directive (76/464/EEC), repealed in 2013.

The EU Water Framework Directive 2000/60/EC came into force on 22 December 2000 and its primary objective is for all waters to achieve 'good' ecological status by 2015. The Water Framework Directive 2000/60/EC also promotes the sustainable use of water resources, defines a management and reporting system based on River Basin Districts (RBDs) and sets environmental objectives which take account of the full range of pressures on the aquatic environment (including pollution, abstraction, flow regulation, habitat impact etc.).

The Groundwater Directive (80/68/EEC) aims to protect groundwater from pollution by controlling discharges and disposal of certain dangerous substances to groundwater. The Directive was transposed into Irish Law by the Protection of Groundwater Regulations, 1999 (SI No. 41 of 1999).

In Ireland the original Groundwater Directive (80/68/EEC) was primarily transposed into National legislation through:

- The Local Government (Water Pollution) Act, 1977 to 1990.
- The Local Government (Water Pollution) Regulations, 1978 (SI No 108 of 1978).

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- The Protection of Groundwater Regulations, 1999 (SI No 41 of 1999). This is due to be repealed and replaced by the Waste Water Discharge (Authorisation) Regulations, 2007 (SI 684 of 2007) in 2013.
- The Local Government (Water Pollution) (Amendment) Regulations, 1999 (SI No 42 of 1999).

Groundwater Directive (80/68/EEC) was repealed with effect from December 2013 by the Water Framework Directive 2000/60/EC. Groundwater Directive (2006/118/EC) complements the provisions preventing or limiting inputs of pollutants into groundwater already contained in Directive 2000/60/EC and aims to prevent the deterioration of the status of all bodies of groundwater. The (Groundwater) Regulations S.I. No. 9 of 2010 was transposed into Irish Law and gives effect to the Groundwater Directive.

6.2.2 Study Area / Spatial Scope

The potential effect that the proposed sand and gravel extraction facility may have on the geological and hydrogeological regime of the site represents the principal consideration for this assessment. To understand the nature of the hydrogeological regime relevant to the Racefield site, the spatial scope of the study area must be sufficiently large to enable the general hydrogeological setting and associated Conceptual Site Model (CSM) to be defined. As such, the study area relevant to consideration of soils, geology and hydrogeology extends outside of the proposed development boundaries, to include the groundwater catchment area in which the site is located.

6.2.3 Assessment Approach

The Environmental Impact Assessment (EIA) was carried out in accordance with the following specific guidelines in relation to geology and hydrogeology:

- Environmental Protection Agency (EPA, 2011). Guidance on the Authorisation of Discharges to Groundwater.
- Institute of Geologists of Ireland (September 2002). 'Geology in Environmental Impact Statements – a Guide'
- Institute of Geologists of Ireland (IGI, 2013). 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'
- National Roads Authority (NRA, 2009). 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'

6.2.4 Information Sources

As part of the desktop study reference has been made to the following online databases:

- Geological Survey of Ireland (GSI); <https://www.gsi.ie/>,
- Environmental Protection Agency (EPA); <http://gis.epa.ie/Envision>
- www.catchments.ie
- Teagasc Soils and subsoils,
- Corine dataset,
- SACs, NHAs and Geological heritage Sites; and
- Water Framework Directive (WFD) data

Other site specific information employed in the assessment include the following reports and data sources which are included in full in **Appendix III** to this EIAR.:

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- Data from the site investigation completed by Ground Investigations Ireland between February to March 2019 (Appendix 6.1 in Volume III); and
- Data from the geophysical site investigation completed in February 2019 by Apex Geophysics (Appendix 6.2 in Volume III).

6.2.5 Consultation

A process of stakeholder consultation was undertaken by RPS in 2019. The consultation process has been described in Section 1.11 of the EIAR with responses relevant to this chapter received from the Geological Survey of Ireland (GSI) which is summarised in Table 1.4 of Chapter 1 of this EIAR and shown in full in Appendix 1.1 of Volume III. The key points raised by the GSI are listed below:

- There are no CGSs located within the vicinity of the site. With the current plans, there is no envisaged impact on the integrity of County Geological Sites by the proposed developments.
- GSI encourage discussion on end-of-life plans for the operations and would be happy to recommend ways to promote the geology to the public or develop tourism or educational resources if appropriate.
- The Geoheritage Programme tries to promote a partnership between geological heritage and active extraction, with such measures as those outlined in the 'Geological Heritage Guidelines for the Extractive Industry'.
- Should development go ahead, all other factors considered GSI would much appreciate a copy of reports detailing any site investigations carried out.
- Should any significant bedrock cuttings be created, GSI asked that these will be designed to remain visible as rock exposure rather than covered with soil and vegetated, in accordance with safety guidelines and engineering constraints.

6.2.6 Assessment Criteria

The significance of an impact is defined by first considering the importance of the attribute impacted and secondly the magnitude of the impact. In accordance with the IGI Guidelines, the importance of geological and hydrogeological attributes (rating criteria) is defined in accordance with the NRA Guidelines. This guidance uses the same significance terminology as the EPA and includes intermediate steps for rating site importance (Table 6.1) and magnitude of impact (Table 6.2) and then significance (Table 6.3).

Table 6.1: Rating Criteria for Site Importance of Geological and Hydrogeological Attributes (NRA, 2008)

Importance	Criteria	Typical Examples	
		Geology	Hydrogeology
Extremely High	Attribute has a high quality or value on an international scale	-	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional scale	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit Proven economically extractable mineral resource	Regionally Important Aquifer with multiple wellfields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site). Well drained and/or highly fertility soils Moderately sized existing quarry or pit Marginally economic extractable mineral resource.	Regionally important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes Moderately drained and/or moderate fertility soils Small existing quarry or pit.	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Large historical and/or recent site for construction and demolition wastes Small historical and/or recent landfill Site for construction and demolition wastes Poorly drained and/or low fertility soils Uneconomically extractable mineral resource.	Poor Bedrock Aquifer Potable water source supplying <50 homes



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Table 6.2: Rating Criteria for Estimation Magnitude of Impact on Geological and Hydrogeological Attributes (NRA, 2008)

Magnitude	Criteria	Typical Examples	
		Geology	Hydrogeology
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves. Irreversible loss of high proportion of local high fertility soils. Removal of entirety of geological heritage features. Requirement to excavate / remediate entire waste site.	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves. Removal of part of geological heritage feature. Irreversible loss of moderate proportion of local high fertility soils. Requirement to excavate / remediate significant proportion of waste site. Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils.	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves. Removal of small part of geological heritage feature. Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Requirement to excavate / remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils.	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but not of sufficient magnitude to affect either use or integrity	No measurable changes in attributes	Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature.	
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature.	
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature.	

Table 6.3: Rating of Significant Environmental Impacts (NRA, 2008)

Importance of Attribute	Magnitude of Potential Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

Source: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2008)

6.3 Baseline Conditions

6.3.1 Topography

The existing ground levels consist of gentle and smooth flowing contours, which vary from 85m to 101m AOD, sloping towards the west and southwest.

6.3.2 Drainage

The site is located within the Barrow WFD Catchment. While there are no streams within the site, the Eaglehill 14 (IE_SE_14K270950) is located circa 250m south of the proposed extraction area. Figure 5.2 shows the drainage ditches within the landownership boundary that drain the west of the application boundary and potentially have a hydrogeological link to the surface water network including the Eaglehill Stream. There are also many unmapped drainage ditches in the commercial coniferous plantation, Clonmoyle Forest, to the south of the site. A spring has been mapped to the south east of the forest that is adjacent to the landownership boundary.

6.3.3 Land Use

The site is currently used for agricultural purposes, leased to local farmers for use as pasture and arable lands. Racefield House is located within the overall land ownership boundary and consists of a two-storey three-bedroom house with adjoining farmyard.

6.3.4 Soils and Subsoils

Figure 6.1 presents the soil type predominantly covering the study area. The majority of the site is classified as deep well drained mineral (mainly basic) soils, mainly derived from calcareous parent materials. There are areas in the north east and west of the landownership boundary that is classified as poorly drained (mainly basic) mineral soils derived from mainly calcareous parent materials and a region in the southwest of lacustrine-type soils.

The underlying subsoil or quaternary sediments comprise primarily of till derived from limestones (TLs) with a small area of lacustrine sediments in the southwest of the landownership boundary, as shown in Figure 6.1.

There are three known GSI listed boreholes within the landownership (Figure 6.2) as follows:

- In the north east the borehole (2619NEW361) was dug in 1899 to a depth of 12.8m for an unknown use;
- In the west, a borehole (2619NEW451) was dug in 2001 by the Kildare GWPS Drilling Program to 3m; and
- In the north west (2619NEW452), the borehole was dug in 2001 to 3m by the Kildare GWPS Drilling Program.



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There are a potential four additional GSI listed boreholes within the landownership boundary, however, these have a 2km locational accuracy, the use of these wells are unknown and have 'Poor' to 'Moderate' yield classes.

6.3.5 Bedrock Geology

The regional geological sequence within the study area is shown in **Figure 6.3**. The bedrock geology in the vicinity of the sand and gravel extraction facility and to the west thereof is dominated by Carboniferous limestone of the Ballysteen Formation. The formation is interpreted as irregularly bedded and nodular bedded argillaceous bioclastic limestones (wackestones and packstones), interbedded with fossiliferous calcareous shales.

The GSI database shows multiple northwest/southeast trending faults that cross cut and displace the Ballysteen Formation. There is bedrock outcrop located circa 1km west north west of the site that is indicative of thin subsoil cover. The regional structure of the Ballysteen Formation is shallowly dipping bedding towards the southeast.

The southeast of the landownership boundary is underlain by the Carboniferous skeletal, oolitic and micritic limestones. The formation mainly consists of varied shallow-water limestones including oolites, skeletal calcarenites and micrites with minor shale and sandstone.

6.3.5.1 Geological Heritage

Geological heritage sites are defined by the GSI on the basis of an audit undertaken by County Geological Sites (CGS). Geological Heritage sites there represent sites considered to be of national importance. The closest geological heritage site is The Curragh (KE009), circa 5km north of the site. The Curragh is a unique deposit of fluvio-glacial gravels that can reach thicknesses of circa 70m.

In response to consultation (refer **Table 1.4**), the GSI state that there are no County Geological Sites (CGSs) located within the vicinity of the site and with the current plans, there is no envisaged impact on the integrity of CGSs by the proposed developments, therefore, no action is required.

6.3.5.2 Geo-Hazards

According to the GSI online database, there are currently no records of geo-hazards such as landslides, within a radius of 10km of the site.

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Legend

Boundaries

- Landownership
- Planning Application
- Limit of Excavation Area

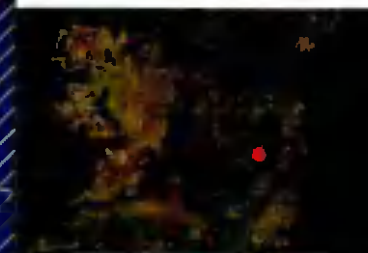
Soil Categories

- Mineral poorly drained (Mainly basic)
- Deep well drained mineral (Mainly basic)

Subsoil Categories

- Lacustrine type soils

Mineral poorly drained (Mainly basic)



Client **Kilsaran build**

Project **Kilsaran Racefield**

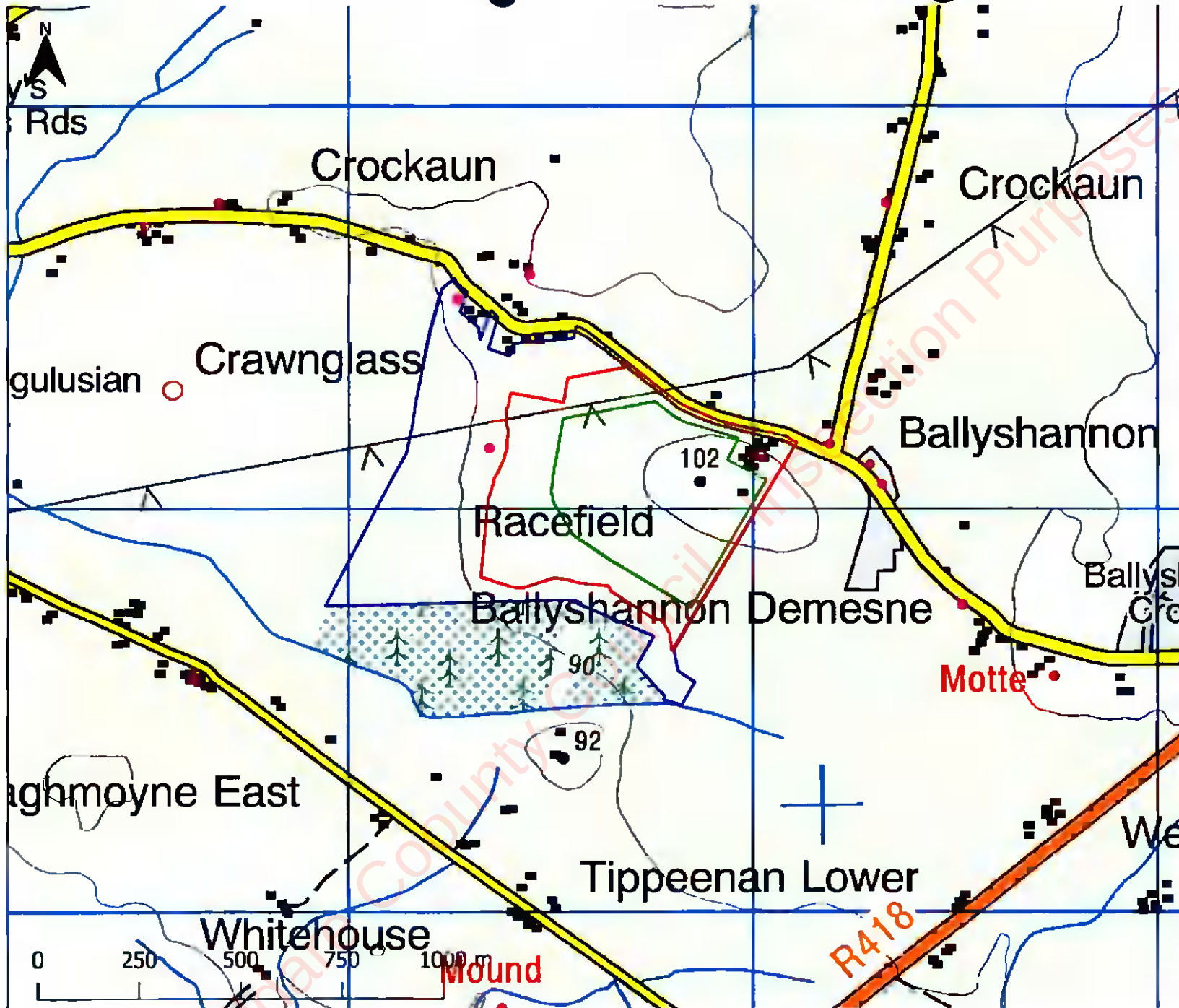
Figure 6.1:
Soil Categories

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West Pier Business Campus
Dun Laoghaire
Co. Dublin
Tel: +353 1 488 2999

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Legend

- Wells 10 to 50
- Site Boundaries
- Landownership
- Planning Application
- Limit of Excavation Area

Kilsaran

Project: Kilsaran Racefield

Figure 6.2
GSI Boreholes

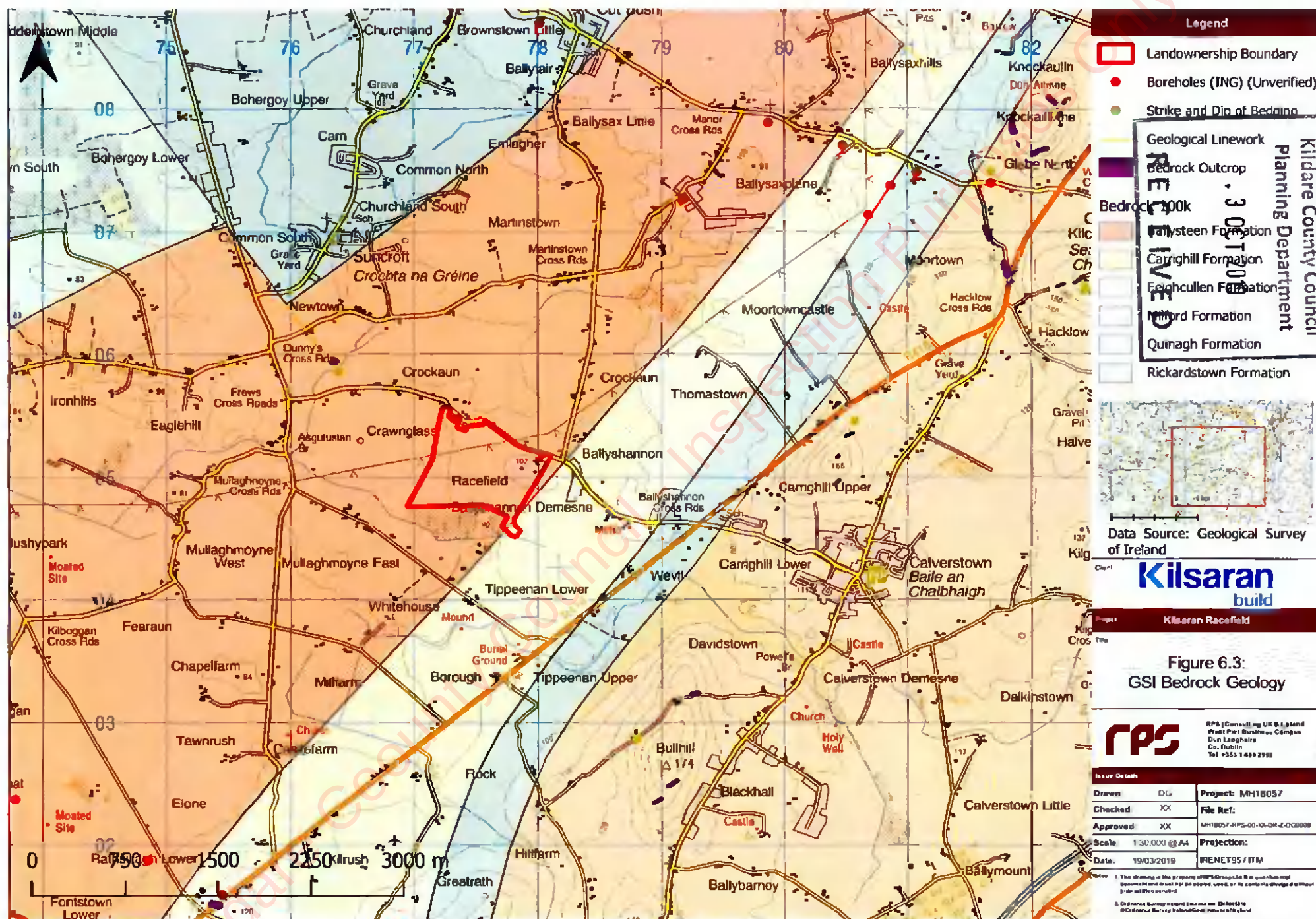
rps

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6.3.5.3 Site Specific Geology

The detailed understanding of site-specific geology is based on data obtained from the following information sources:

- Data from the site investigation completed by Ground Investigations Ireland between February to March 2019 (Appendix 6.1 in Volume III); and
- Data from the geophysical site investigation completed in February 2019 by Apex Geophysics (Appendix 6.2 in Volume III).

Apex Geophysics carried out a geophysical investigation at the site in February 2019 to provide information on potential sand and gravel deposits at the site, providing information of the overburden (material above economic deposits), estimated thickness of the sand and gravel and potential aggregate resource. The investigation consisted of reconnaissance EM Ground Conductivity mapping with follow-up 2D Electrical Resistivity Tomography (ERT) and Seismic Refraction profiling. The results of the geophysical investigation indicate the likely underlying conditions.

The investigation found that the overburden (gravelly clays overlying the sand and gravel deposits) has an average thickness of 3.10m across the site, with thicker overburden in the west and south of the site and thinner overburden in the east of the site overlying mainly silty sand and gravels with pockets of 'clean' sand and gravel. The investigation found that the average thickness of the silty sand and gravels and the 'clean' sand and gravels is 8.10m. The main sand and gravel layer is underlain by 2.50m – 7.00m of clayey sand and gravel and between 11m to 35m of interpreted very stiff sandy gravelly clay.

The geophysical investigation estimates 545,600m³ (982,080 tonnes) of clay overburden and 1,408,000m³ (2,534,400 tonnes) of silty SAND/GRAVEL and 'Clean' SAND/GRAVEL pockets (using the 1.8tonnes/m³ conversion rate) in the excavation area.

Material with a resistivity of 250 - 2500 Ohm-m is present across the site and has been interpreted as Ballysteen Formation Limestone. The bedrock is interpreted as possibly composed of dark limestone and the geophysics estimates that the top of the bedrock typically occurs at 60m ADD across the site.

Ground Investigation Ireland Ltd undertook a site investigation between the 12th February and 15th March 2019. The locations of the eight boreholes drilled during the site investigation are displayed in Figure 6.4 and details summarised in Table 6.4.

Ground Investigation Ireland Ltd logged the arising from the eight boreholes, and a summary of the logs is displayed in Table 6.5. The underlying soil is composed of topsoil and slightly gravelly clay (overburden) – up to 3.70mbgl, the overburden overlies the sand and gravel with thicknesses between 3.50m (BH2 and BH6) and 14.00m (BH9). Varying forms of clay-dominated soil underlie the sand and gravel.

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Table 6.4: Borehole Locations and Details

Borehole Reference	Easting	Northing	Ground Level (mAOD)	Borehole Depth (mbgl)	Water Strike (mAOD)	Comments
BH2	677633 196	705385 283	94.123	10.2	89.6106	50mm slotted pipe fitted with raised cover & bentonite seal to -1m bgl
BH3	677944 938	705135 863	99.740	21.0	89.749	50mm slotted pipe fitted with raised cover & bentonite seal to -1m bgl
BH4	677820 296	704922 382	97.006	20.0	89.749	50mm slotted pipe fitted with raised cover & bentonite seal to -1m bgl
BH5A	677593 702	704863 112	92.195	14.0	89.684	50mm slotted pipe fitted with raised cover & bentonite seal to -1m bgl
BH6	677435 382	705059 975	93.093	9.1	88.497	50mm slotted pipe fitted with raised cover & bentonite seal to -1m bgl
BH7	677614 221	705041 970	97.438	13.6	-	No Standpipe Installed
BH8	677553 456	705233 554	95.306	10.9	-	No Standpipe Installed
BH9	677777 703	705154 054	100.135	15.5	-	No Standpipe Installed

Note: Water level as of the 25th of March 2019

Table 6.5: Summary of Borehole Logs (Logged by Ground Investigation Ireland)

Log	Depth Range (mbgl)							
	BH2	BH3	BH4	BH5A	BH6	BH7	BH8	BH9
TOPSOIL	0.0 - 0.6	0.0 - 0.6	0.0 - 0.4	0.0 - 0.4	0.0 - 0.4	0.0 - 0.3	0.0 - 0.4	0.0 - 0.8
Slightly Gravelly CLAY	0.6 - 3.7	0.6 - 2.7	0.4 - 1.6	0.4 - 2.5	0.4 - 2.5	0.3 - 2.4	0.4 - 2.7	0.8 - 1.50
SAND and GRAVEL	3.7 - 7.2	2.7 - 16.5	1.6 - 14.0	2.5 - 6.1	2.5 - 6.0	2.4 - 12.3	2.7 - 9.5	1.5 - 15.5
Gravelly CLAY	7.2 - 10.2	16.5 - 21.0	14.0 - 20.0	6.1 - 14.0	6.0 - 9.1	12.3 - 13.6	9.5 - 10.90	-

Note: Unit not encountered (end of borehole)





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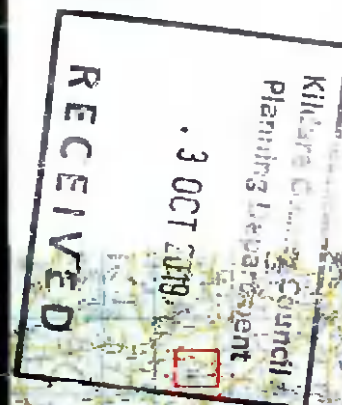
Investigative Borehole Locations

Site Boundaries

Landownership

Planning Application

Limit of Excavation Area



Client

Kilsaran
build

Project

Kilsaran Racefield

Title

Figure 6.4:
Intrusive Site Investigation
Borehole Locations

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6.3.6 Climatic Data

Updated climatic and rainfall data for the site has been obtained and is described in **Chapter 7: Water**. Groundwater recharge according to the GSI for the site is 60% of effective rainfall (462mm/year) which equates to 277mm/year.

6.3.7 Hydrogeology

6.3.7.1 Hydrogeological Classification

The GSI provide a general hydrogeological classification based on the geological setting. The GSI aquifer categories are intended to describe both resource potential (Regionally or Locally Important, or Poor) and groundwater flow type and attenuation potential (through fissures, karst conduits or intergranular).

The aquifer classification for the key geological units within the study area (**Figure 6.5**) is a Locally Important Aquifer (LI) where bedrock is moderately productive only in local zones.

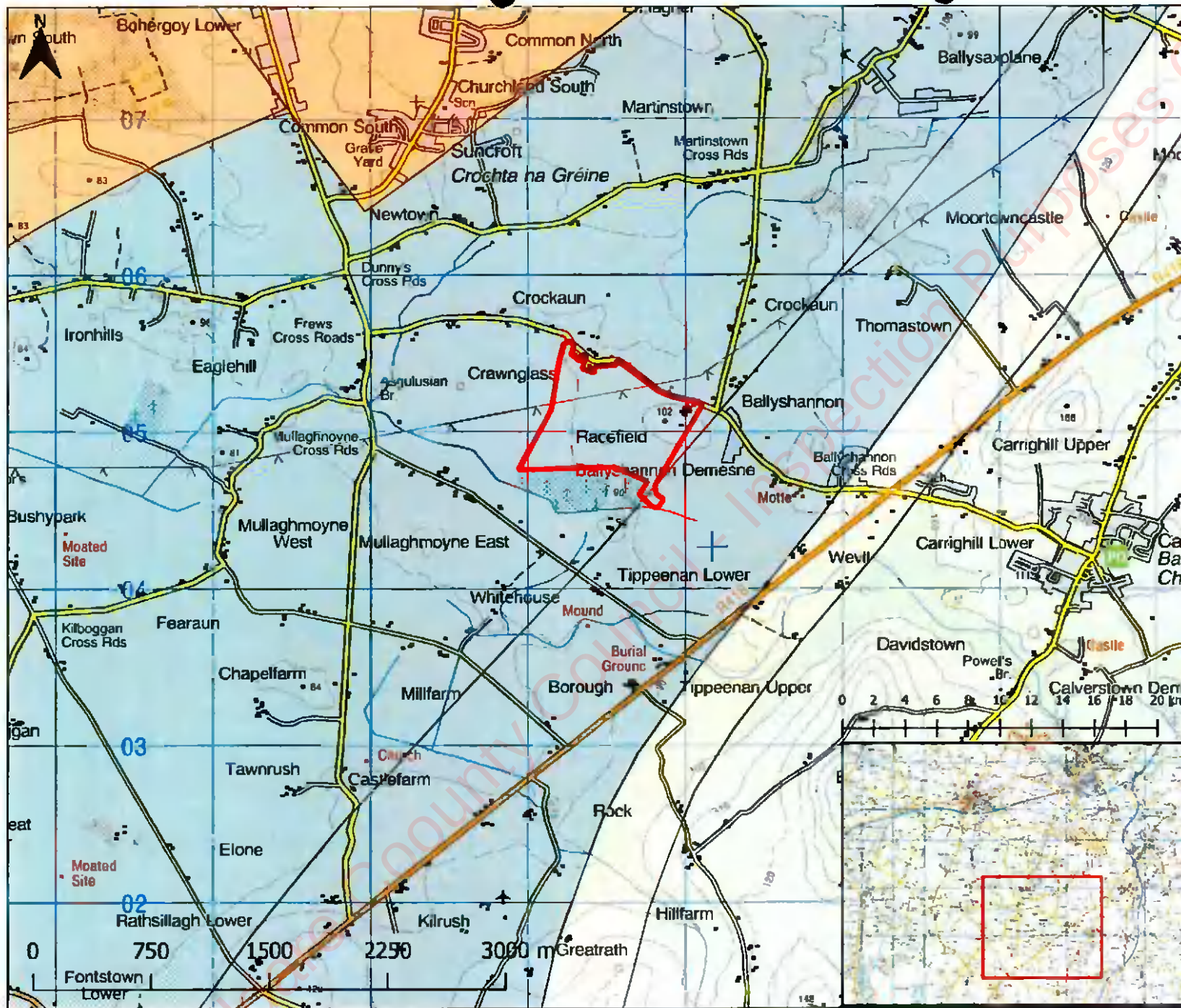
Groundwater Bodies (GWB) have been designated for the purpose of the Water Framework Directive (WFD) (Directive 2000/60/EC). GWBs are subdivisions of large geographical areas of aquifers that allow more effective management to protect the groundwater and linked surface water or groundwater dependent features.

The site is located within the New Ross GWB which spans across the counties of Kildare, Carlow, Wicklow, Kilkenny and Wexford. The large area of the groundwater body does not imply a regional flow system spanning the entire length. In this poor aquifer, groundwater will recharge and discharge in local areas. The New Ross GWB is described by the EPA as poorly productive bedrock. Groundwater flow is influenced by topography and mirrors the ground levels. Groundwater flow is confined to fractures, fissures, joints, bedding planes and the uppermost part of the bedrock. Most groundwater flow is thought to be relatively shallow concentrating in the top 10m to 30m of the rock profile. The flow is therefore likely to follow local variations in topography.

6.3.7.2 Groundwater Vulnerability

Groundwater vulnerability designation in the vicinity of the site is shown in **Figure 6.6**. The GSI classifies the aquifer in the region as Moderate (M), suggesting that there are moderate permeability subsoils with greater than 10m depth to bedrock or low permeability subsoil with 5-10m depth to bedrock. The site investigation boreholes found that the site is underlain by a mixture of low permeability clay and high permeability sand/gravel, and depth to bedrock is greater than 21.0mbgl. The geophysical study estimates that bedrock is encountered at 60m AOD with at least 15m of clay dominated soils between the bedrock and sand/gravel. Based on the GSI classification the site could be classes as having a 'Low' groundwater vulnerability.





Legend

Aquifer Classification

- Locally Important Aquifer
- Locally Important Aquifer - Mod. Productive in Local Zones only
- Locally Important Aquifer - Karstified
- Poor Aquifer
- Poor Aquifer - Gen. Unproductive except Local Zones
- Regionally Important Aquifer - Fissured bedrock
- Regionally Important Aquifer - Karstified
- Regionally Important Aquifer - Karstified (conduit)
- Regionally Important Aquifer - Karstified (diffuse)
- Unclassified
- Landownership Boundary
- Boreholes (ING) (Unverified)

Data Source: Geological Survey of Ireland

Client: **Kilsaran**

Project: **Kilsaran Racefield**

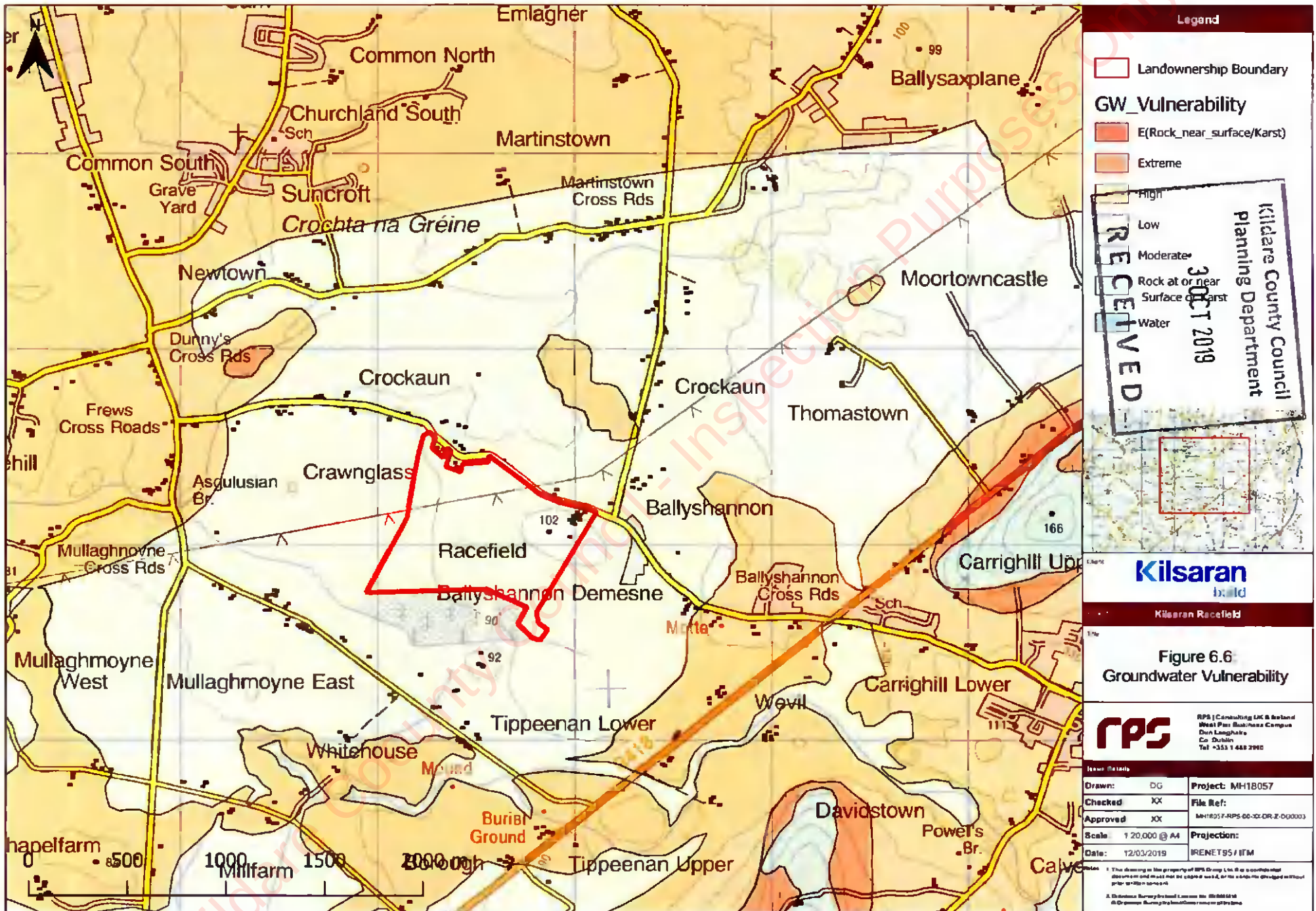
Figure 6.5: **Aquifer Classification**

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6.3.7.3 Groundwater Levels and Flow Directions

Groundwater levels have been recorded between the 25th of March 2019 and the 24th June 2019 at five monitoring boreholes (BH2, BH3, BH4, BH5A and BH6). The location and elevation of all monitoring boreholes constructed within the landownership boundary is summarised in Table 6.4 and displayed in Figure 6.7.

The highest water level is consistently recorded in monitoring borehole, W3. W3 is located in the north east of the site at an elevation of 100.249mAOD and has recorded water levels between 89.749mAOD and 89.369mAOD. The water level in the remaining four boreholes follow a similar trend, ranging from 88.5mAOD to 89.684mAOD and the elevation levels of these four boreholes range from 92.59 to 97.45mAOD.

The water level data combined with the well location map (Figure 6.7) suggests that water flows away from the sites topographic high point (W3) towards the west of the site. The March to June 2019 groundwater level monitoring shows that there is no real change in groundwater direction as groundwater consistently flows towards the west.

6.3.8 Groundwater Abstraction

The GSI has defined a Source Protection Area for the Curragh Camp Public Water Supply (PWS) composed of an Inner Protection Area (SI) and Outer Protection Area (SO). As shown in Figure 6.8, the site is located circa 4km south of the Outer Source Protection Zone, the protection zone is upgradient of the site as groundwater and surface water flows towards the west. The Curragh PWS is located within the Curragh Gravels West GWB.

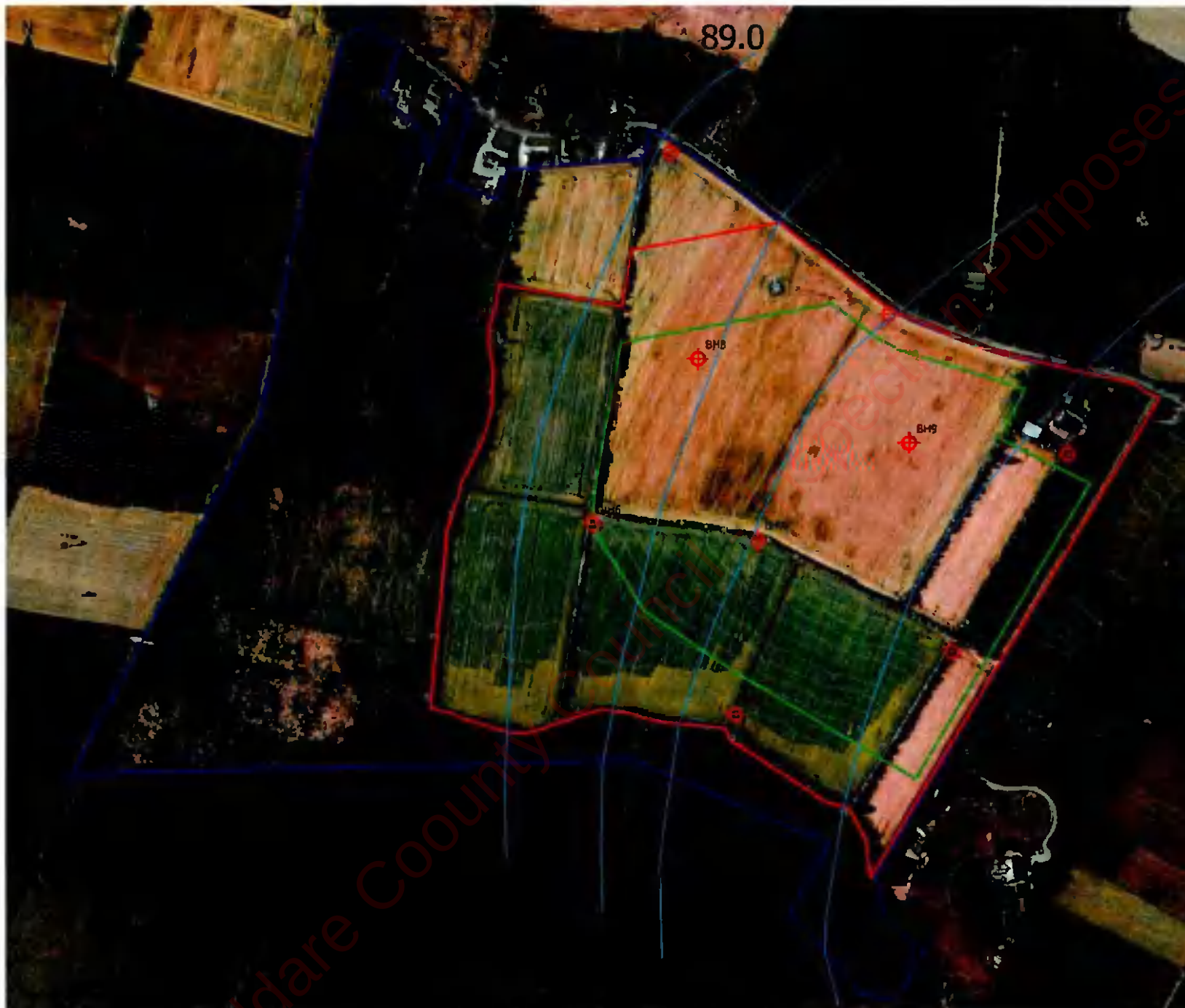
A second defined GSI Source Protection Area is the Lipstown Narraghmore Groundwater Supply (GWS) composed of an SI and SO. As shown in Figure 6.8, the site is located circa 5km north of the SO, the protection zone is upgradient of the site as groundwater and surface water flows towards the west. Part of the Lipstown Narraghmore GWS is located in the New Ross GWB, however, a large proportion of the GWS is located within the Narraghmore Gravels GWB.

A third defined GSI Source Protection area is the USK/Gormanstown Groundwater Supply (GWS) composed of an SI and SO. The site is located circa 11km east of the SI, the protection zone is upgradient of the site as groundwater and surface water flow towards the west. The GWS is located within the Gormanstown Gravels GWB, north of the New Ross GWB.

6.3.9 Areas of Conservation

The GSI online database lists the areas of conservation in the immediate vicinity of the site (refer Chapter 5 Biodiversity). The nearest site designated for nature conservation is the River Barrow and River Nore Special Area of Conservation (SAC), located circa 3.9km west of the site. The SAC has groundwater dependent feature of interest including estuaries (1130), mudflats and sandflats not covered by seawater at low tide (1140) and reefs (1170).

The site is located within a nutrient sensitive catchment of interest, the Barrow River Catchment (IERI_SE_2001_0015) which intersects the New Ross GWB (IE_SE_G_152).



Legend

Site Boundaries

- Landownership Boundary
- Planning Application Boundary
- Limit of Excavation Area

Surface Contours (0.5m)
Groundwater Contours (0.5m)
Investigative Borehole Locations

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Figure 6.7:
Groundwater
Elevation Contours

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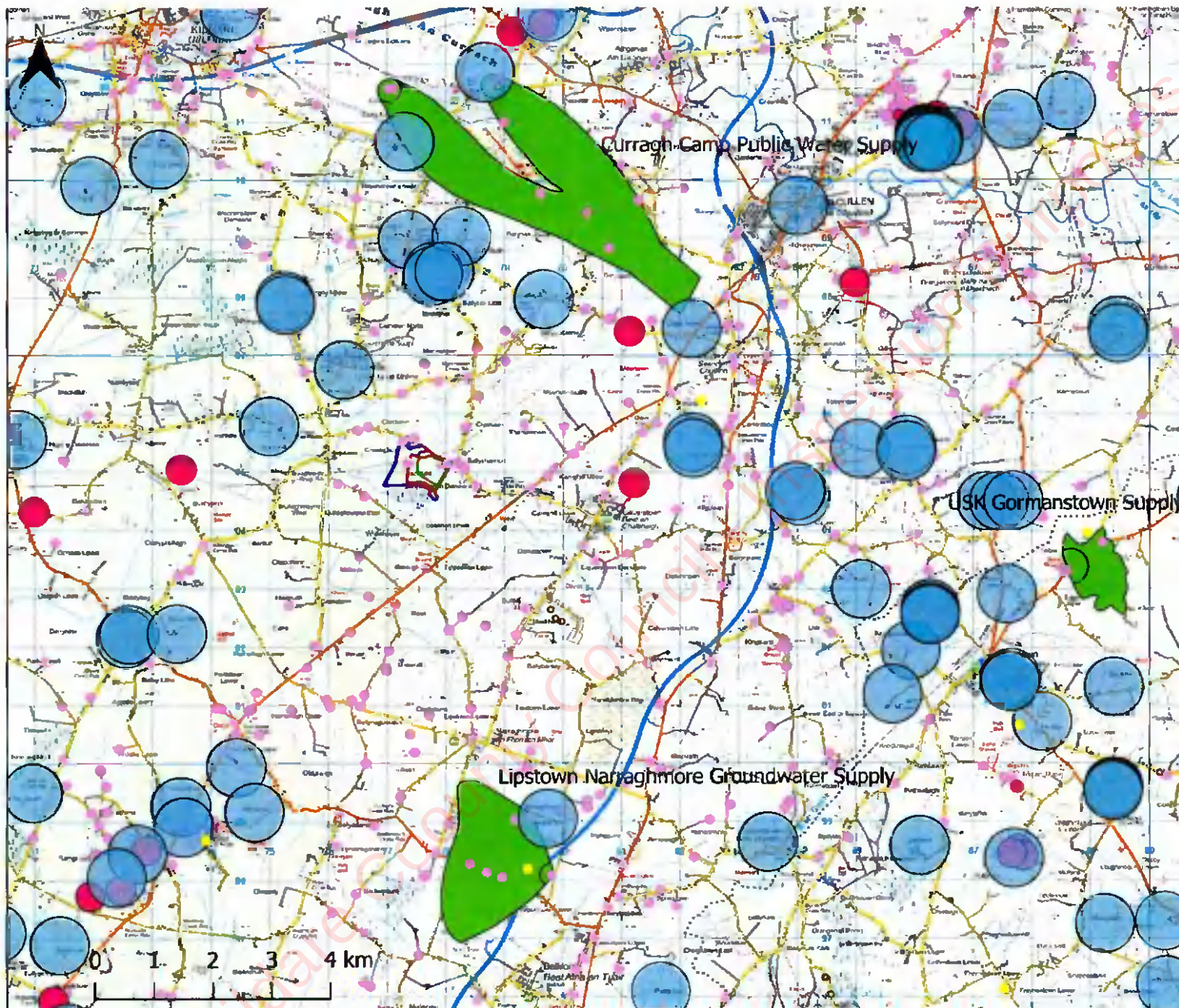
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- GSI Special Protection Areas
- EPA Groundwater Abstraction Points
- Wells10to50
- Wells500_250B
- Wells100_50B
- Wells1km_500B
- Wells200_100B

Site Boundaries

- Landownership Boundary
- Planning Application Boundary
- Limit of Excavation Area

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Figure 6.8
Special Protection Areas and Abstraction Points

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6.3.10 Environmental Receptors

The environmental receptors considered relevant to the assessments presented in this chapter and their respective sensitivity is summarised in Table 6.6.

Table 6.6: Environmental Receptors

Receptor	Key Receptor Attributes	Distance to Kilsaran Facility boundary	Receptor Importance
Curragh PWS Source Protection Zone	Two production boreholes abstracting c.2000m ³ d ⁻¹ in a Regionally Important sand and gravel aquifer. Source protection areas are vulnerable to contamination with moderate to low permeability subsoil overlying the protection zone.	c.4km north upgradient	High
Gormanstown Naraghmore Groundwater Supply	Intermediate spring with good quality water in a Locally Important sand and gravel Aquifer. Groundwater feeding the source is extremely to highly vulnerable to contamination due to the limited overburden overlying the aquifer.	c 5km south upgradient	High
River Barrow and River Nore SAC	Groundwater dependent features of interest	c 3.9km west downgradient	Extremely High

Note: The USK/Gormanstown GWS was excluded from the list as it is greater than 10km upgradient of the site.

6.4 Impact Assessment

This assessment considers the initial construction phase and the ongoing operational phase of the proposed development on land, soils, geology and the hydrogeological environment.

6.4.1 'Do-Nothing' Scenario

Under the do-nothing scenario the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. The baseline condition of land, soils and hydrogeology will remain unaltered under such a scenario other than natural variation in these parameters with time.

6.4.2 Construction/Operation Phase

These phases have the potential to affect land, soils, geology and hydrogeology and effects considered for this chapter include:

- Accidental emissions and release of potentially hazardous substances during construction that may affect the quality of groundwater and/or soils, most notably associated with cement, concrete materials, temporary oils and fuel particularly where below ground excavations are required;
- Short-term effects on groundwater quality through the infiltration of surface run-off within or adjacent to construction areas; and
- Loss of soil reserves through the construction of hardstanding and structures on the site.

These risks will be managed through standard measures operational during the construction phase. It is not anticipated that any of the construction activities will directly intercept groundwater in the aquifer identified on site thereby, not having a direct effect on the groundwater flow regime in the aquifer.

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The proposed extraction plan for the site is described in **Chapter 3** and the proposed working methods include:

- **Dry working:** The working method consists of separate topsoil and overburden removal which will be carried out in advance of a proposed load, haul and dump method of extraction.
- **Wet Working:** Once all the gravel has been extracted from above the watertable, extraction from below the watertable will proceed for the wet working phase. The sand and gravels will be extracted 'wet' and therefore there will be no requirement to dewater the working areas of the site and so the watertable will remain undisturbed.

The excavation phase does have the potential to affect land, soils, geology and hydrogeology, and the effects considered for this chapter include:

- Generation of suspended sediment within the standing water during wet working and potential impact to groundwater with subsequent impact on the connecting surface water bodies such as the Eaglehill Stream;
- Generation of suspended sediment within the standing water during wet working and potential impact to groundwater with subsequent impact on the springs located within the western perimeter of the site.
- Accidental release of hazardous materials, most notably fuels and oils associated with areas of parking, vehicle movements and refuelling activities;
- Chemicals will be banded, accidental release could occur if not mitigated correctly;
- Increased hard standing area associated with the new access road will reduce local recharge to ground and increase surface run-off, and
- Stockpiling of excavated material reducing local recharge to ground and increased surface run-off.

6.4.2.1 Impact on Groundwater Levels/Flows

Existing groundwater flows and levels are presented in **Section 6.3.7.3** and indicates that groundwater levels were recorded at circa 89mAOD across the site and that groundwater flows away from the sites topographic high point towards the west of the site.

The processing system for washing the sands and gravels following extraction will require circa 6.8m³ per hour of water to ensure the water balance in the system is maintained. This water will be sourced from a groundwater sump within the extraction area to feed the processing. The extraction of 6.8m³ of water per hour during operational hours (assuming 10 days, circa 68m³ per day) will have negligible impact on groundwater flows and levels across the site and in the wider hydrogeological body.

Similarly, during the wet working the gradual excavation of the sand and gravel material below the watertable will have no significant impact on groundwater flows and levels. While the removal of each loader bucket of aggregate will create a void space for the groundwater to fill, the rate of extraction, coupled with the size and free flowing nature of the surrounding groundwater body will result in a negligible change in groundwater flow as a result of extraction.

6.4.2.2 Impact of Wet Working on the Eaglehill Stream

Wet working is a standard operation in sand and gravel pits across Europe. During wet working the extraction of sands and gravels below the watertable will generate sediment within the water body contained within the pit. However, this sediment will effectively be controlled within the water body of the pit and will not have an adverse impact for groundwater or any linked surface water body in the area, such as the Eaglehill Stream to the south.

There is a strong research body that indicates that gravel filters (such as the geological regime surrounding the proposed extraction area) are found to be very effective for removal of sediment and heavy metals under all water level regimes (*Hatt, Fletcher and Deletic, 2007*). Sediment is shown to get trapped in gravel filtration

systems such as the naturally occurring one that forms the pathway between the source and receptors in this instance.

Figure 6.9 (from Hatt, Fletcher and Deletic, 2007) shows that even under varying inflow concentrations, the sediment concentration of the outflow water after passing through just 90cm of gravel was consistently negligible. As sediment accumulated within the system over time, it became clogged and with this material, the hydraulic loading decreased. Under almost saturated conditions the output sediment concentration remained at 0% contamination. Within a confined space, sediment removal increases with time due to either the aggregation of sediment and reduced remobilisation or enhanced adhesion. This evidence supports the assessment that any sediment generated through wet working will be effectively 'filtered' by the surrounding gravel body ensuring no release of suspended sediment to the groundwater body or other receptors (e.g. the Eaglehill Stream).

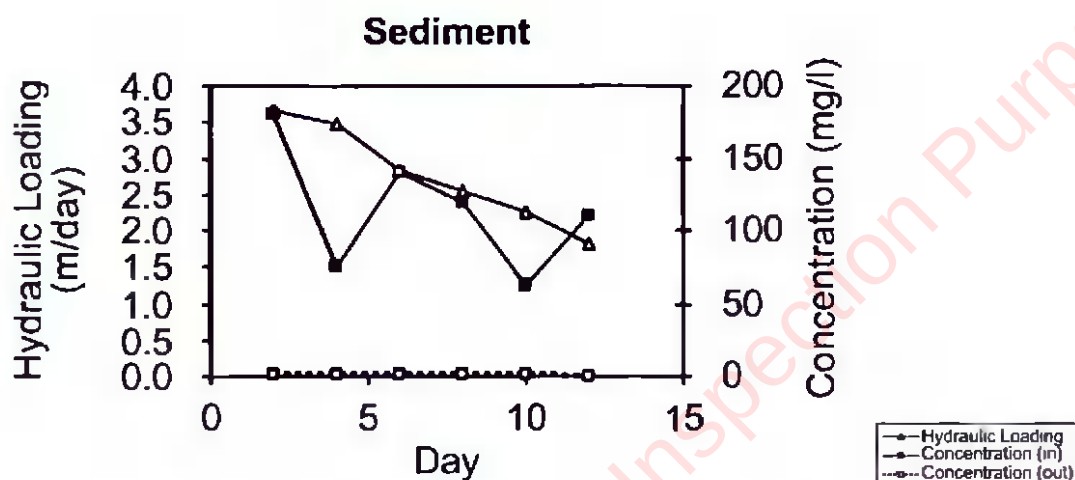


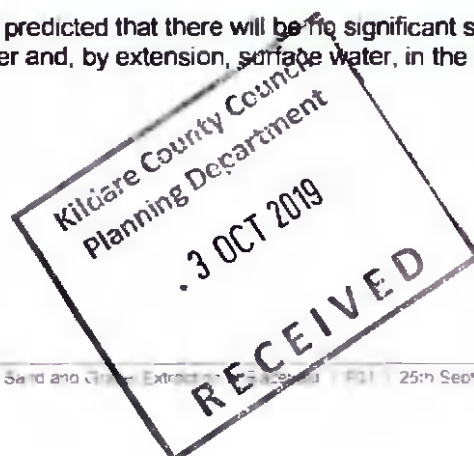
Figure 6.9: Sediment Output (source: Hatt, Fletcher and Deletic, 2007)

Figure 6.10 shows the effectiveness of gravel filtration over just very small distances. 0.5m was found to give adequate pollutant removal. Mikkelsen *et al.*, 1996 states that in infiltration systems the concentrations levels of all pollutants rapidly decreased to background levels within distances less than 1.5m.

The primary disadvantage of gravel filtration commercially is the eventually clogging and end of life of the system and risk of breakthrough and remobilisation in advance of this. This is only the case in one and small two-dimensional systems. In an open, three-dimensional system such as the site at Racefield, the flow can bypass any potential clogging or breakthrough areas and to give a more even spread of sediment. In the case of much smaller systems used to filter stormwater, the life cycle is generally 15-20 year before clogging occurs (Pratt, Mantle and Schofield, 1995). This is longer than the life cycle and of the proposed development and hence, longer than the period in which wet working will occur.

As a conservative distance of 1.5m is proven to mitigate the effects of any sediment disturbance, the 250m which the groundwater must flow through before reaching the Eaglehill River at its closest approach is a sufficient distance to filter out all sediment and eliminate any possible disturbance to the river. The timeframe and available space also mitigates the chance of the system clogging and the remobilisation of the sediment.

For these reasons it is predicted that there will be no significant sediment impact from the proposed wet working on groundwater and, by extension, surface water, in the area around the site.



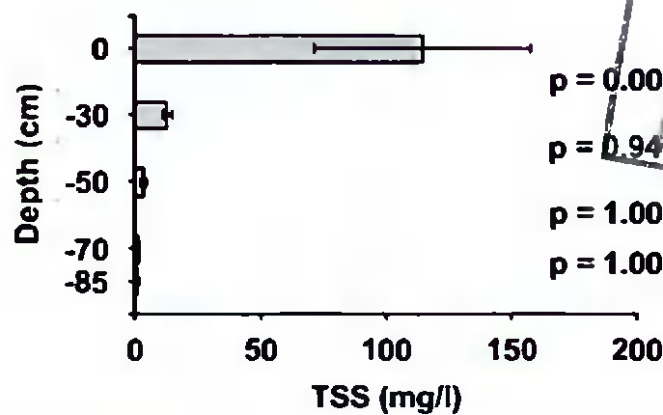


Figure 6.10: Sediment Removal with Depth (source: Mikkelsen *et al.*, 1996)

6.4.2.3 Impact of Wet Working on the Drainage Ditches

There are a series of drainage ditches in the west of the landownership boundary that act as field boundaries. The individual ditches are shown in Figure 7.3 and these drains were inspected and it was found that there was a potential hydrogeological connection to the Eaglehill Stream.

It should also be noted that there is also a potential pathway for surface water to these ditches from storm water runoff from the overburden stockpiles to be located at the west of the site. This impact is addressed in Chapter 7 but it noted here for cumulative impact assessment.

As noted above, the gravel bed around the pit void will effectively filter out any suspended sediment within the standing water thereby breaking any potential pathway between the pit source and the receptors (in this case the drainage ditches). As such, there is no predicted significant impact from groundwater to these ditches to the west of the site and hence, no indirect impact to the Eaglehill Stream.

There is potential for sediment run off from the storm water discharges from site clearance works and stockpiling of overburden. These impacts are addressed in Chapter 7 but will be effectively mitigated through a sediment control plan of good working practices and the use of hard mitigation such as silt curtains. As a consequence, there is no predicted significant impact to these ditches and ultimately the Eaglehill Stream from the proposed extraction stage and wet working.

6.4.2.4 Impact of Material Stockpiling

Overburden stripped to obtain access to the sand and gravel resource will be either utilised directly for construction of temporary topsoil storage & screening mounds or placed in the overburden storage area. Excess overburden will also be used during the operational phase to construct / maintain silt disposal lagoon. This material in turn will be used in the restoration of the site where required.

The removal of the overburden and sand and gravel deposits would reduce the material overlying the bedrock. The removal of the material overlying the bedrock will potentially increase the groundwater vulnerability as the GSI determine groundwater vulnerability on the thickness and permeability of the overburden. Without mitigation, the impact to the aquifer is considered to be permanent. The geophysical study suggests, that post-excavation of overburden and sand and gravel, there is sufficient sandy, gravelly clay above the bedrock aquifer for the aquifer vulnerability to be classed as 'Low'. The removal of material overlying the bedrock will also increase the recharge to the bedrock aquifer as there will be less material to percolate through.

6.4.2.5 Impact of Processing Plant

The proposed processing plant generator will be refuelled locally in the area of operation by a mobile double-skinned fuel bowser. There will be spill trays, spill kits and procedures in place for this operation. The fuel bowser will also carry a spill kit. As a consequence, with these good working practices in place there is no predicted significant adverse impact to ground from these operations.

6.4.2.6 Groundwater Recharge

The installation of new hard standing areas at the site entrance will potentially reduce local recharge to ground and increase surface run-off. The storm water design for the access road has been carried out to limit the discharge from the area to greenfield runoff rates through the use of flow control unit.

The layout of the site has been designed to collect surface water runoff from the access road and associated hard stand areas within the development. From here the water will be collected in the discharged via a Class 1 bypass interceptor to a soakaway and allowed to exfiltrate to ground at the appropriate greenfield run off rates. As such, there is no significant impact predicted in relation to groundwater recharge.

6.4.3 Restoration Phase

Following cessation of extraction after the 12 year period the restoration of the site will commence for a two year period. The proposed restoration of the pit will not involve any infilling at the void space but the site will be restored as an ecological resource through the development of a mix of terrestrial and aquatic habitats to ensure a diverse ecosystem.

The restoration phase has no potential for significant environmental impacts to land, soils or hydrogeology.

6.5 Mitigation Measures

6.5.1 Construction/Operation Phase

Kilsaran carry out all operations in accordance with the following guidance:

- Irish Concrete Federation Environmental Code;
- EPA – Guidelines on Environmental Management in the Extractive Industries published by the Environmental Protection Agency (EPA, 2006);
- CIRIA – Guideline Document C532 Control of Water Pollution from Construction Sites (CIRIA, 2001);
- CIRIA – Guideline Document C650 Environmental Good Practice on Site (CIRIA, 2005);
- BPGCS005 – Oil Storage Guidelines

The delivery of these plans shall ensure that the risk of contamination of soils, surface waters and groundwater or the discovery thereof will be minimised, avoided and/or managed during the construction phase. All personnel working on the site will be trained in the implementation of the procedures. These phases can be separated into site preparation works which includes stripping topsoil and overburden and the extraction and on-site processing of gravels.

6.5.1.1 Site Preparation

Mitigation measures during the site preparation stage of construction include managing soil in line with best practice guidelines with regards to stripping, transportation and storage of soils. Soil quality can be deformed and weakened during handling (e.g. trafficking), therefore, excavator and truck movement will be managed to avoid severe soil deformation.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

6.5.1.2 Extraction and on-site processing

Operations within the extraction zone will adhere to the Health and Safety Authority Safe Quarry Guidelines in relation to the Safety Health and Welfare at Work (Quarries) Regulations 2008 and this will limit the potential for unplanned events such as instability of pit faces or instability in adjacent lands.

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Sediment runoff will be controlled by the following measures:

- A minimum of 3 no. closed circuit silt disposal lagoons will be provided in the south eastern corner of the extraction application area. The purpose of the silt lagoons is to remove any suspended solids and will operate as a closed system, which allows for the re-cycling of water for use in the processing plant. The lagoons also minimise the need for excessive extraction of groundwater and to eliminate the need to discharge process water from the site.
- Use of silt screens or turbidity curtains to prevent the release of sediments to the watercourses at the west of the site.
- Periodic water monitoring will be undertaken to establish baseline conditions (water chemistry & TSS monitoring) and to ensure that the proposed development does not lead to an impact on water quality.
- The proposed processing plant will be refuelled locally in the area of operation by an off-site mobile double-skinned fuel bowser visiting the site. There will be spill trays, spill kits and procedures in place for this operation. The fuel bowser will also carry a spill kit.

6.5.2 Restoration Phase

No proposed mitigation measures for this phase of works.

6.6 Residual Impact

6.6.1 Construction/Operation Phase

A summary of the potential effects that may occur during the construction/operation phase and their likely significance is provided in Table 6.7.

6.6.2 Restoration Phase

There is no predicted significant residual impact for land, soils and hydrogeology from this phase of works.

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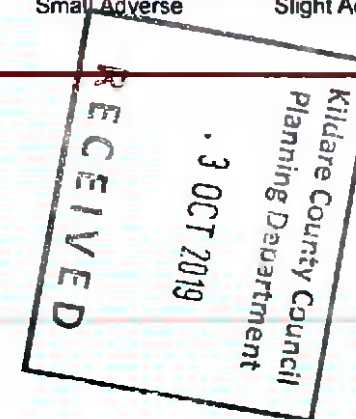
Table 6.7: Summary of Potential Effects during the Construction Phase

Activity	Potential Effect	Receptor Affected	Importance of Receptor	Incorporated Mitigation Measures	Magnitude of Potential Effects	Significance of Residual Effect
Storage and handling of potentially hazardous substances.	Accidental emission/release of potentially hazardous substances resulting in a localised, short-term effect on soil and groundwater quality beneath release area. Localised and short-term effect	Soils	Medium	Measures delivered principally through following best practice storage and spill management stated in Section 6.5.1.	Small Adverse	Slight Adverse
		Curragh PWS Source Protection Zone	High		Negligible	Imperceptible
		Lipstown Narraghmore Groundwater Supply	High		Negligible	Imperceptible
		Groundwater Ballysteen Formation (LI) Aquifer	Medium		Negligible	Imperceptible
		River Barrow and River Nore SAC	Extremely High		Negligible	Imperceptible
Stripping of topsoil and overburden and stockpiling	Stockpiling resulting in reduced groundwater recharge to groundwater and soil compaction	Soils	Medium	Stockpiles will be fully managed through height restrictions and a sediment control plan.	Small Adverse	Slight Adverse
		Curragh PWS Source Protection Zone	Very High		Negligible	Imperceptible
		Lipstown Narraghmore Groundwater Supply	Very High		Negligible	Imperceptible
		Groundwater Ballysteen Formation (LI) Aquifer	Medium		Small Adverse	Slight Adverse
		River Barrow and River Nore SAC	Extremely High		Negligible	Imperceptible
Excavation – impact of dry working.	Potential for surface water contamination	Soils	Medium	The series of silt lagoons incorporated into the design will control potential for run off.	Negligible	Imperceptible
		Curragh PWS Source Protection Zone	Very High		Negligible	Imperceptible



REPORT

Activity	Potential Effect	Receptor Affected	Importance of Receptor	Incorporated Mitigation Measures	Magnitude of Potential Effects	Significance of Residual Effect
Excavation – impact of wet working	Sediment loading to groundwater and direct or indirect discharge to the streams, ditches and springs.	Lipstown Narraghmore Groundwater Supply	Very High	Measures delivered principally through following best practice and guidelines stated in Section 6.5.1	Negligible	Imperceptible
		Groundwater: Ballysteen Formation (LI) Aquifer	Medium		Negligible	Imperceptible
		River Barrow and River Nore SAC	Extremely High		Negligible	Imperceptible
		Soils	Medium		Negligible	Imperceptible
		Curragh PWS Source Protection Zone	Very High		Negligible	Imperceptible
		Lipstown Narraghmore Groundwater Supply	Very High		Negligible	Imperceptible
Excavation and export of materials	Loss of soil reserves through excavation and / or concealment by structures / hardstanding	Groundwater: Ballysteen Formation (LI) Aquifer	Medium	Stripping and storing of soils for re-use on site	Small Adverse	Slight Adverse
		River Barrow and River Nore SAC	Extremely High		Negligible	Imperceptible
		Soil	Medium		Small Adverse	Slight Adverse



6.7 Monitoring

Groundwater monitoring will be undertaken to establish baseline conditions (water chemistry & TSS monitoring) and to ensure that the proposed development does not lead to an impact on groundwater quality. A minimum of one upgradient (north east of the site) and two downgradient borehole wells will be installed for these monitoring purposes.

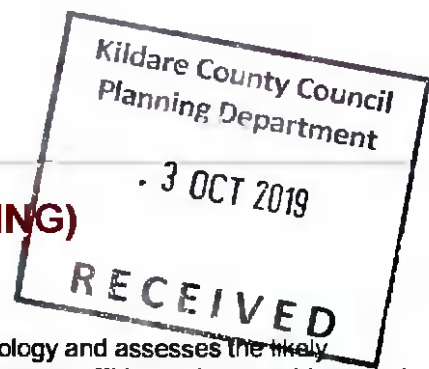
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7 WATER (HYDROLOGY AND FLOODING)

7.1 Introduction

This chapter of the EIAR presents baseline information on the local hydrology and assesses the likely significant effects of the proposed activities on the receiving water environment. This section should be read in conjunction with the site layout plans for the site and project description in Chapter 3 of this EIAR. The local hydrology and drainage for the site is inter-related with the aquatic ecology of the receiving waters and also the hydrogeology of the study area. Further details can be found in Chapter 5 Biodiversity and Chapter 6 Land, Soils, Geology and Hydrogeology of this EIAR.

7.2 Assessment Methodology

7.2.1 Assessment Approach

The EIA was carried out in accordance with the following specific guidelines in relation to hydrology

- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Environmental Protection Agency (2011): BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities; and,
- Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2001.
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (OPW, 2009)

7.2.2 Information Sources Used

As part of the desktop study to inform the assessment, reference has been made to the following:

- Online databases of the Environmental Protection Agency (EPA) <https://gis.epa.ie/EPAMaps/>, and www.catchment.ie, for information on:
 - Surface water courses in the area and their respective water quality status;
 - Special Areas of Conservation & Special Protected Areas; and
 - Water Framework Directive (WFD) data.
- Office of Public Works (OPW); www.opw.ie and www.floodinfo.ie for flooding information;
- Ordnance Survey Ireland aerial photographs and historical mapping;
- Met Eireann www.met.ie for historic rainfall and evapotranspiration data;
- National Parks and Wildlife Services (NPWS) <http://webgis.npws.ie/npwsviewer/> for designated sites
- Other online databases consulted included:
 - www.epa.ie/licensing for Annual Environmental Reports
 - www.kildare.ie for Kildare County Development Plan 2017-2023
 - Flood Studies Update (FSU) Web Portal <http://opw.hydronet.com/>

A review of the relevant EIA consultation responses from statutory authorities and consultees as outlined in Section 1.11 of this EIAR was also undertaken.

7.2.3 Assessment Criteria

The significance of an impact is defined by first considering the importance of the attribute impacted and secondly the magnitude of the impact. The importance of hydrology attributes (rating criteria) is defined in accordance with the NRA Guidelines (NRA, 2008). This guidance includes intermediate steps for rating site importance (Table 7.1) and magnitude of impact (Table 7.2) and then significance (Table 7.3).

Table 7.1: Rating Criteria for Site Importance of Hydrology Attributes

Importance	Criteria	Typical Examples
Extremely high	Attribute has a high quality or value on an international scale.	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very high	Attribute has a high quality or value on a regional scale.	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale.	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale.	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale.	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

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Table 7.2: Rating Criteria for Estimation Magnitude of Impact on Hydrology Attributes

Magnitude	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and/or quality and integrity of attribute	Loss or extensive change to a water body or water dependent habitat Increase in predicted peak flood level >100mm Extensive loss of fishery Calculated risk of serious pollution incident >2% annually Extensive reduction in amenity value
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm Partial loss of fishery Calculated risk of serious pollution incident >1% annually Partial reduction in amenity value
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm Minor loss of fishery Calculated risk of serious pollution incident >0.5% annually Slight reduction in amenity value
Negligible	Results in an impact on attribute but not of sufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level Calculated risk of serious pollution incident <0.5% annually
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

Table 7.3: Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Potential Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely high	Imperceptible	Significant	Profound	Profound
Very high	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

7.3 Baseline Conditions

7.3.1 Rainfall and Climate

The 30-year average annual rainfall measured at Casement Aerodrome is 754.2mm for the period 1981 to 2010. The annual average values for the hydrometric years between the period 2010 to 2018 are shown in Table 7.4 where data is available. The data shows that the average annual rainfall to be varied above and below than the 30-year average since 2010. Annual potential evapotranspiration has not changed significantly since 2015 and has a peak value of 585mm/year in 2010. Effective rainfall which is the amount of rainfall available to infiltrate the ground (and not evaporated or taken up by plants) has been notably low in 2010 and 2011. In 2018, dry summer months were counteracted by wet winter months.

Table 7.4: Annual Rainfall and Potential Evapotranspiration measured at Casement

Year	Rainfall (mm/yr)	Potential Evapotranspiration (mm/yr)	Effective Rainfall (mm/yr)
2018	866.2	518.8	347.4
2017	677.0	520.2	156.8
2016	988.6	504.0	484.6
2015	673.0	494.7	178.3
2014	882.6	535.2	347.4
2013	767.3	542.6	224.7
2012	959.1	538.3	420.8
2011	634.7	553.1	81.6
2010	609.6	584.9	24.7

7.3.2 Existing Site Drainage

There are two watercourses in the direct vicinity of the site which are the Eaglehill Stream and the Brownstown Stream as shown in Figure 7.1. The Eaglehill Stream runs from east to west approximately 250 metres from the proposed excavation area. The Brownstown Stream runs in a southern direction until it confluences with the Eaglehill Stream approximately 1.1km downstream of the south-west corner of the development application area.

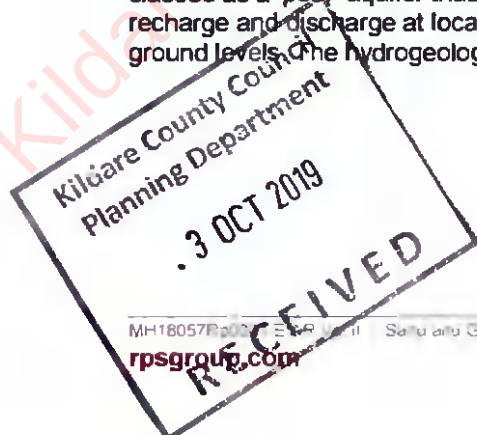
According to the EPA database, the Eaglehill Stream and the Brownstown Stream both discharge to the Kildoon River (part of the Tully River Network – IE_SE_14K270950). The EPA mapping locates the Tully River within the River Barrow catchment (Barrow_SC_060). The flow direction of this Eaglehill River from the site is generally to the west where the Kildoon River and subsequently the Tully River discharges to the River Barrow approximately 6.5km upstream of Athy.

The Eaglehill Stream and the Brownstown Stream are not designated as a European site; however, the Kildoon River downstream is designated within the River Barrow and River Nore SAC.

The Tully River Network is known as the Water Framework Directive (WFD) Barrow[river]_SC_060 sub-catchment (refer Figure 7.2) and forms part of the wider EPA Hydrometric Area no. 14 (HA014). A review of OSI Historic maps between 1837 and 1913 show that the river and stream courses have not changed significantly in the interim.

The Kilsaran landholding contains a series of drainage ditches located immediately west of the application area as shown in Figure 7.3. Such drainage ditches are typical of agricultural land use. These ditches are considered to potentially discharge (either hydrological or hydrogeological connection) to the surface water network in the area. In this regard, there is a direct connectivity between these drainage ditches and the Eaglehill Stream.

The site is underlain by sand and gravel and the features on site indicate that the majority of the surface water run-off discharged to drains, particularly within the project application area, infiltrate to the ground at the basin areas. The site is located within the New Ross Groundwater Body (Hydrometric Area 14) which spans across the counties of Kildare, Carlow, Wicklow, Kilkenny and Wexford. This groundwater body is classed as a 'poor' aquifer thus it does not imply a regional flow system for its large area. This aquifer will recharge and discharge at local level and the groundwater flow is influenced by topography and mirrors the ground levels. The hydrogeology for the site is discussed in further detail in Chapter 6 of this report.





Legend

- WFD-RIVER WATER BODIES
- River Flow Direction

Boundaries

- Landownership
- Planning Application
- Limit of Excavation Area

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Kilsaran build

Client
Kilsaran Racefield

Title
Figure 7.1:
Surface Water Environment

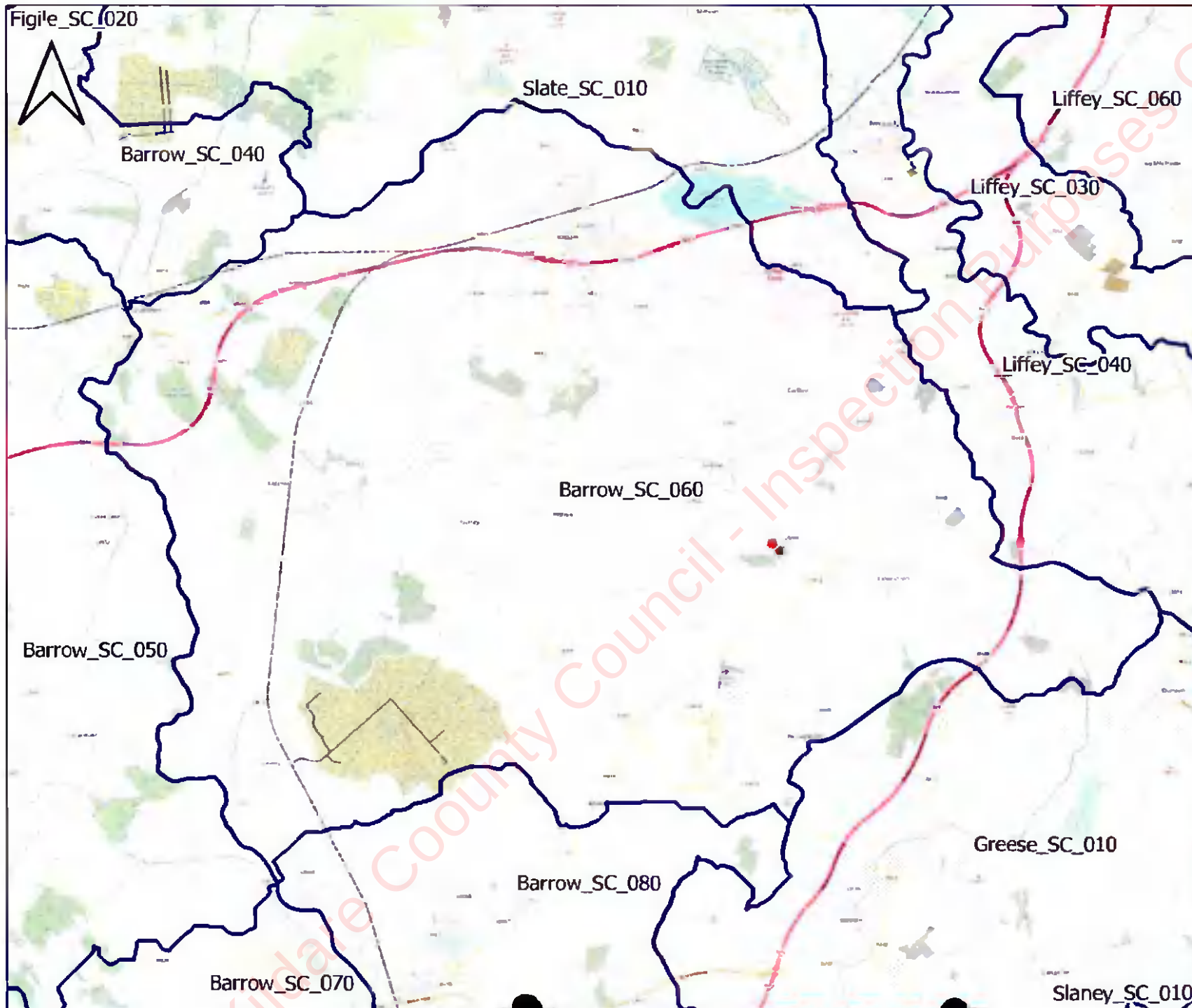
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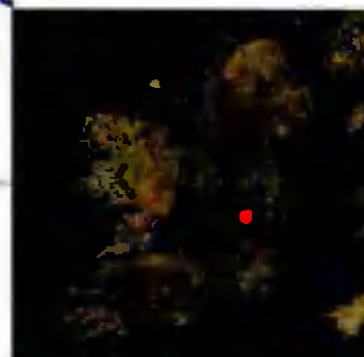
WFD Subcatchments

Site Location

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Kilsaran
build

Page 1

Kilsaran Racefield

Title

Figure 7.2:
WFD Subcatchment

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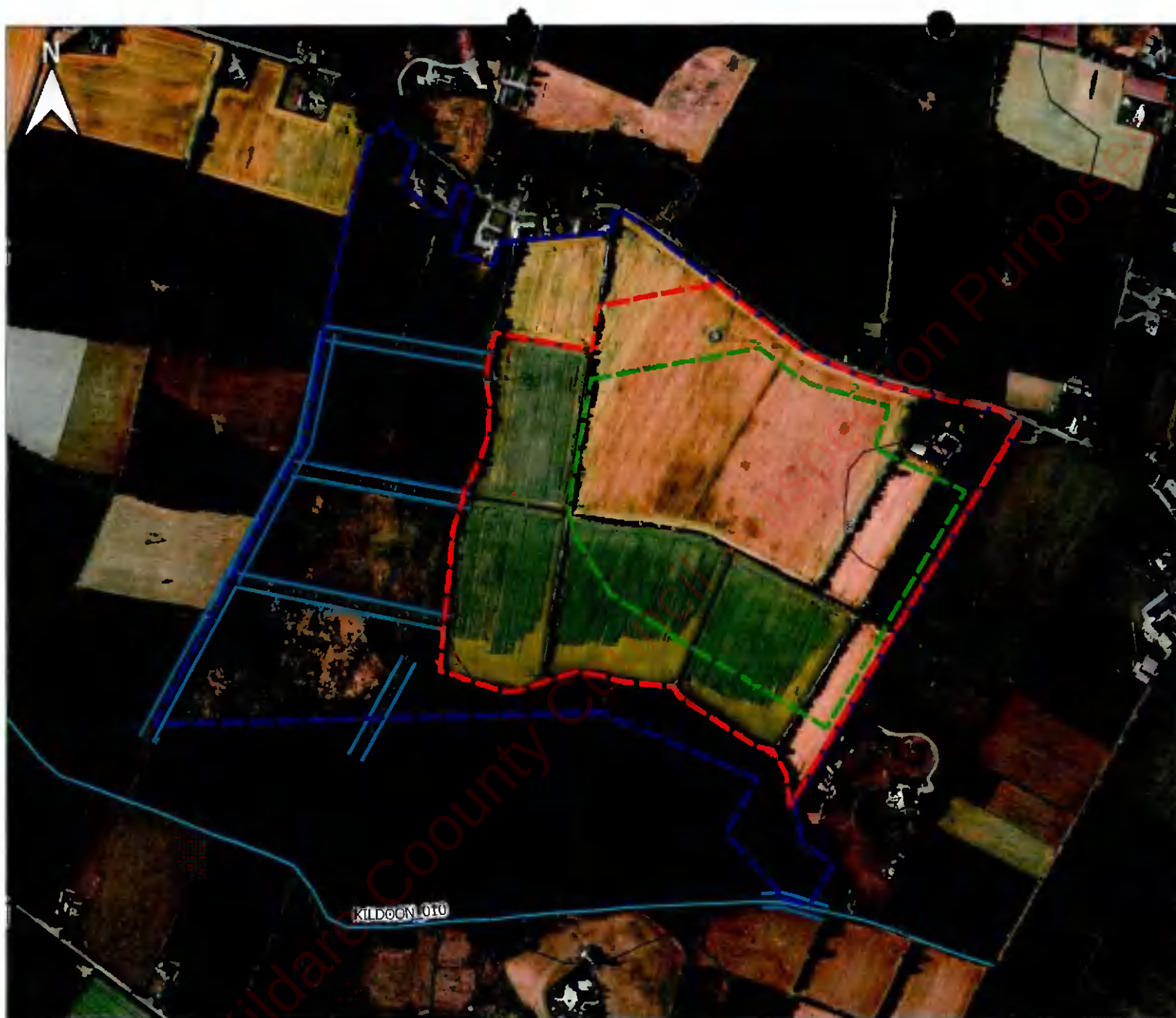
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Legend

- WFD RIVER
- Wet Drainage Ditch
- 10m Contour Lines
- Boundaries
- Landownership Boundary
- Planning Application Boundary
- Limit of Excavation Area

Kilsaran
build

Kilsaran Racefield

Title

Figure 7.3:
Local Drainage

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7.3.3 River Catchment Parameters

The catchment characteristics for the Eaglehill Stream and the Brownstown Stream at the confluence are listed in Table 7.5 and Table 7.6 respectively.

Table 7.5: Eaglehill Stream Catchment Characteristics

Catchment Characteristics	Units	Value
Catchment Area	km ²	1.416
Baseflow Index (Soil)	-	0.685
Average Annual Rainfall	mm	835.75
Drainage Density	km/km ²	1.679
Catchment Slope	m/km	3.6763
Percent Urban Area	%	0

Table 7.6: Brownstown Stream Catchment Characteristics

Catchment Characteristics	Units	Value
Catchment Area	km ²	33.224
Baseflow Index (Soil)	-	0.695
Average Annual Rainfall	mm	832.620
Drainage Density	km/km ²	0.356
Catchment Slope	m/km	4.195
Percent Urban Area	%	11.890

7.3.4 Flood Risk Review

The OPW flood mapping website shows the site does not reside within river or coastal flood zones. Similarly, the site does not reside in any rainfall (pluvial) flood zones. The recorded and predicted flood risk at the site as per the OPW flood risk mapping tool are available on the flood info website (<http://www.floodinfo.ie/map/floodmaps/>) as shown in Figure 7.4)

The flood mapping website also contains records of historical flooding incidents in the surrounding area. The nearest location subject to previous flooding is approximately 750 metres east of the site occurring within a localised hollow on the country lane (L6090). This location was subject to flooding after heavy rainfall on an annual basis. The records noted that the Kildare County Council carried out remedial works on the road and the flooding problem appears to have been resolved.

The Eaglehill Stream, which runs along the southern boundary of the landowners site, overflows its banks in localised hollow after heavy rainfall approximately 1.0 km south-east of the site, hence contributing to previous flooding on an annual basis.

The Kildoon Stream overflows its banks immediately upstream of the N78 crossing after heavy rainfall approximately 1.1 km downstream of the site to the west. This has contributed to previous flooding on an annual basis. Remedial works were carried out and the recurring flooding may be resolved. However, the Kildoon Stream is not hydrologically linked to the site of the proposed development.

The Brownstown Stream, which confluences with the Eaglehill Stream 1.1km from the site boundary, overflows its banks after heavy rainfall contributing to flooding on the country lane (L70721) and also adjacent properties approximately 1.35 km north (upstream) of the site. The stream is maintained by the local authority on an annual basis.

There are currently no OPW flow gauges present for the adjacent streams in the immediate vicinity of the site. The nearest OPW flow gauge is located on the Tully River/River Bohanbaun at Boghall Bridge located approximately 8.5km downstream of the site.

The review of all available data concluded that site is an appropriate development within this area, and there are no current flooding or surface water management issues related to the site.

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OPW National Flood Hazard Mapping**Summary Local Area Report**

This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Kildare

NGR: N 772 049

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.

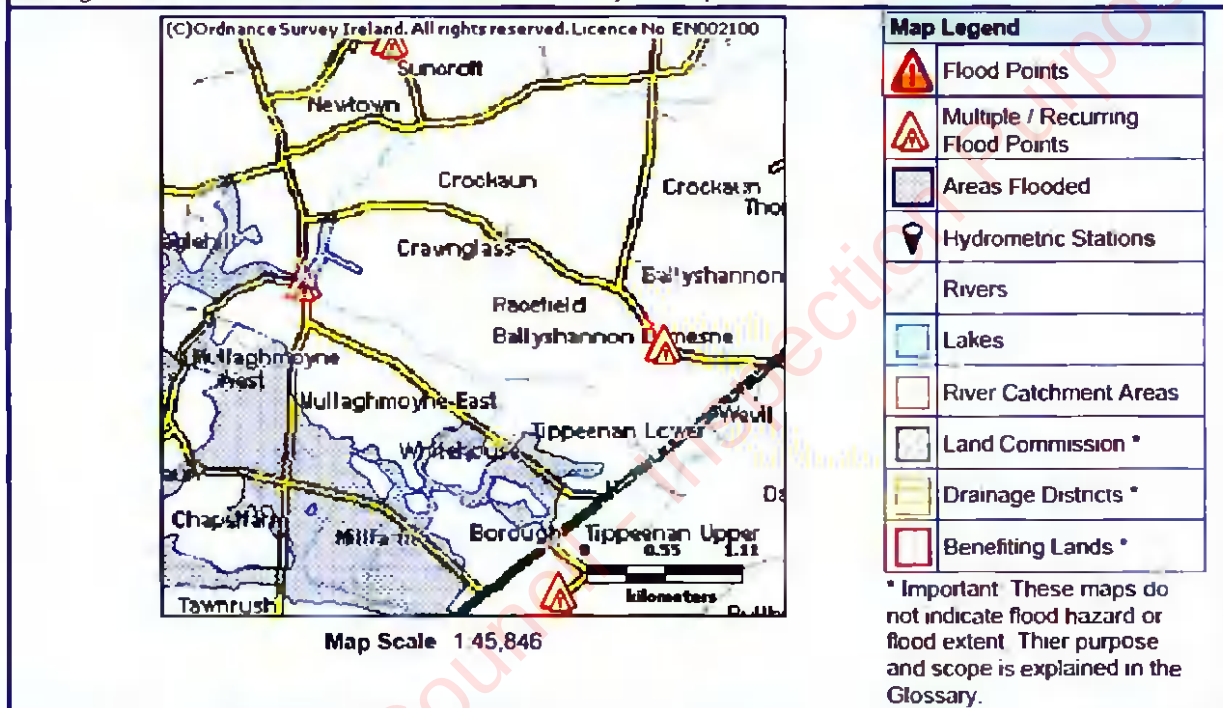


Figure 7.4: Flood Risk Map

7.3.5 Surface Water Quality

7.3.5.1 Regional

The WFD requires 'Good Water Status' for all European waters by 2015 or at the latest by 2027, to be achieved through a system of river basin management planning and extensive monitoring. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. The overall objective of the river basin management plans is to restore the status to 'Good' by 2021.

The WFD status 2010 to 2015 for the Tully River approximately 3.5km west of the site (IEEA_08W0103000) is 'Good'.

The biological quality of the Tully River is assessed by the EPA at Cloney Bridge monitoring station (RS14T020600), located approximately 15km west (down gradient) of the site and at Bert Bridge monitoring station (RS14B011500) located approximately 21km south-west of the site (down gradient).

Q-Values are used by the EPA to express biological water quality, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. The higher the pollution level in a watercourse, the lower the Q-value as summarised in Table 7.7. The EPA Q values for the Tully River

REPORT

between 2009 and 2017 are displayed in Table 7.8 and the results indicate predominantly moderate to good status within this surface waterbody.

Table 7.7: EPA Biological Q – Value Ratings

Quality Ratings (Q)	Status	Water Quality
Q5, Q4-5	High	Unpolluted
Q4	Good	Unpolluted
Q3-4	Moderate	Slightly polluted
Q3, Q2-3	Poor	Moderately polluted
Q2, Q1-2, Q1	Bad	Seriously polluted

Table 7.8: EPA Q Values for Tully River

Station Code	2009	2011	2014	2017
Cloney Bridge monitoring station (RS14T020600)	3-4	4	4	3-4
Bert Bridge monitoring station (RS14B011500)	3-4	3-4	4	4

7.3.6 Areas of Conservation

The NPWS database lists no areas of conservation in the immediate surroundings (<1km) from the project application area. The sites designated for nature conservation to a 20km radius from the project application area location are as follows:

- Blackstairs Mountains SAC
- River Barrow and River Nore SAC
- Barrow River Estuary pNHA
- Ballykelly Marsh pNHA
- Blackstairs Mountains pNHA
- Oaklands Wood pNHA
- Ballymoon Esker pNHA
- Pollmounty River Valley pNHA
- Clohastia pNHA
- Corballis Hill pNHA
- Derryvullagh Island pNHA
- Ballycore Rath pNHA
- Lowtown Fen pNHA



Further details on the above designated sites and their respective distance from the site are presented in Chapter 5 Biodiversity.

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7.3.7 Other Projects and Facilities

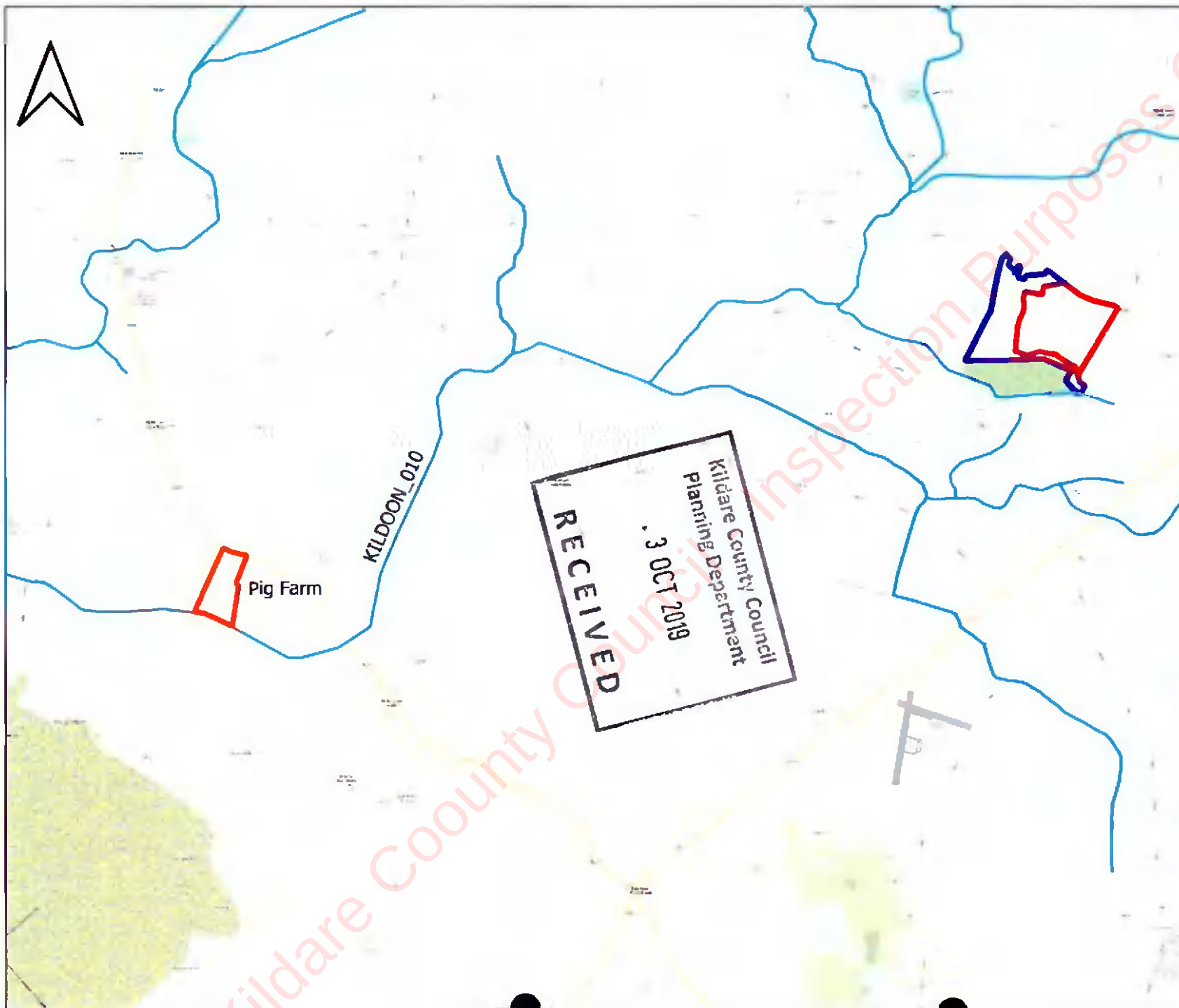
There are currently no EPA licensed facilities present in the immediate vicinity of the site. The nearest EPA licensed facility, which is a pig farm, is located adjacent to the Tully River/River Bonanbaun and the R415 south of Nurney approximately 8.0km downstream of the site as shown in Figure 7.5.

There are no licensed waste facilities in the vicinity of the project site. The nearest licensed waste facilities are the Bord Na Mona Composting and Anaerobic Digestion Facility (W0198-01) located in Kilberry 12km to the south-west from the site; the Silliot Hill Landfill (W0014-01) located to the north of Killcullen 10km to the north-east from the site.

The immediate area surrounding the project site is not highly populated. The local area surrounding the site primarily consists of a mix of agricultural and undeveloped lands and one-off residential properties.

The northern perimeter of the site is bounded by the local road L-8006. The eastern, southern and western perimeter of the site is bounded by lands in active agricultural use. There are one-off residential properties located adjacent to the north-west corner and the south-east corner of the project site.

There are a number of one-off residential and agricultural properties in the local area that share the same access road as the site.



Legend

- EPA facility
- WFD RIVER
- Boundaries**
- Landownership
- Planning Application



Client **Kilsaran build**

Project **Kilsaran Recycled**

Title **Figure 7.5:
EPA Licensed Facilities
in the Area**

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West Pier Business Campus
Dun Laoghaire
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7.4 Impact Assessment

7.4.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. Existing pressures on the aquatic environment from agriculture, forestry, etc. will remain in place. The water quality levels identified in the baseline assessment would remain largely unaltered from that presented in this EIAR other than natural variation anticipated in Irish water courses.

7.4.2 Mitigation Inherent in the Project Design

This assessment outlined the design features that are inherent in the project design to effectively mitigate potential impacts to the environment. Following the description of this inherent design, an impact analysis is undertaken to determine the need for any additional mitigation requirements.

7.4.2.1 Materials Processing

The sand and gravel extraction will consist of dry and wet working with a long reach excavator used to extract material. The extracted material will be processed using mobile plant which will be located within the pit void and processing will be undertaken periodically, depending on the nature of the material encountered. The aggregate processing plant chosen for this proposed development will involve washing to produce wet aggregates to remove fine particles in order to reduce dust generation. The washing process will be undertaken using recycled water from closed circuit silt disposal lagoons.

The closed circuit silt disposal lagoons will consist of three settlement ponds proposed at the south-east corner of the project application area as indicated in Figure 3.3. The surface water run-off from the project application area is to be intercepted and drained via surface water channels to the lagoons.

The primary purpose of the silt lagoons is to remove suspended solids derived from the washing process and will operate as a closed system, which allows for the re-cycling of water for use back in the processing plant. The lagoons will be constructed from overburden material from the stripping phase. The lagoons will be rectangular in shape with parallel sides in the directions of flow. The floor and sides of the lagoon will be as smooth as practicable to minimise turbulent flow. The base of the silt lagoons will be raised off the pit floor and will be sealed with impermeable clay material sourced from within the site. Similarly, the side walls of the silt disposal lagoons will be constructed from silty/clay material, which will be sourced from within the site and will in effect seal the lagoons.

The closed circuit lagoons are sized accordingly to the key criteria outlined below:

- The proposed washing plant uses water at a rate of circa **136m³** per hour. This water is initially sourced from a groundwater sump which is excavated at the project outset within the pit.
- Over a typical 10 hour working day with the plant at an operating capacity of 85% (i.e. 8.5 hours per day), this washing plant will generate circa **1,156m³** of wash water per day. This water is discharged through a pipe directly to the first of the three silt disposal lagoons operated in series.
- With a target hydraulic retention time of 11 hours for settlement of medium silt residue, the three lagoons need to have a capacity of circa **1,496m³** or approximately **500m³** for each of the lagoons. Lagoons will be designed to ensure a minimum of 1m in depth to maximise settlement capacity.
- Settled water from the third lagoon (clear water lagoon) is pumped directly to the washing plant to meet the ongoing water demand for that plant.
- This cycle operates at a water deficit with water lost by evapotranspiration and on the surface of the washed stone product. There is an ongoing requirement to top up the cycle with circa 5% (circa **6.8m³** every hour) and this is sourced from the sump.

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- **There is strictly no discharge from the lagoons to the environment.** The purpose of the lagoons is to allow settlement and to maintain as much working water as possible within the balance.

The lagoons will be cleaned on a periodic basis, with the settled silt used as a restoration material within the site.

7.4.2.2 Storm Water Management at the Pit

A series of surface water channels will be contoured around the edge of the pit to direct flow towards the lagoons and to mitigate the potential for any sediment laden storm water from the site operations to discharge uncontrolled into the receiving environment.

The surface water channels will not be lined to facilitate infiltration to the ground is expected. The surface water channels and closed circuit lagoons will be maintained through the operational period. As the ground is lowered it will be sloped towards the surface water channels. This also allows surface water and groundwater discharge to be conveyed to the closed circuit lagoons.

The open channel proposed for the pit will consist of a trapezoid shape and sized to convey the peak surface water run-off rate for the 5 year return period and groundwater discharge during the backfilling operations. The sizing for the proposed channel was designed based on a longitudinal slope (fall) of 1 in 500. The proposed dimensions for the open channel are indicated in Figure 7.6.

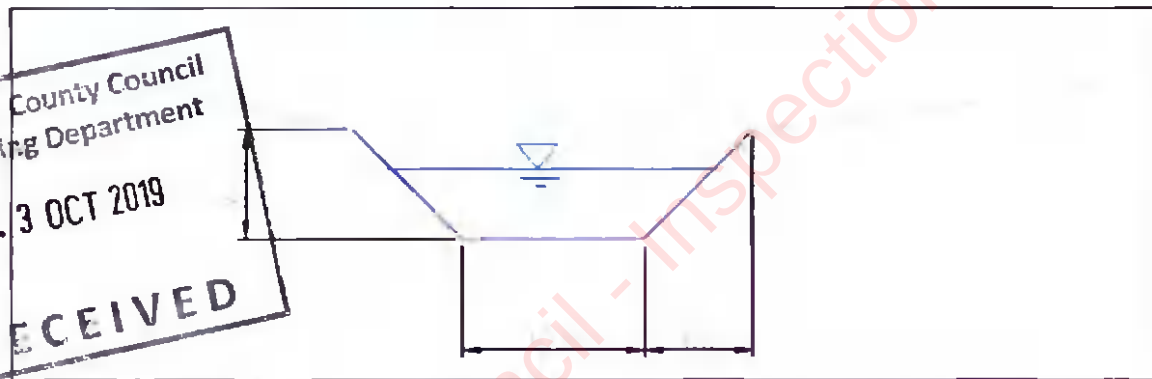


Figure 7.6: Open Channel Dimensions

7.4.2.3 Storm Water Management at the Overburden Stockpiles

As noted, there are a series of drainage ditches at the western perimeter of the application area that are connected to the surface water network. The storage of overburden at the western section of the pit void has the potential for uncontrolled storm water to erode the stockpiles and impact on these springs through sedimentation. This is a greater risk in the early months of the works where exposed soil is to be left before seeding or planting can be fully established.

In order to mitigate this potential impact, the following sediment control measures have been incorporated into the project:

- Scheduling activities to minimise the area and period of time that soil would be exposed, particularly during wetter periods;
- Use of sediment barriers such as silt fences and/or silt curtains (used and positioned in appropriate locations);
- Leave buffer strips of vegetation 5–10m wide between the stockpiles and the ditches to act as sediment filters.

It is proposed to install three separate silt curtains within each of the drainage ditches at the site to mitigate the potential for sedimentation impact from the overburden stockpiles to the springs to the west of the site.

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These silt curtains will provide an effective barrier between the stockpiles and the water courses for the duration of works. The silt curtains will be inspected as part of routine maintenance to ensure the efficiency in the operation is maintained.

After circa 12 months the stockpiles will revegetate after which the risk of sedimentation subsides. An ongoing review of the risk of sedimentation will be carried out to determine the need for additional silt curtains, the extent of vegetation and the requirements for any supplementary measures.

7.4.2.4 Other Site Facilities

The proposed site facilities consist of prefabricated welfare/canteen facility, bunded and covered fuel tanks, weighbridge, wheelwash, packaged wastewater treatment plant and perimeter screening berms. Thus, the proposed establishment will include hardstanding areas, site compound area and internal access road for the proposed operations.

A self-contained wheelwash facility will be provided at close proximity to the site entrance and this will be used during the lifetime of the proposed operation. All Kilsaran aggregates haulage vehicles leaving the site will be required to exit through the wheelwash to reduce the potential for dust and mud being carried to the public roads. All water for the wheelwash will be sourced from the on-site groundwater sump within the pit void.

The surface water run-off from the site entrance and associated hardstand is to be drained via a closed pipe system to a hydrocarbon interceptor for treatment prior to discharge to a soakaway to allow for infiltration to ground. The soakaway will consist of a pit filled with angular gravel and sized to store run-off for up to 1 in 50 year return period taking into account 20% for climate change.

The Frequency Duration Depth (FDD) table supplied by Met Eireann for the site location was used to predict surface water run-off for the hardstanding areas within the site compound during storm events. The design return period has been taken at 1 in 50 years for the soakaway.

The infiltration rate applied was attributed for the site compound based on the results of the infiltration tests undertaken on site and also the resulting run-off calculated for different duration storms. The peak total run-off volume occurs after 6 hours, although run-off rates are greater for smaller duration events. The maximum total run-off for the site has been estimated to be 42m³ for a 6 hour event. Thus, the soakaway will be sized to provide 42m³ storage for surface water run-off.

Sanitary effluent water will be generated from the canteen, toilet and wash facilities within the site compound for the 5-10 persons employed on the site. All effluent will be collected in a sealed underground pipe network and discharged to a packaged treatment plant with treated effluent percolated to ground through a polishing filter.

A site suitability assessment has been carried out on the site in June 2019 in accordance with EPA Code of Practice for Wastewater Treatment and Disposal Systems Serving Single dwellings (October 2009). The assessment considered the suitability of the site for a development with three workers full time on site and up to five drivers periodically on site using the canteen and welfare facilities (worst case maximum of 10 workers full time).

The report recommends that, based on this PE and the site conditions, the installation of a packaged aeration system and to polish the effluent through a soil polishing filter using a pressurised effluent distribution system.

As the watertable is in excess of 2mbgl the base of the distribution gravel can be at 500mm bgl. A layer of 200mm washed gravel is placed on the surface of the prepared area. Distribution system (32mm diameter) is placed on this and covered with 100mm gravel. This is covered with geotextile and finished with 200mm soil. Based on a PE of 3 and hydraulic load of 400 litres, the T-value is in excess of 50 so the maximum loading rate is 3 litres/m². There is therefore a requirement for 150m² soil polishing filter.

The design specification (Oakstown BAF 6 PE wastewater treatment system) for the proposed treatment system is included in **Appendix 3.2 in Volume III** of this EIAR. The Oakstown BAF 6 PE is designed to provide proven, cost effective primary and secondary wastewater treatment in robust steel reinforced

concrete tanks. The primary sedimentation chamber has a 2.2m³ capacity to allow anaerobic digestion to occur naturally while letting sludge settle on the tank floor. Once primary treatment has taken place the effluent is further degraded in the aeration chamber where oxygen enriched wastewater provides ideal conditions for aerobic bacteria to thrive. Before pumping to the percolation area, the clear water is left to further settle in the clarifier chamber to eliminate any remaining settleable solids.

The proposed treatment system for the canteen will be connected via a gravity system consisting of a 150mm diameter uPVC pipe laid underground at maximum gradients of 1 in 100 from the canteen.

7.4.3 Overview of Hydrological Impacts

7.4.3.1 Direct Impacts during Construction and Operation

Surface water generated in the application area during the construction/operation phase as a result of rainfall will either evaporate or infiltrate naturally to the ground. Fine sediment could also infiltrate with surface water runoff into bedrock. The removal of soil and subsoil cover over the proposed new sand and gravel extraction areas could increase the fine sediment concentration in surface water run-off on the pit floor.

Without mitigation, the probability of fine sediment in surface water run-off impacting on the local hydrology is 'low'. There is no direct hydrological connection for surface water run-off from the project application area to nearby watercourses but there is potential for a hydrogeological connection – refer Chapter 6. The magnitude of such a hydrological impact would be 'small-adverse'. Therefore, the overall risk to surface waters from direct sedimentation through hydrology without mitigation is 'imperceptible'.

There is a potential impact on the surface water run-off from refuelling and maintenance activities on site. Any potential contaminants will pass through the surface water run-off discharging to the closed circuit lagoons or the proposed soakaway. Without mitigation, the potential impact of spillage of fuels, lubricants and other potentially contaminative liquids (contaminated runoff) on the local hydrology is 'low' as there is no direct hydrological connection to the nearby watercourses. The magnitude of such an impact would be 'moderate-adverse'. Therefore, the overall risk to surface water run-off, without mitigation, is 'slight'.

During the operation stage of the proposed new sand and gravel extraction development, there is a risk of pollution of process waters and surface water run-off from the following potential sources:

- Accidental spillage of fuels and lubricants by operating plant and trucks during operation;
- Increase in suspended solids and potential for contaminated runoff entering the closed circuit lagoons during operation.

Without mitigation, the potential impact of spillage of fuels, lubricants and other potentially contaminative liquids (contaminated runoff) on the local hydrology is 'low' as there is no direct hydrological connection to the nearby watercourses. The magnitude of such an impact would be 'moderate-adverse'. Therefore, the overall risk to surface water run-off, without mitigation, is 'slight'.

Surface water may accumulate and overflow the closed circuit lagoons and proposed soakaway at the site compound during extreme rainfall events. Without mitigation, the potential impact of localised flooding within the project application area on the human environment is 'medium'. The magnitude of such an impact would be 'small-adverse'. Therefore, the overall risk to surface water run-off, without mitigation, is 'slight'.

Wastewater will be produced at the site from the site toilet and washroom facilities. Without mitigation, the probability of waste water impacting on groundwater and surface water quality is medium during the operational stage. The magnitude of such an impact would be 'moderate-adverse'. Therefore, the overall risk to water quality without mitigation is 'moderate'.

The proposed activities will involve wet working which is sand and gravel extraction below the watertable. The groundwater exfiltration will be effectively filtered by the surrounding gravel beds (refer Chapter 6) before any connection to the surrounding surface water network. The magnitude of such an impact would be negligible. Therefore, the overall risk to water quality without mitigation is 'imperceptible'.

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7.4.3.2 Direct Impacts during Restoration

The final restoration for the project application area will consist of remediation works to convert the pit void to facilitate an ecological resource. The proposed plant, site facilities and associated infrastructure is to be decommissioned and removed from site following the cessation of the sand and gravel extraction activities.

During the post-operational stage, surface water runoff may accumulate on the base of the void during times of heavy rainfall and will either evaporate or infiltrate naturally to the ground.

Without mitigation, the probability of surface water discharge from the proposed development causing deterioration in groundwater and surface water quality is low. The magnitude of such an impact would be 'negligible'. Therefore, the overall risk to groundwater is 'imperceptible'.

It is highly unlikely that any unplanned events within the application site would result in a noticeable impact on the hydrology. Accidents could result in the spillage of fuel, which has been considered in the assessment above.

7.4.3.3 Indirect Impacts

There is no direct hydrological link to adjacent watercourses from the project application area, hence there is no significant indirect impact from the proposed sand and extraction activities on the local hydrology during the construction, operational and post-operational stages.

7.5 Mitigation Measures

7.5.1 Construction and Operation Phases

Proposed mitigation measures required to reduce the potential impacts associated with the proposed works to acceptable levels with a low risk to the receiving environment, are identified in this section. These measures are designed to either reduce the likelihood of an event occurring or reduce the magnitude of the consequences if the event does occur.

The following proposed measures will be implemented during these phases.

- The use of a closed circuit series of lagoons to contain and treat process water from the aggregate washing plant.
- A proprietary waste water package treatment plant will be installed at the site with soil polishing filter for discharge to the ground.
- The only chemicals to be stored on site for the proposed extraction that will have the potential to cause water pollution are lubricating oils, hydraulic oils and diesel fuel. All of these chemicals will continue to be stored in the following manner:
 - Suitably certified tanks within areas bunded to a capacity of 110% of the tank.
 - Where two tanks are bunded, bund capacity will be 120% of the largest tank.
 - No pipe work will go through the bund at any point to reduce the risk of leakage.
 - Surface water from bunds will be pumped out through a suitable oil interceptor.
- A wheelwash facility will be utilised throughout the life of the operation, with due maintenance and upgrading as required. This will eliminate the transportation of mud and dust from the development onto the public road. In the unlikely event that a spillage occurs, the applicant will ensure that spilled material is removed from the road surface in a safe and timely manner, as soon as they notice or are notified that a spillage has arisen.

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- High absorbency mats and pig tails are available on site to be used in the event of a hydrocarbon spill.
- Use of a series of suitably sized and located silt curtains within the ditches along the western perimeter of the overburden stockpiles along the western perimeter of the site to protect the drainage ditches in the area.

Taken together, these measures reduce the potential impact of:

- Spillage of fuels and lubricants from 'slight' to 'imperceptible';
- Potential flooding within site compound from 'slight' to 'imperceptible';
- Waste water impact on groundwater quality from 'moderate' to 'imperceptible'.

7.5.2 Restoration Phase

The site facilities and the associated plant and machinery for sand and gravel extraction are to be decommissioned and removed from the project application area following the cessation of the proposed activities.

7.6 Residual Impact

Examination of the identified potential impacts on the receiving environment provided appropriate mitigation measures are put in place, there are no significant residual impacts with respect to surface water during the construction and operation phases. It is therefore considered that with the implementation of the mitigation measures outlined in this EIAR, the proposed sand and gravel extraction activities will not cause any significant impact on surface water.

There are no significant residual impacts with respect to surface water during the restoration phase.

7.7 Monitoring

The following monitoring activities are recommended to demonstrate that the development will not have an adverse impact on the surrounding environment.

- Regular inspection of the silt curtains at the overburden stockpile;
- Regular Inspections of the package treatment plant & petrol/oil interceptor; and
- Regular inspections of the silt lagoons and storm water channels.

Periodic surface water monitoring will be undertaken in the Eaglehill Stream for a standard suite of parameters to track the water quality within the stream and to verify that the proposed sediment and pollution control measures are adequate.

7.8 References

Kildare County Development Plan 2017-2023.

NRA (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, National Roads Authority.



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8 AIR QUALITY AND CLIMATE

8.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the Air Quality and Climate impacts associated with the proposed sand and gravel extraction facility at Racefield, Ballyshannon, Co. Kildare. This section should be read in conjunction with the site layout plans for the site and project description in **Chapter 3** of this EIAR. Impacts to air quality, such as from the generation of dust and road traffic, will arise during both the site construction and operational (extraction) phases of the proposed development. The proposed development has been examined to identify those that have the potential for air emissions. Where applicable, a series of suitable mitigation measures have been listed.

8.2 Assessment Methodology

8.2.1 Baseline Air Quality

As the site is located within Air Quality Zone D (Rural Ireland: Remainder of the State excluding Zones A, B and C.), baseline air quality has been determined from the data available from the EPA monitoring results for the Zone D network. This data will be used to determine (if air quality projections) will be in line / be compliant with relevant ambient air legislation.

8.2.2 Dust Emissions

Dust dispersion has the potential to cause local impacts through dust nuisance to the nearest sensitive receptors and also sensitive ecosystems. The potential for dust generation associated with the proposed excavation will be assessed on the basis of a review of the proposed methodologies and the proximity of these activities to sensitive receptors.

The operations associated with the proposed development such as the topsoil and overburden stripping, material excavation and material processing may produce quantities of dust, particularly in dry weather conditions. The extent and nature of potential dust arisings is dependent on the nature of materials (soils, gravel, sands, silts etc.) and the nature of the operations. Additionally, the potential for dust dispersion and deposition is dependent on meteorological factors such as rainfall and wind direction and speed.

The potential for dust emissions from the proposed development is addressed qualitatively in accordance with the NRA Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (Rev. 1) (NRA 2011; referred to hereafter as the TII Guidelines).

8.2.3 Road Traffic Emissions

Emissions from construction vehicles are assessed, in accordance with the TII Guidelines where traffic results in a significant (>10%) increase in AADT (annual average daily traffic) flows near sensitive receptors.

The traffic volumes associated with the proposed development are predicted to exceed 10% of the current AADT on L-8006/L-8007 (refer **Chapter 10**). It is predicted that there will be a circa 15.2% increase in AADT as result of the additional vehicles using the road for the duration of the proposed development. As such, the predicted impacts of traffic at this stage of the development on local air quality are assessed using a predictive screening model.

A prediction of the local impact of traffic-derived pollution during the extraction phase was carried out using the local assessment model in the Design Manual for Road and Bridges (DMRB), Volume 11, Section 3, Part 1 as per the TII guidelines for assessment of impacts to air from road transport. Traffic data was provided in the form of Annual Average Daily Traffic (AADT) for baseline and a theoretical operational year with the site operating at full capacity.

8.2.4 Climate

Existing climate data for the study area have been derived from the Met Éireann 30-year averages (1981 – 2010).

The climate assessment was carried out to identify sources and quantify total GHG emissions generated from the operational activities associated with the proposed development. This assessment was carried out using the carbon calculator for construction activities developed by the Environment Agency (EA) in the UK. The carbon calculator calculates the embodied carbon dioxide (CO₂) of materials plus CO₂ associated with their transportation. It also considers personal travel, site energy use and waste management.

In addition to GHG generation as described above, the adaptability of the proposed development to climate change has also been assessed. In particular, the potential impact of flooding in the area has been addressed through consultation with the CFRAM mapping for the area and interaction with the drainage specialist on the project. These details are presented in **Chapter 7** of this EIAR.

8.2.5 Air Quality Assessment Criteria

8.2.5.1 Dust

During the operational (extraction) phase, dust is considered the principal risk of pollution to the atmosphere as noted by the main guidance on these operations as follows:

- Quarries and Ancillary Activities, Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government (DoEHLG), (2004); and
- Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006)

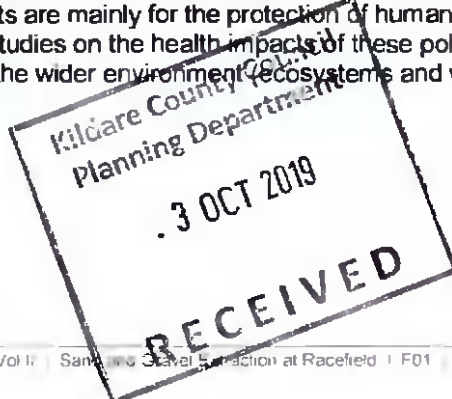
According to these guidelines, extraction activities by their nature, generate dust, with the main impact being dis-amenity due to dust deposition. However, there is no Irish or European Union or Commission guideline or legislative limits for total suspended particles.

Therefore, the limits provided by the German Government under the TA Luft guidance *Technical Instructions on Air Quality Control* (TA Luft, 2002) are employed. Under this guidance, operations are required to maintain monthly dust levels below the guideline of 350mg/m³/day as an annual average at sensitive receptors using the Bergerhoff Method. Below this threshold, the potential for dust nuisance to impact people in the nearest residential, commercial or other structures will be minimised. This is the standard guideline employed in Ireland by both the EPA and the TII.

8.2.5.2 Combustion Gases/Particulates (Traffic)

In May 2008, the European Commission introduced a revised Directive on ambient air quality and cleaner air for Europe (2008/50/EC), which has been transposed into Irish Legislation through the revised Air Quality Standards Regulations (S.I. 180 of 2011).

The Directive and Regulations specify limit values in ambient air for sulphur dioxide (SO₂), lead, benzene, particulate matter (PM₁₀ and PM_{2.5}), carbon monoxide (CO), nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x). These limits are mainly for the protection of human health and are largely based on review of epidemiological studies on the health impacts of these pollutants. In addition, there are limits that apply to the protection of the wider environment (ecosystems and vegetation). These limits are presented in Table 8.1.



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Table 8.1: Limit Values in Ambient Air Quality (Source: S.I. 180 of 2011)

Pollutant	Criteria	Value
Nitrogen Dioxide	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 $\mu\text{g}/\text{m}^3$ NO ₂
	Annual limit for protection of human health	40 $\mu\text{g}/\text{m}^3$ NO ₂
	Annual limit for protection of vegetation	30 $\mu\text{g}/\text{m}^3$ NO + NO ₂
Benzene	Annual limit for protection of human health	5 $\mu\text{g}/\text{m}^3$
Carbon Monoxide	Maximum daily 8-hour running mean	10 mg/m^3
Lead	Annual limit for protection of human health	0.5 $\mu\text{g}/\text{m}^3$
Sulphur Dioxide	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350 $\mu\text{g}/\text{m}^3$
	Daily limit for protection of human health - not to be exceeded more than 3 times/year	125 $\mu\text{g}/\text{m}^3$
	Annual limit for protection of vegetation	20 $\mu\text{g}/\text{m}^3$
Particulate Matter PM ₁₀	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 $\mu\text{g}/\text{m}^3$ PM ₁₀
	Annual limit for protection of human health	40 $\mu\text{g}/\text{m}^3$ PM ₁₀
Particulate Matter PM _{2.5}	Annual target value for the protection of human health	25 $\mu\text{g}/\text{m}^3$ PM _{2.5}

The TII Guidelines specify the significance criteria for determining air quality impacts. The predicted increases or decreases from road traffic pollution may be utilised to determine the significance of any impact in relation to the TII criteria as presented in Tables 8.2, 8.3 and 8.4.

Table 8.2: Definition of Impact Magnitude for Changes in Ambient Air Pollutant Concentrations (Source: NRA, 2011)

Magnitude of Change	Annual Mean NO ₂ /PM ₁₀	No. of Days with PM ₁₀ Concentration greater than 50 $\mu\text{g}/\text{m}^3$	Annual Mean PM
Large	Increase/decrease $\geq 4 \mu\text{g}/\text{m}^3$	Increase/decrease > 4 days	Increase/decrease $\geq 2.5 \mu\text{g}/\text{m}^3$
Medium	Increase/decrease 2 - $< 4 \mu\text{g}/\text{m}^3$	Increase/decrease 3 of 4 days	Increase/decrease 1.25 - $< 2.5 \mu\text{g}/\text{m}^3$
Small	Increase/decrease 0.4 - $< 2 \mu\text{g}/\text{m}^3$	Increase/decrease 1 or 2 days	Increase/decrease 0.25 - $< 1.25 \mu\text{g}/\text{m}^3$
Imperceptible	Increase/decrease $< 0.4 \mu\text{g}/\text{m}^3$	Increase/decrease < 1 day	Increase/decrease $< 0.25 \mu\text{g}/\text{m}^3$

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Table 8.3: Air Quality Impact Descriptors for Changes in Annual Mean Nitrogen Dioxide Concentrations at a Receptor (Source: NRA, 2011)

Absolute Concentration in Relation to Objective/Limit Value	Changes in Concentration		
	Small	Medium	Large
Increase with Proposed Project			
Above Objective/Limit Value with development ($\geq 40\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($\geq 25\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with development ($36 < 40\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($22.5 < 25\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with development ($30 < 36\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($18.75 < 22.5\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with development ($< 30\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($< 18.75\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Negligible	Negligible	Slight Adverse
Decreased with Proposed Project			
Above Objective/Limit Value with development ($\geq 40\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($\geq 25\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with development ($36 < 40\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($22.5 < 25\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with development ($30 < 36\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($18.75 < 22.5\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with development ($< 30\mu\text{g}/\text{m}^3$ of NO_2 or PM_{10}) ($< 18.75\mu\text{g}/\text{m}^3$ of $\text{PM}_{2.5}$)	Negligible	Negligible	Slight Beneficial

Table 8.4: Air Quality Impact Descriptors for Changes in Number of Days with PM_{10} Concentrations Greater than $50\mu\text{g}/\text{m}^3$ at a Receptor (Source: NRA, 2011)

Absolute Concentration in Relation to Objective/Limit Value	Changes in Concentration*		
	Small	Medium	Large
Increased with Proposed Project			
Above Objective/Limit Value with development (≥ 35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with development ($32 < 35$ days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with development ($26 < 32$ days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with development (< 26 days)	Negligible	Negligible	Slight Adverse
Decrease with Proposed Project			
Above Objective/Limit Value with development (≥ 35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with development ($32 < 35$ days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with development ($26 < 32$ days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with development (< 26 days)	Negligible	Negligible	Slight Beneficial

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In addition to the statutory limits for the protection of human health listed in Air Quality Standards Regulations (S.I. 180 of 2011), the World Health Organisation (WHO) has published a set of air quality guidelines for the protection of human health. The key publication is the 'WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Dioxide, Global update 2005 Summary of Risk Assessment'. The WHO guidelines are based on reducing the risk to human health and in some cases the levels differ from the EU statutory limits as these limits are based on balancing health risks with technological feasibility, economic considerations and various other political and social factors in the EU.

The 2005 WHO guidelines are presented in **Table 8.5** and illustrate that while the NO₂ levels are analogous to those in S.I. 180 of 2011 (excluding the tolerance levels for the 1-hour averages), the annual average PM₁₀ and PM_{2.5} levels specified by the WHO are half of the limits specified in the legislation. The WHO note that these are the lowest levels at which total, cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to long-term exposure to PM_{2.5}. The EPA has called for movement towards the adoption of these stricter WHO guidelines as the legal standards across Europe and in Ireland.

Table 8.5: WHO 2005 Air Quality Guidelines

Pollutant	Criteria	Value
Nitrogen Dioxide (NO ₂)	Hourly level for protection of human health	200 µg/m ³ NO ₂
	Annual level for protection of human health	40 µg/m ³ NO ₂
Sulphur Dioxide (SO ₂)	10-minute level for protection of human health	500 µg/m ³
	Daily level for protection of human health	20 µg/m ³
Particulate Matter (PM ₁₀)	24-hour level for protection of human health	50 µg/m ³ PM ₁₀
	Annual level for protection of human health	20 µg/m ³ PM ₁₀
Particulate Matter (PM _{2.5})	24-hour level for protection of human health	25 µg/m ³ PM _{2.5}
	Annual level for protection of human health	10 µg/m ³ PM _{2.5}

8.2.6 Climate Assessment Criteria

CO₂ emissions have a global climate warming effect. This is regardless of their rate of release, location or the weather when they are released into the atmosphere. This is unlike pollutants that affect local air quality where the rate of release, location and prevailing weather, as well as the amount of pollutant, determines the local concentrations and the impact. Local ambient concentrations of CO₂ are not relevant and there are no limits or thresholds that can be applied to particular sources of carbon emissions. Any amount of CO₂ released into the atmosphere will contribute to climate warming, the extent of which is determined by the magnitude of the release. Although CO₂ emissions are typically expressed as kilogrammes or tonnes per year, there is a cumulative effect of these emissions because CO₂ emissions have a warming effect which lasts for 100 years or more.

It is difficult to assess the scale and significance of any adverse (increased) changes in CO₂ emissions resulting from the proposed development in a similar way to other impacts within this EIAR. The effect, the term used to describe an environmental response resulting from an impact or series of impacts, is not possible to assess for individual CO₂ emissions. However, commentary and context to the calculated CO₂ emissions reported is provided with reference to historic and projected national emissions in Ireland.

The National Policy Position on Climate Action and Low Carbon Development was published on the 23rd April 2014. The policy sets a fundamental national objective to achieve transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050. The policy states that GHG mitigation and adaptation to the impacts of climate change are to be addressed in parallel national strategies – respectively through a series of National Mitigation Plans and a series of National Climate Change Adaptation Frameworks.

The National Policy Position envisages that development of National Mitigation Plans will be guided by a long-term vision of low carbon transition based on the following:

- An aggregate reduction in carbon dioxide (CO₂) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors, and

- In parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

Further to the National Policy Position, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) was enacted on the 10th of December 2015. The Climate Act sets out the proposed national objective to transition to a low carbon, climate resilient and environmentally sustainable economy by the end of 2050.

On 14th May 2018, the European Council adopted a regulation on greenhouse gas emission reductions, the EU effort Sharing Regulation, which sets out 2030 targets for member states. The starting point is an average of 2016 – 2018 emissions with binding emission reduction targets of 30% compared to 2005 levels.

In 2017, total national emissions of greenhouse gases in Ireland are estimated to be 60.74 million tonnes carbon dioxide equivalent (Mt CO₂eq), which is 0.9% lower (0.53 Mt CO₂eq) than emissions in 2016, and 9.6% higher than 1990 national total. The total for 2017 is 13.9% lower than the peak of 70,555.06 Mt CO₂eq in 2001 when emissions reached a maximum following a period of unprecedented economic growth.

The EPA estimate emissions to 2035 using two scenarios as follows:

- 'With Existing Measures' - scenario assumes that no additional policies and measures, beyond those already in place by the end of 2017 (latest EPA GHG Emissions Projections Report), are implemented; and
- 'With Additional Measures' - scenario assumes implementation of the 'With Existing Measures' scenario in addition to progressing of renewable and energy efficient targets for 2020.

GHG projections by sector under 'With Additional Measures' projects that industrial processes will contribute to 3.9% of Ireland's total GHG emissions in 2020, this is projected to increase to 5.4% in 2030. Emissions in the industrial emissions sector are projected to increase 13% to 2.4 Mt CO₂eq between 2017 and 2020 and by 52% between 2017 and 2030 (3.2 Mt CO₂eq).

8.3 Baseline Scenario

8.3.1 Receiving Environment

The site of the proposed development sand and gravel extraction development and related ancillary site works is located at Racefield, Ballyshannon, County Kildare, approximately 2.5km from Calverstown and circa 7km from Kilcullen.

There are various sensitive receptors (residential, agricultural, and commercial) located in the area and these receptors vary in distance from the proposed development. These receptors may experience a change in air quality and the extent of these changes in air quality is identified in this assessment. The nearest sensitive residential receptors to the proposed development are the residential dwellings located along the site's northern boundary on the L-8006, dwellings located to the east of the site boundary, and those located along/off the L-8009 to the south of the site. A small number of commercial operations are within the proposed developments vicinity. The nearest commercial receptors include various operations along the R418 at the Ballyshannon crossroads.

There are two national schools in the general area including Ballyshannon National School at Ballyshannon Cross (and on the proposed haul route) and Suncroft National School to the north west of the site.

The nearest Natura 2000 site to the proposed development is the River Barrow and River Nore SAC (Site Code 2162), which is located circa 4.0km to the west of the proposed development. This SAC is downstream of the proposed development, via the Eaglehill Stream (order 1), which runs along the site's southern boundary, and the Kildoon stream (order 3). Furthermore, the proposed development is located with the same Catchment Management Unit (CMU) as The River Barrow and River Nore SAC. Other Natura 2000 sites in the area are located over 10km away from the site. The nearest sites of note are listed below:

- Pollardstown Fen SAC (site code 000396) is located circa 11km to the north of the site;

- Mouds Bog SAC (site code 002331) is located circa 13km north of the site.

There are no other habitats or species located within the vicinity of the proposed development that may be adversely impacted by air quality emissions from the proposed development.

8.3.2 Existing Sources in the Area

The main existing sources of pollution in the vicinity of the site are from road traffic from the existing network and general dusts for agriculture and other operations. Seasonal agricultural activities can give rise to localised dust impact both through in field activities and through road haulage.

The road network around the proposed development is predominantly composed of national and local roads including L-8006 and L-8007 to the north, which run along the northern site boundary and connect to R418 at Ballyshannon crossroads to the east, and the L-4007 to the west, and subsequently the M7 and M9 motorways.

The local and regional roads serve HGVs and vehicles entering and leaving the M7 and M9 for the operations in the area including other quarry/gravel sites (including other Kilsaran operations), agriculture, bog lands, businesses (industrial and commercial) and any construction sites in the vicinity.

Waste operations in the area can give rise to odour and dust nuisances to the receptors in the area. There are approximately 16 waste licenses operating in County Kildare. These facilities are located beyond the study area, circa 10km or further from the proposed development. Of these, the following are the facilities closest to the site that are licenced by the EPA:

- W0014-01 Silliot Hill Landfill Brownstown c.10km north east of the site
- W0081-04 Kilcullen Landfill Limited c.10km north east of the site
- W0198-01 (IED) Bord na Móna Plc (Kilberry) c.12km south west of the site

There are approximately 20 industrial licensed facilities located in County Kildare, however, there are no industrial licensed facilities noted within the 3km of the study area.

8.3.3 Baseline Air Quality

Air quality legislation in Ireland deals with air quality by the means of 'zones' based on population. For Ireland, four zones are defined, and the main areas defined in each zone are:

- Zone A: Dublin Conurbation
- Zone B: Cork Conurbation
- Zone C: Other cities and large towns comprising Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Letterkenny, Celbridge, Newbridge, Mullingar, Balbriggan, Greystones, Leixlip and Portlaoise.
- Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

The proposed development is located at Racefield, Kilcullen, Co. Kildare in the jurisdiction of Kildare County Council. As such, the site lies within EPA Air Quality Zone D (Rural Ireland: the remainder of the State excluding Zones A, B and C.).

The EPA air quality monitoring network for Zone D and the nearest EPA National Ambient Air Quality Monitoring locations have been reviewed and suitable representative data is presented to identify the background air quality in the area of the proposed development.

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The EPA monitoring networks in Zone D includes multiple monitoring locations in rural areas across Ireland. Of these, the Emo Court (24km east of the site) monitoring station would be most representative of the site location at Racefield, Co. Kildare. However, this monitoring location does not record all ambient air quality parameters outlined in the Directive on ambient air quality and cleaner air for Europe (2008/50/EC). Therefore, overall air quality in the receiving environment is described using the average annual mean value concentrations from all measured monitoring stations in Zone D.

Table 8.6 shows the aggregated annual mean value concentrations measured for SO₂, PM₁₀, PM_{2.5}, NO₂, NO_x, CO and Ozone in Zone D for 2016 and 2017. The table compares the annual mean measured levels with the limit values defined in the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011). The averages are considered representative of the Rural Ireland and the site of the proposed development.

Table 8.6: Extract of summary data from EPA Ambient Air Monitoring for Zone D in 2016 and 2017

Pollutant	Unit	Annual Mean Concentration in 2016	Annual Mean Concentration in 2017	Annual Limit for Protection of Human Health
Nitrogen Dioxide (NO ₂)	µg/m ³	6.3	4.36	40
Nitrogen Oxide (NO _x)	µg/m ³	9.97	5.7	30
Sulphur Dioxide (SO ₂)	µg/m ³	2.1	1.95	20
Particulate Matter (PM ₁₀)	µg/m ³	11.85	9.93	40
Particulate Matter (PM _{2.5})	µg/m ³	9	7.4	25
Ozone Concentrations	µg/m ³	59.74	62.4	120
Carbon Monoxide (CO)*	mg/m ³	0.6*	N/A**	10

*One site - Enniscorthy, Co. Wexford

**No CO concentrations available for Zone D in EPA Air Quality in Ireland 2017 Report

The existing baseline levels of NO₂, NO_x, SO₂, PM₁₀, PM_{2.5}, and Ozone based on data from the EPA monitoring network are currently below annual ambient air quality limit values (and the WHO Guidelines) in Zone D.

Emo Court is the nearest EPA National Ambient Air Quality Monitoring site to the proposed development. It is located at Emo Court House, Co. Laois, approximately 24km west of the site at Racefield. A summary of the Air Quality monitoring results for this location are presented in the following sections. The parameters monitored at this location are NO₂, NO_x, and Ozone. Benzene is noted as parameter recorded at this location by the EPA Maps tool, however the data for this parameter at this location is not available in the EPA 2016 and 2017 Air Quality in Ireland Reports. The air quality at this monitoring location is noted as 'Good' on the EPA Air Quality Index.

Table 8.7 outlines the annual mean concentrations measured for NO₂, NO_x, and Ozone at Emo Court for 2016 and 2017. The results from this location are considered representative of the air quality of the Rural East area and the site of the proposed development. The table compares the annual mean measured levels for the location with the limit values defined in the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011).

Table 8.7: Annual Mean data from EPA Ambient Air Monitoring Site at Emo Court in 2016 and 2017

Pollutant	Unit	Annual Mean Concentration in 2016	Annual Mean Concentration in 2017	Annual Limit for Protection of Human Health
Nitrogen Dioxide (NO ₂)	µg/m ³	4.1	3.4	40
Nitrogen Oxide (NO _x)	µg/m ³	5.5	4	30
Ozone Concentrations	µg/m ³	49.8	57	120

In summary, existing baseline levels of pollutants based on the data from both the EPA Zone D are currently below ambient air quality limit values and WHO guidelines and by extension the levels in the vicinity of the proposed sand and gravel extraction facility are also considered to be below the limit values.

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8.3.4 Baseline Climate

The weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain. Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

The nearest meteorological station to the area is the Met Éireann Station at Casement Aerodrome which lies approximately 35km north east of the subject site. The 30-year averages from the station at Casement Aerodrome are presented in Table 8.8.

Table 8.8: 30-Year Average Meteorological Data from Casement Aerodrome (Annual Values from 1981-2010, source: (www.met.ie))

Parameter	30-Year Average
Mean Temperature (°C)	9.7
Mean Relative Humidity at 0900UTC (%)	83.6
Mean Daily Sunshine Duration (Hours)	3.7
Mean Annual Total Rainfall	754.2
Mean Wind Speed (knots)	10.7

8.3.4.1 Temperature

At Casement Aerodrome (35km NE) the 30-year record for temperature (Table 8.9) shows that the average daily temperature across a calendar year is 9.7°C with an average maximum of 13.4°C and an average minimum of 6.1°C. Across the calendar year the average number of days with air frost is 37.2.

Table 8.9: 30-Year average data for rainfall at Casement Aerodrome (Annual Values from 1981-2010, source: (www.met.ie))

Temperature (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Daily Max	8.0	8.2	10.2	12.4	15.2	17.9	19.8	19.5	17.1	13.6	10.2	8.3	13.4
Mean Daily Min	2.1	2.0	3.3	4.1	6.6	9.4	11.5	11.3	9.5	7.0	4.2	2.4	6.1
Mean Temperature	5.1	5.1	6.8	8.2	10.9	13.6	15.7	15.4	13.3	10.3	7.2	5.4	9.7
Mean num. of Days with Air Frost	7.5	7.7	4.6	3.4	0.8	0	0	0	0	1.3	4.3	7.6	37.2

8.3.4.2 Wind

The prevailing wind direction for the area is between west and southwest (6-24%) as presented in the wind-rose for Casement Aerodrome Meteorological Station for 1981-2010 in Figure 8.1. Easterly and south-easterly winds tend to be very infrequent (less than 3%) with north and north-easterly winds marginally more frequently (6%).

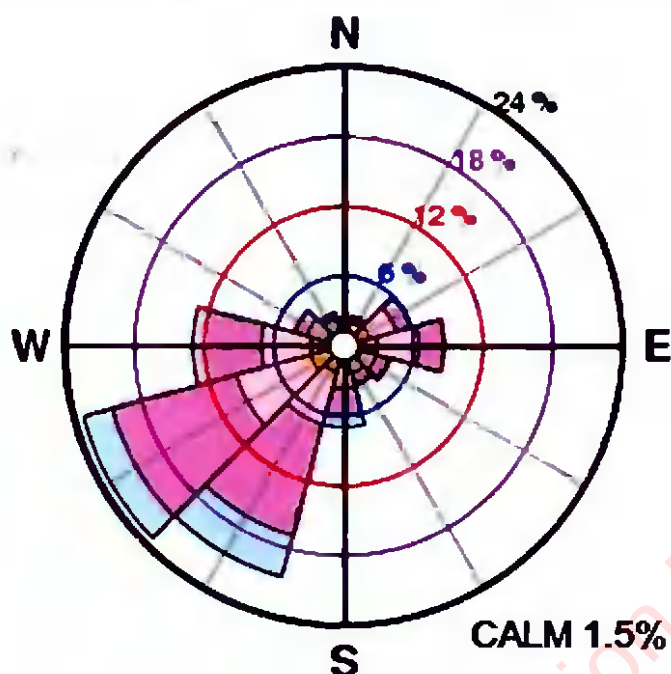


Figure 8.1: Wind-rose for the Casement Aerodrome 1981-2010 (Source: www.met.ie)

Wind characteristics are typically moderate with relatively infrequent gales with an average of 18.1 days with gales per annum with an average maximum wind gust of 82 knots during the year (Table 8.10).

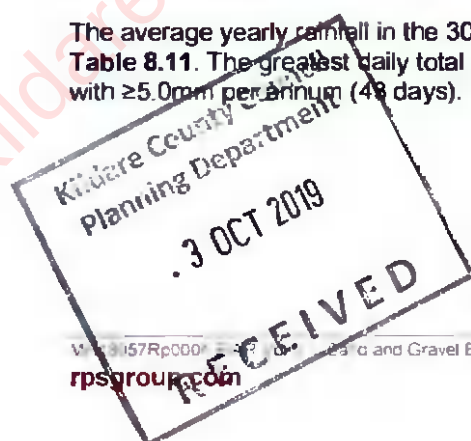
The subject site is located further inland from the east coast, and the percentage of time that the winds are calm is expected to be higher. For example, a mean calm of 1.5% was recorded for Casement Aerodrome, whereas the mean calm recorded for Dublin Airport was 0.2% (located approximately 55km north east of the site at Racefield), demonstrating the difference between coastal and inland winds. Furthermore, the calms recorded at Mullingar, based in the midlands and approximately 57km north west of the site, was 3.1%. There for it would be expected that the Racefield site, which is further inland than Casement Aerodrome, may experience calmer winds than the 1.5% recorded at this met station.

Table 8.10: 30-Year average data for wind at Casement Aerodrome (Annual Values from 1981-2010, source: (www.met.ie))

Wind (knots)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Monthly Speed	13.6	12.9	12.4	9.8	9.1	8.6	8.8	9.0	9.6	11.1	11.6	12.3	10.7
Max Gust	80	78	71	59	63	51	58	55	59	65	66	82	82
Mean num. of Days with Gales	4.5	3.2	2.1	0.6	0.4	0.1	0.1	0.2	0.3	1.2	1.9	3.5	18.1

8.3.4.3 Rainfall

The average yearly rainfall in the 30-year average is 754.2mm, this is broken down into monthly averages in Table 8.11. The greatest daily total of rain is recorded in December (75.7mm) with moderately frequent days with $\geq 5.0\text{mm}$ per annum (48 days).



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Table 8.11: 30-Year average data for rainfall at Casement Aerodrome (Annual Values from 1981-2010, source: (www.met.ie))

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Monthly Total	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.2
Greatest Daily Total	30.0	32.2	31.1	38.7	29.8	97.5	33.7	89.3	51.1	50.1	82.0	46.8	97.5
Mean num. Days with ≥5.0mm	4	3	3	3	3	3	3	4	4	4	4	5	43

8.3.4.4 Weather Events

The proposed development must consider weather events relating to cold weather, wind, rain and events (storms, snow etc.) that may disrupt operations. Table 8.12 displays the mean number of days per annum on average across the 30-year average a weather event occurs. Snow lying at 0900UTC is infrequent occurring on average 4.1 days per annum, posing a low risk to operations. Fog is the most frequent weather event observed at Casement during the 30-year average records, occurring on average 22.1 days per annum.

Table 8.12: 30-Year average data for weather events at Casement Aerodrome (Annual Values from 1981-2010, source: (www.met.ie))

Weather (mean num. of days with...)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Snow or Sleet	4.1	3.9	2.5	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.5	2.3	14.6
Snow lying at 0900UTC	1.8	1.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	4.1
Hail	1.0	1.5	2.7	2.4	1.5	0.2	0.2	0.1	0.2	0.2	0.7	0.6	11.3
Thunder	0.1	0.1	0.3	0.4	1.1	1.0	1.0	1.2	0.6	0.4	0.1	0.1	6.3
Fog	1.8	1.9	1.6	1.6	1.5	1.2	1.1	2.0	2.8	2.0	2.1	2.4	22.1

8.4 Potential Impact of the Proposal

8.4.1 'Do-Nothing' Scenario

The 'Do-Nothing' scenario refers to the site remaining vacant as per the existing baseline scenario and no activity associated with the proposed development taking place. Under such a scenario, the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. There will be negligible ongoing impact to air quality over that presented in the baseline section of this chapter.

8.4.2 Construction/Operation Phase Dust

Dust is considered a risk of pollution to the atmosphere from the activities associated with the proposed development. In accordance with the NRA Guidelines, where there are operations at a construction, quarrying or dust risk site, there is a risk that dust may cause an impact at sensitive receptors in close proximity to the source of the dust generated. The distances identified within which impacts may arise are presented in Table 8.13 (source NRA Guidelines, May 2011 Revision).

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Table 8.13: TII (formerly NRA) Assessment Criteria for the Impact of Dust Emissions from Construction Activities (with standard mitigation in place)

Scale	Source Description	Potential Distance for Significant Effects (Distance from source)		
		Soiling	PM ₁₀	Vegetation Effects
Major	Large Construction sites, with high use of haul routes.	100m	25m	25m
Moderate	Moderate Construction sites, with moderate use of haul routes	50m	15m	15m
Minor	Minor Construction sites, with minor use of haul routes	25m	10m	10m

There are approximately 13 properties located within 100m of the site's landownership boundary, of these only one is located within 100m from the proposed extraction area of the site.

- Two residential properties situated on the L-8006 are located immediately to the north of the site's northern boundary. One of these properties is located c 22 metres from the site boundary and c.35m proposed extraction area. The second property is c.10m north of the site boundary, however, it is located c.170m from the proposed extraction area.
- Another property on the L-8006 is located to the north east, however, this is circa 85m from the site boundary, and 150m from the proposed extraction area.
- Another property is located to the south east; however, this is circa 105m from the site's eastern boundary, and c.120m from the proposed extraction area.
- A small cluster of approximately 10 properties are located immediately north west of the site's (landownership) boundary. In this cluster, the nearest house to the site is c.10m from the northern boundary, however, it is c.190m from the proposed extraction area.

Properties located to south of the site, along or off the L-8009, are c 400m or further from the site's southern boundary.

Operational related dust from the proposed development is likely to result in a 'Medium-Term Slight Adverse' impact for the single property located within 100m of the extraction area, without additional mitigation measures in place. All other properties that are beyond a 100m distance are unlikely to experience dust impact as a result of the proposed operations. Where dust related impacts are anticipated avoidance and mitigation measures will be put in place to reduce the impact level.

8.4.3 Road Traffic

Road traffic associated with the proposed development can impact directly on local air quality and any sensitive receptors that are located adjacent to the local road networks may experience the impacts to local air quality.

Traffic on the road network is predicted to increase directly as a result of the excavation of sands and gravels from the site during years 1 to 12 of operation. The volume of traffic predicted is shown in Chapter 10 based on the proposed excavation rates and phasing.

The main haul route for the proposed transport of material will be via the existing local road (L-8006/L-8007) in an easterly direction onto the R418 at Ballyshannon Crossroads. Given the proposed heul route and the locations of residential areas along this route, the following receptor has been assessed using the DMRB local model:

R1: Residential Properties along the L-8006/L-8007 to quantify the impacts for properties along the road that links the site to the R418.

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The results of the analysis for this receptor along the existing haul route are presented in Table 8.14.

Table 8.14 Local impact to air quality as a result of road traffic is typical year of operation at R1

Property	Scenarios	Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)	Particulates (PM ₁₀) ($\mu\text{g}/\text{m}^3$)	
		Annual Average NO ₂	Annual Average PM ₁₀	No. of days > 50 $\mu\text{g}/\text{m}^3$
R1	Background Air Quality	4.36	9.93	0
	Do Nothing	4.51	9.97	0.00
	Do-Something	4.69	9.99	0.00
	Statutory Limits	40	40	25
	WHO Guidelines	40	20	-

The results indicate that all levels of pollutants are predicted to remain within the limits for the protection of human health and the WHO guidelines along the proposed haul route during standard levels of road haulage in a typical scenario year. Using the NRA significance criteria (as outlined in Table 8.2), the predicted increases NO₂ and PM₁₀ associated with the proposed development relative to the background air quality and the 'Do-nothing' scenario are classed as 'imperceptible'. While the levels remain below the relevant limits, these increases and the air quality impact from this traffic are classed as 'negligible'.

Furthermore, all levels remain below the relevant annual Statutory Limits (S.I. 180 of 2011 - Air Quality Standards Regulations 2011) and the World Health Organization (WHO) Air Quality Guidelines for protection of human health both with and without the proposed traffic. As a consequence, the predicted impact of road traffic on air quality is considered negligible.

8.4.4 Emissions of Greenhouse Gases

Emissions of GHG from the proposed development may arise from the following sources:

- Embodied emissions in site won materials relative to other recycled materials;
- Direct emissions from plant machinery/equipment;
- Transport emissions from vehicles importing/exporting material to and from the site.

Embodied emissions are the carbon footprint of a material, i.e. the total emissions released throughout the supply chain of the material. This includes the energy required for extraction, processing, operation and disposal of a material and for some materials such as steel or glass the use of recycled materials has a lower embodied GHG emission than the use of virgin material. The sand and gravel to be extracted from the site will have an embodied GHG emission when used in the construction industry that will be greater than using recycled material and hence this impact is quantified. These emissions have been estimated using the Environment Agency (EA) Carbon Calculator for Construction Sites and the results are presented in Table 8.15.

Table 8.15 Summary of the Greenhouse Emissions from the Proposed Development

Item	Estimated GHG Emissions (tCO ₂ e)
Quarried Material (gravel)	15,000
Plant Emissions	16,007
Material Transport	48,024
Personnel Transport	451
TOTAL	79,482

The total estimated greenhouse gas emissions associated with the 12 years of extraction included in the proposed development is calculated at 79,482 tonnes of CO₂e (6,653 tonnes per annum) which will result in a 'permanent slight adverse impact' for climate. Estimated plant emissions are based on the assumption of diesel consumed across plant and equipment on site for the duration of the project. Estimated material

transport emissions are based on the assumption of a 150km round trip being undertaken to the greater Dublin area.

8.4.4.1 Climate Change Adaptation

In terms of the risk of major disasters which are relevant to the proposed development, given the location and physical characteristics of the proposed development, the main potential risks of flooding, wind, rain and weather events are reduced. Regarding the flood risk of the proposed development, the site boundary is will not be affected by a 100-year event. A flood risk assessment of the proposed development is presented in Chapter 10 and confirms the low vulnerability of the proposed development.

8.5 Mitigation Measures

8.5.1 Dust

The potential for dust to be emitted depends on the type of activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations.

The sites dust management will be in line with industry guidelines such as the Building Research Establishment document entitled 'Control of Dust from Construction and Demolition Activities', the Construction Industry Research and Information Association (CIRIA) 'Environmental Good Practice on Site', 3rd Edition, 2010, and the Department of the Environment, Heritage and Local Government's draft document entitled 'Quarry and Ancillary Activities: Guidelines for Planning Authorities', 2004.

The implementation of a dust minimisation plan during the operation of the project will include measures such as:

- Screening mounds will be put in place along the site's periphery at the northern and eastern boundaries;
- Dust suppression and water spraying of plant, material loads, stockpiles and roads;
- Wheelwashing, covering of material exiting the site;
- Inspection and regular cleaning of the public road and site entrance area;
- Appropriate maintenance of vehicles and machinery;
- Maintenance of overburden storage areas.

To ensure that potential dust nuisance is minimised, a series of mitigation measures have been listed. If the applicant adheres to good working practices and the dust mitigation measures outlined above, the levels of dust generated are assessed to be minimal and are unlikely to cause an environmental nuisance. Dust deposition is not likely to result in a significant impact as a result of the proposed development, as it will continue to be controlled in the appropriate and adequate manner.

8.5.2 Road Traffic

Mitigation of road traffic emissions are mainly achieved through EU legislation driven improvements in fuel and engine technology resulting in a gradually reducing emissions per vehicle profile. The collection of EU Directives, known as the Auto Oil Programme, have outlined improved emission criteria which manufacturers are required to achieve from vehicles produced in the past and in future years. This is a trend which has been in operation for many years and is destined to continue in future years for both cars and heavy-duty vehicles such as road haulage vehicles.



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Road haulage drivers will be controlled by Kilsaran with the use of signage, speed restrictions and a one-way system to limit the varying speeds of traffic that negatively impacts air quality. All vehicles must use the wheelwash facility before leaving the site. The development will be controlled in the appropriate and adequate manner.

The proposed development is intended as a source of raw materials for Kilsaran's own concrete manufacturing facilities. As such, the company will have complete control over the haulage fleet, transport routes and driver behaviour. Kilsaran has a modern fleet of HGVs that will service the site. Vehicles are predominately 5 years old or younger and fitted with the latest technology to maximise fuel efficiency.

Fleet management will be utilised to avoid conflicts with traffic at Ballyshannon National School. The proposed HGV arrival and departure times associated with the development will be scheduled so as to not coincide with early morning drop off and afternoon collection times at Ballyshannon National School.

8.5.3 Greenhouse Gases

Consideration is given in this section to specific measures associated with the proposed development at and wider measures applicable to the overall extractive operations. It is noted that the mitigation measures proposed in Section 8.5.2 will also benefit in terms of reducing CO₂ emissions. Mitigation measures to minimise CO₂ emissions from the construction/operational phase include the following:

- Implementation of a traffic management measures;
- Reducing the idle times by providing an efficient material handling plan that minimizes vehicle wait time. Reducing idle times could save up to 10% of total emissions during operations;
- Turning off vehicular engines when not in use for more than five minutes. This restriction will be enforced strictly unless the idle function is necessary for security or functionality reasons;
- Regular maintenance of plant and equipment. Technical inspection of vehicles to ensure they will perform the most efficiently;

8.5.4 Restoration

Upon cessation of the operations at the site, and the site's restoration to a landscaped habitat lake, the sources of pollution (i.e. dust and traffic) associated with the operational phase will be eliminated. As a result, there would cease to be any potential impact to air quality for this phase. As such the post-restoration phase would result in a 'negligible' impact on air quality.

8.6 Residual Impact

On implementation of the dust minimisation plan and ongoing monitoring of the impact of dust from the proposed development on the community is considered 'negligible'.

As the construction traffic volumes predicted with the operational phase are not considered significant, the resultant air quality impact from this traffic is 'negligible'.

The total estimated greenhouse gas emissions associated with the proposed development is calculated at 79,482 tonnes of CO₂eq which will result in a 'permanent slight adverse impact'.

8.7 References

NRA Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (Rev. 1).

Design Manual for Road and Bridges (DMRB), Volume 11, Section 3, Part 1.

Quarries and Ancillary Activities, Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government (DoEHLG), (2004); and

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Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006)

Technical Instructions on Air Quality Control (TA Luft, 2002)

WHO Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Dioxide, Global update 2005 Summary of Risk Assessment'



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9 NOISE AND VIBRATION

This chapter of the EIAR assesses the predicted noise and vibration impacts of the proposed sand and gravel extraction facility at the Kilsaran Racefield site. This section should be read in conjunction with the site layout plans for the site and project description provided in **Chapter 3** of this EIAR.

Scoping of the proposal identified the following for consideration in the EIAR:

- Planning should take account of noise mitigation and operating hours with consideration for nearby residential communities;
- Any plans for this site must give due consideration to protecting the safety of nearby residents and will require strict restriction of routes that can be used by vehicles accessing the site to minimise the disturbance and risk to local residents and students of the Ballyshannon National School;
- There are houses adjacent to the site which may be affected by increased HGV traffic to and from sites of production in terms of the potential effects of increased noise and dust. For this reason, it is recommended that a baseline is established and that noise and dust be continually monitored at this facility.

9.1 Assessment Methodology

9.1.1 Guidelines

The general assessment methodology of the potential noise and vibrational impacts that the proposed development will have on the receiving environment has been prepared in accordance with the following guidance:

- Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (TII, 2014);
- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4, January 2016); and
- Quarries and Ancillary Activities, Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government (DoEHLG), 2004);
- Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006);
- Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures, Third Edition (ISO 1996-1: 2016);
- Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels, Third Edition (ISO 1996-2: 2017);
- BS 6472-1:2008 'Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting';
- BS 6472-2:2008 'Guide to evaluation of human exposure to vibration in buildings. Blast-induced vibration'; and
- BS 7385-2:1993 'Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration'.
- BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise';
- BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Vibration';

- Calculation of Road Traffic Noise (CRTN), Department of Transport Welsh Office, HMSO, 1988.

9.1.2 Assessment Approach

This assessment has been undertaken in line with best practice assessment procedures for environmental noise impact. A desk top study was undertaken to review the existing site layout, orthophotography, Google Earth™ imagery and OSI mapping of the surrounding environment to determine the context of the proposed development and the surrounding environment in which it is located. The desk top study identified the main scope of the baseline noise climate and the location of the closest noise sensitive locations to the proposed operations for the impact assessment. The desktop assessment was supplemented with a site specific baseline noise survey.

9.1.3 Definition of Study Area

The study area for the noise and vibration impact assessment has been defined with reference to the adjoining areas bordering the proposed site, in which there is potential for an increase in noise levels as a result of the construction and operational phases of the proposed development.

9.1.4 Fundamentals of Noise

Noise is typically defined as 'unwanted sound'; sound being the human sensation of pressure fluctuations in the air. Sound pressure levels are expressed in decibels (dB) on a logarithmic scale. Audible sound for humans ranges from 0dB (i.e. the threshold of hearing) to the threshold of pain at 120dB. A doubling or halving of pressure equates to a 3dB increase or decrease in decibel level. Typically, under normal circumstances, a 3dB change in environmental noise level is the smallest noticeable change to the human ear. A 10dB increase or decrease in sound level equates to a subjective doubling or halving of noise which is a perceived doubling or halving by the human ear according to *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* (EPA, January 2016).

The frequency of sound is the rate at which a sound wave oscillates and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250 Hz. A mechanism known as 'A-weighting' has been adopted in order to account for this non-linearity of the human ear. Sound levels expressed using 'A-weighting' are typically denoted dB(A). An indication of the level of common sounds on the dB(A) scale is presented in Figure 9.1.



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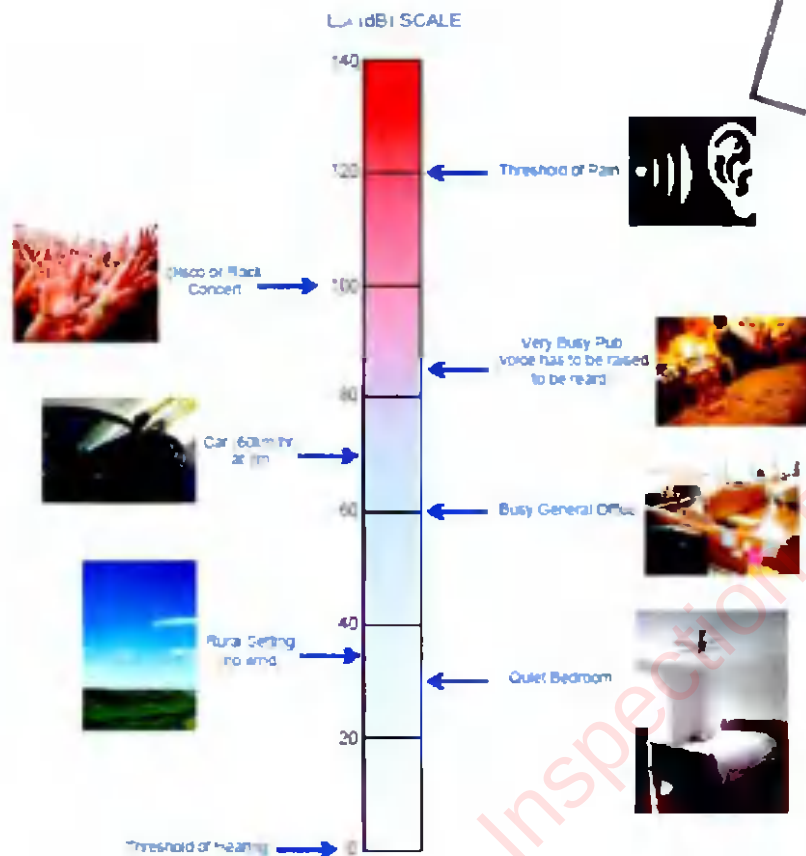


Figure 9.1: L_{pA} (dB) Scale and Indicative Noise Levels [Source: EPA, NG4 Guidance]

The parameter most commonly used for the assessment of noise impacts is L_{Aeq}, which is defined as being the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value. In other words, the L_{Aeq} is a good measure of the average ambient noise level. The L_{A10} index has been historically considered a good indication of road traffic noise, while the L_{A90} index is considered a good indication of the background noise level. A glossary of noise level indices terms is given below for ease of reference:

L _A	Denotes measurements were made using the A-weighting network. The A-weighting represents the response of the human ear to sound.
L _{Aeq,T}	The continuous equivalent A-weighted sound pressure level. This is an 'average' of the sound pressure level over a period of time (T).
L _{AMax,T}	This is the maximum A-weighted sound level measured during a period of time (T).
L _{Amin,T}	This is the minimum A-weighted sound level measured during a period of time (T).
L _{A90,T}	The A-weighted noise level exceeded for 90% of the measurement over a period of time (T). This is normally used to indicate background noise.
L _{A10,T}	The noise level exceeded for 10% of the measurement over a period of time (T). This is normally used to indicate road traffic noise.

9.1.5 Fundamentals of Vibration

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

P.P.V is defined in BS 5228+A1 (2014): Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration as the: *'instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.'*

The unit of measurement of P.P.V. is most commonly millimetres per second, mm/s. However, when dealing with human perception to vibration and the tolerances of sensitive equipment the unit of measurement of micrometres per second, $\mu\text{m/s}$, may be used. It is also important to take account the frequency at which the vibration occurs, which similar to sound is expressed in Hertz (Hz).

Buildings are sensitive to vibration at very low frequencies, i.e. less than 10Hz, and are more resistant to vibration at higher frequencies, i.e. above 50Hz.

It is acknowledged, however, that humans are sensitive to vibration stimuli at much lower magnitudes than those likely to cause damage to buildings. Vibration typically becomes perceptible at around 150 to 300 $\mu\text{m/s}$ PPV and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin of vibration is known.

9.1.6 Assessment Criteria

9.1.6.1 Noise Criteria

The level of environmental noise generated during the operation of any development is determined primarily by the operations employed. The significance of the noise impact of such methods will arise from the specific sound power levels generated by the plant and machinery used, the duration of each particular operation as well as the time and location in which the equipment is used.

The potential sources of environmental noise during the operations of the proposed development will primarily arise from increased traffic on the surrounding road network (from construction workers and delivery of plant and materials) and actual on-site works where heavy plant machinery will be required.

The EPA has published specific noise guidance for the proposed development in the form of the *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (2006). This guidance recommends the noise limits presented in Table 9.1 apply for such extractive operations and these guidelines will be applied in this assessment to on site activities. The EPA guidance states that it is also appropriate to permit higher noise ELVs for short-term temporary activities such as construction of screening bunds, such as those proposed along the northern and north western perimeter of the proposed development site, where these activities will result in a considerable environmental benefit.

Table 9.1: EPA Recommended Noise Emission Limits³⁴

Period	Noise Criterion dB L _{eq} 1hour
Daytime Noise Criterion, (08.00 to 20.00hrs)	55
Night-time Noise Criterion, (20.00 to 08.00hrs)	45

Note: 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dB(A).

The draft 'Guidelines for Noise Impact Assessment' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party have been referenced in relation to the

EPA (2006), *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)*

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potential impact of changes in the ambient noise levels during the construction and the operational phases of the proposed development.

The findings of the Working Party are draft at present although they are of some assistance in this assessment. The draft guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise.

The draft 'Guidelines for Noise Impact Assessment' impact scale adopted in this assessment is shown in Table 9.2. The corresponding significance of impact presented in the EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft August 2017) is also presented. It should be noted that the subjective description outlined in Table 9.2 applies to relatively continuous noise only. RPS would therefore deem the outlined changes as suitable criteria for assessing noise arising from the proposed development, from both onsite and road traffic related noise impacts.

Table 9.2: Likely impact associated with a change in noise level

Change in Noise Level dB (A)	Subjective Reaction	Impact Guidelines for Noise Impact Assessment Significance (IOA)	Impact Guidelines on the Information to be contained in EIARs (EPA)
0	No change	None	Imperceptible
0.1 - 2.9	Barely perceptible	Minor	Not Significant
3.0 - 4.9	Noticable	Moderate	Slight, Moderate
5.0 - 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Very Significant, Profound

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level. It is considered that the criteria specified in Table 9.2 provides a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

9.1.7 Vibration Assessment Criteria

There are generally accepted criteria for vibration levels that would be likely to lead to complaints, and vibration levels that would be likely to lead to structural damage. These levels are outlined in the guidance documents BS6472: 1992 Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz), and BS7385: Part 2 1990: Evaluation and measurement for vibration in buildings - Guide to damage levels from ground-borne vibration.

Operational practices employed should have regard to best practice as recommended in the following standards and guidance:

- BS 6472-1 (2008) Guide to evaluation of Human Exposure to Vibration in Buildings - Vibration sources other than Blasting.
- BS 7385-1 (1990) Evaluation and Measurement for Vibration in Buildings - Guide for Measurement of Vibration and evaluation of their effects on buildings.
- BS 7385-2 (1993) Evaluation and Measurement for Vibration in Buildings - Guide to damage levels from Groundborne Vibration.

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- BS 5228-2:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

In the case of nominally continuous sources of vibration, such as traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, the operational phase of the proposed works will not generate perceptible vibrations.

9.2 Baseline Scenario

The site is situated in Racefield, Ballyshannon, Kilcullen, Co. Kildare approximately 2.5km from Calverstown and c7km from Kilcullen. It is situated on the south side of the local road, L-8006, which connects the R418 with the L-4002.

The area is generally rural in character. The land in the vicinity of the site is typically agricultural with the surrounding fields employed for a mixture of pasture and arable uses. There is a small amount of low-density residential housing in the area. The immediate area is rural and housing consists mainly of the one-off detached residential properties located along the L-8006 road.

There are approximately 56 occupied residential properties within 1km of the planning application boundary. Figure 9.2 shows all the local residential properties within 1 kilometre of the planning application boundary and displays their distance from that boundary. It can be seen that most of the other properties are located along the L-8006/L-8007 or to a lesser extent, the L-8009 road which runs south of the property. The road network around the site is comprised of these two roads and the aforementioned R418 and L-4002 roads.

9.2.1 Baseline Noise Survey

The survey was conducted in general accordance with Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures, Third Edition (ISO 1996-1: 2016) sets out requirements for conducting a baseline survey to establish prevailing noise levels. A noise survey was conducted on the 18th of June 2019 to meet with these requirements. During the survey seven attended monitoring locations were monitored.

9.2.1.1 Procedure

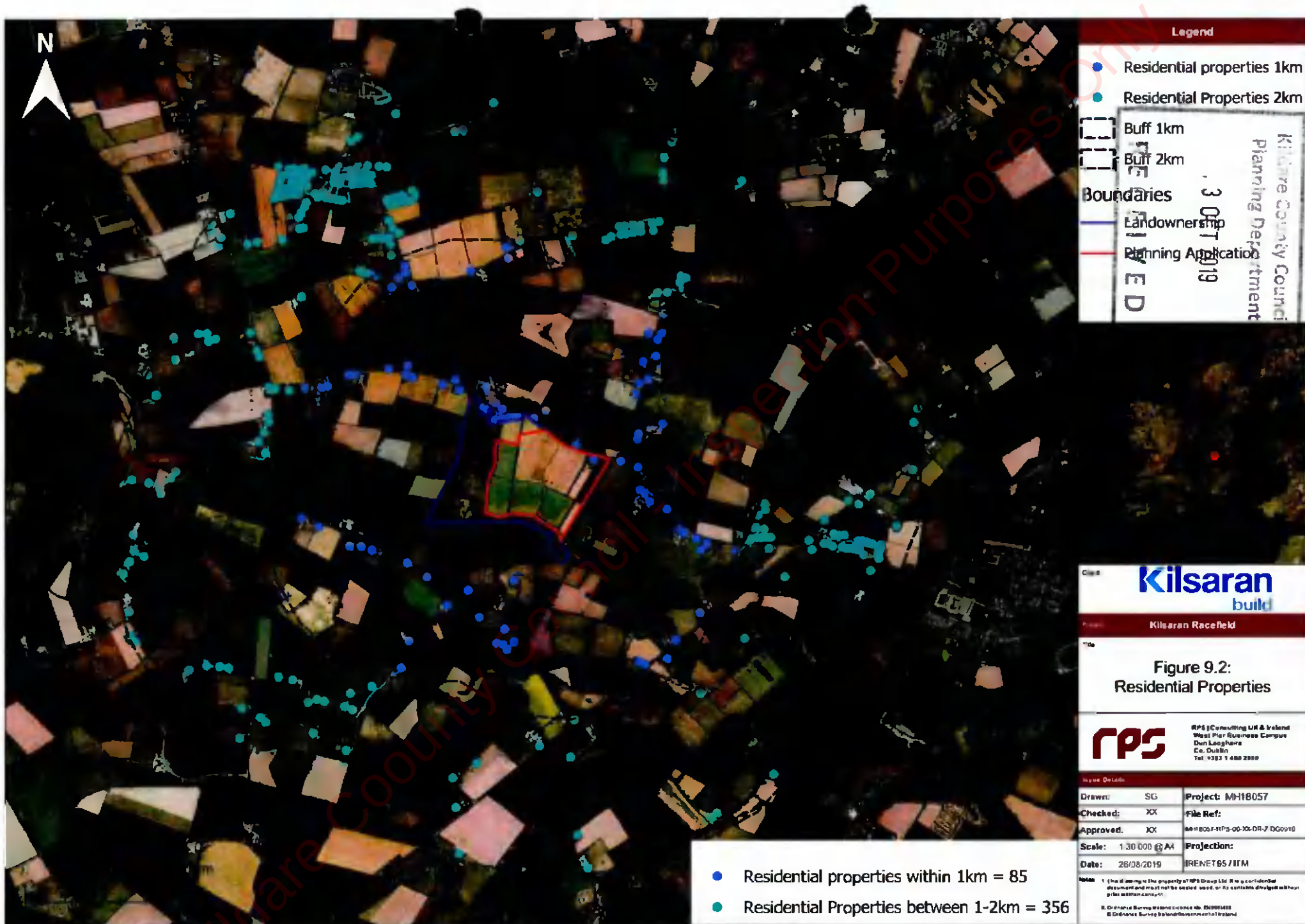
Measurements were conducted over 15-minute periods on a cyclical basis during the daytime between 09:00 to 19:00 hours.

The measurement equipment used was a Brüel and Kjær 2250 Type 1 Sound Level Meter with outdoor microphone protection. All measurements were free field, measured >2m from reflecting facades and the microphone was positioned at a height of 1.5m above ground level.

Weather conditions during the surveys were in line with the conditions described within ISO 1996, Acoustics 'Description and Measurements of Environmental Noise'. All measurement equipment complies with the relevant Type 1 requirements of: IEC 61672 Specification for Sound Level Meters and IEC 60804 Specification for Integrating – Averaging Sound Level Meters and were checked and calibrated before and after the survey using a Brüel and Kjær 4231 piston phone calibrator to an accuracy of +/- 0.3dB.

The measurement results were noted onto survey record sheets immediately following each measurement and also stored in the instrument's internal memory for subsequent analysis. Notes were taken in relation to the primary contributors to noise build-up at each location.





9.2.1.2 Measurement Parameters

The noise parameters recorded during the baseline noise assessment were:

L_{Aeq} is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value. This is the equivalent continuous sound level.

L_{A10} refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of road traffic.

L_{A90} refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to describe a background level.

9.2.1.3 Measurement Locations

Measurements were carried out at the nearest noise sensitive locations to the site. The EPA defines a noise sensitive location as 'any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels'.

Monitoring locations were comprised of seven attended measurements locations, five sensitive receptors and two onsite locations which are detailed in Table 9.3 and outlined in Figure 9.3.

The main noise sources in the study area comprise of road traffic noise, primarily from the R418 regional road but also from occasional local passing traffic along the local road network. Birdsong, farm animals and agricultural practices were audible within the vicinity of the area.

Table 9.3: Noise Monitoring Locations

Position	Description
N1	'Dowling's Bar', along R418
N2	'Whitehouse' residence, south west of site
N3	Residential property north west of site
N4	Residential property north east of site
N5	Vacant residence at north east corner of site boundary
N6	Along south east boundary inside site
N7	Along north west boundary inside site





Legend

- Noise Monitoring Locations
- Boundaries
 - Landownership
 - Planning Application
 - Limit of Excavation Area

Noise monitoring to be carried out x3 in rounds of 15mins, during daytime / working hours.

Kilsaran
build

Kilsaran Racefield

Title
Figure 9.3:
Noise Monitoring locations

rps

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Issue Details		
Drawn:	DG	Project: MH18057
Checked:	XX	File Ref:
Approved:	XX	MH18057 RPS-00-40-DR-Z DG0020
Scale:	1:15,000 @ A4	Projection:
Date:	12/07/2019	IRENET95 / ITM

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9.2.2 Baseline Noise Survey Results

The results of the baseline noise survey carried out are shown below in Table 9.4 to Table 9.10. Daytime measurements were 15 minutes in. All noise monitoring results are presented rounded to the nearest whole integer.

Table 9.4: Baseline Noise Survey Results for N1

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2×10^{-5} Pa)		
			L _{Aeq}	L _{A10}	L _{A90}
N1	Daytime	09:14 – 09:29	67	71	44
		12:04 – 12:19	66	71	38
		14:25 – 14:40	68	72	47
		Arithmetic Average	67	71	43
		Daytime Criterion, dB L _A R,T			55

Three sampling periods were carried out for daytime measurements. Noise levels recorded at location N1 were in the range of 66 to 68dB L_{Aeq}, 15 minutes with an arithmetic average of 67dB L_{Aeq}. The dominant noise source at this location was passing local traffic along the R418, with birdsong during lulls in traffic and occasional noise of children playing in the nearby schoolyard. This is confirmed by analysis of the L_{A10} statistical noise parameter which had an arithmetic average of 71dB. Background noise levels were in the range of 38 to 47dB L_{A90}, 15 minutes. The arithmetic average of the L_{A90}, 15 minutes was 43dB, which excludes the contribution from any intermittent noise sources such as road traffic noise and as such is more representative of the noise at this location.

Table 9.5: Baseline Noise Survey Results for N2

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2×10^{-5} Pa)		
			L _{Aeq}	L _{A10}	L _{A90}
N2	Daytime	09:34 – 09:49	51	51	31
		12:23 – 12:38	50	47	32
		14:45 – 15:00	51	48	31
		Arithmetic Average	51	49	31
		Daytime Criterion, dB L _A R,T			56

Daytime noise levels recorded at location N2 were in the range of 50 to 51dB L_{Aeq}, 15 minutes with an arithmetic average of 51dB L_{Aeq}. The dominant noise sources at this location were background birdsong, farm animals and the distant traffic along the R418 regional road. On average only two cars passed along the local road during each monitoring period and overall, there was low level of noise at this location on the day of monitoring. This is confirmed by analysis of the L_{A10} and L_{A90} noise parameters which had arithmetic averages of 49dB and 31dB, respectively.

Table 9.6: Baseline Noise Survey Results for N3

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2×10^{-5} Pa)		
			L _{Aeq}	L _{A10}	L _{A90}
N3	Daytime	09:56 – 10:11	56	48	30
		12:42 – 12:57	59	44	28
		15:05 – 15:20	59	48	29
		Arithmetic Average	58	47	29
		Daytime Criterion, dB L _A R,T			55



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Three sampling periods were carried out for daytime measurements. Noise levels recorded at N3 were in the range of 56 to 59dB LAeq, 15 minutes with an arithmetic average of 58dB LAeq. During the daytime, the dominant noise source was distant road traffic and tractor/farm equipment noise. Very occasional local passing traffic, background birdsong, farm animal noise and a barking dog were also audible during these measurement periods. Background noise levels were in the range of 28 to 30dB LA90, 15 minutes, with an arithmetic average of the 29dB.

Table 9.7: Baseline Noise Survey Results for N4

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)		
			LAeq	LA10	LA90
N4	Daytime	10:18 – 10:33	58	54	29
		13:00 – 13:15	57	52	30
		15:24 – 15:39	55	50	30
		Arithmetic Average	57	52	30
		Daytime Criterion, dB LA _{r,T}			55

Three sampling periods were carried out for daytime measurements at location N4. Noise levels recorded were in the range of 55 to 58dB LAeq, 15 minutes with an arithmetic average of 57dB LAeq. During the daytime, dominant noise source was distant road traffic noise from the R418 regional road as well as from intermittent passing local traffic, background birdsong and distant farm equipment noise. This is confirmed by the observed background noise levels in the range of 29 to 30 dB LA90, 15 minutes. The arithmetic average of the LA90, 15 minutes was 30dB, which excludes the contribution from any intermittent noise sources such as road traffic noise and as such is more representative of the noise at this location.

Table 9.8: Baseline Noise Survey Results for N5

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)		
			LAeq	LA10	LA90
N5	Daytime	10:39 – 10:54	46	47	32
		13:19 – 13:34	42	41	29
		15:42 – 15:57	48	49	32
		Arithmetic Average	45	46	31
		Daytime Criterion, dB LA _{r,T}			55

Three sampling periods were carried out for daytime measurements. Noise levels recorded at N5 were in the range of 42 to 48dB LAeq, 15 minutes with an arithmetic average of 45dB LAeq. During the daytime, the dominant noise sources were distant road traffic, tractor/farm equipment noise. Very occasional local passing traffic, background birdsong and a barking dog were also audible during these measurement periods. Background noise levels were in the range of 29 to 32dB LA90, 15 minutes, with an arithmetic average of the 31dB.

Table 9.9: Baseline Noise Survey Results for N6

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)		
			LAeq	LA10	LA90
N6	Daytime	11:09 – 11:24	42	45	31
		13:36 – 13:51	37	39	30
		16:05 – 16:20	43	45	35
		Arithmetic Average	41	43	32
		Daytime Criterion, dB LA _{r,T}			55

Three sampling periods were carried out for daytime measurements at the onsite location N6. Noise levels recorded were in the range of 37 to 43dB LAeq, 15 minutes with an arithmetic average of 41dB LAeq. During the

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daytime, the dominant noise sources were birdsong and distant farm equipment and road traffic noise. Background noise levels in the range of 30 to 35dB LA_{F90, 15 minutes}, which excludes the contribution from any intermittent noise sources such as road traffic noise and as such is more representative of the noise at this location. The arithmetic average of the LA_{F90, 15 minutes} was 32dB.

Table 9.10: Baseline Noise Survey Results for N7

Position Number	Period	Measurement Period	Measured Noise Levels (dB re. 2x10 ⁻⁵ Pa)		
			LA _{eq}	LA _{T0}	LA ₉₀
N7	Daytime	11:33 – 11:48	43	46	29
		13:58 – 14:13	41	45	29
		16:28 – 16:43	41	45	32
		Arithmetic Average	42	45	30
		Daytime Criterion, dB LA _{r,T}			55

Three sampling periods were carried out for daytime measurements at the onsite location N7. Noise levels recorded were in the range of 41 to 43dB LA_{eq, 15 minutes} with an arithmetic average of 42dB LA_{eq}. During the daytime, the dominant noise sources were birdsong and distant farm equipment and road traffic noise. Background noise levels in the range of 29 to 32dB LA_{F90, 15 minutes}, which excludes the contribution from any intermittent noise sources such as road traffic noise and as such is more representative of the noise at this location. The arithmetic average of the LA_{F90, 15 minutes} was 30dB.

9.2.3 Baseline Vibration

It has not been considered necessary to undertake baseline vibration monitoring as there is no evidence to suggest that existing receptors are currently affected by appreciable environmental vibration. In addition, based on the previous experience of the applicant in operating other sand and gravel extraction facilities indicates that little or no vibration arises from activities of this nature and, as such, no vibration assessment is required.

9.3 Impact Assessment

9.3.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. Under this scenario, there will be negligible ongoing impact to noise and the baseline levels presented in Section 9.2 would remain largely unaltered with the exception of potential slight increases in traffic volumes and or seasonal agricultural activity.

9.3.2 Construction and Operation - Material Haulage

The road traffic impact has been undertaken in accordance with the UK's Highway Agency, Design Manual for Roads and Bridges (DMRB) HD 213/11 Volume 11, Section 3, Part 7 Revision 1. The DMRB states that noise should only be assessed when changes in traffic flow are greater than 25% or a 20% decrease in traffic flow.

The haulage route from the site will be via the existing local road network with the main route selected being via the M9 R418, Ballyshannon Crossroads on to the single lane L-8007 and L-8006 local roads. This analysis focuses on the areas where traffic noise will have the greatest impact, i.e. the sensitive receptors along the L-8006/L-8007 and the school on the R418.

Traffic data in the form of existing and proposed AADT volumes on the roads are presented in Chapter 10 of this EIAR. Table 9.11 presents the findings of the analysis based on the proposed traffic volumes for the opening year (2020) and a future operational year (2035) based on projected traffic growth. It is noted that

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the proposed development is a 12 year operation and will have ceased operations in 2035 but this scenario year is used in this analysis for the determination of greatest traffic impact.

Table 9.11: Change in Noise Level due to Material Haulage

Link	Traffic Volumes		Change in Noise Level (dB)
	Do Nothing (AADT)	Do Something (AADT)	
2020 L-8006 haul route	474	546	+0.6dB
2020 L-8007 haul route	842	914	+0.3dB
2020 R418 haul route	4,185	4,257	+0.1dB
2035 L-8006 haul route	594	666	+0.5dB
2035 L-8007 haul route	917	989	+0.3dB
2035 R418 haul route	5,241	5,313	+0.1dB

It is predicted that the additional road traffic noise attributable to the development will result in an increase in the baseline noise environment of less than 3dB(A) for properties located along the L-8006 and L-8007 local roads and the school on the R418 with other receptors further from the road network experiencing a lower noise impact.

9.3.3 Construction and Operation - On Site Noise Sources

During the excavation operations at the site the primary noise impact will arise as a direct result of the use of mobile plant within the pit void including excavators, the crusher and the screener. The location of the crusher and screener has been devised to minimise the noise impact on sensitive receptors as follows:

- The mobile plant is located to the south east of the pit void to maximise the distance between the plant and the nearest receptors to the north west of the site;
- The plant is to be permanently located within the pit void to allow for the pit walls to provide natural noise attenuation between source and receptor; and
- Similarly, the berms to be constructed at the northern and north western parameters of the pit are designed to provide further noise attenuation for these receptors.

Using the method outlined in standard guidance, a worst case L_{Aeq} value at the nearest residential property has been calculated for the proposed mobile plant and machinery to be employed. The nearest residential property lies circa 400 metres from the proposed location of the mobile plant. The plant listed in **Table 9.12** has been included to assess the potential cumulative noise levels at this worst case receptor with all plant operating continuously. Some allowance for noise attenuation from screening by both the pit wall and the berms has been assumed.

Table 9.12: Sample Fixed and Mobile Plant to be employed

Noise Source	A-weighted Sound Pressure Level L_{Aeq} , dB at 10m
37t Tracked Hydraulic Excavator (Ref. C.10.1)	80
29t Wheeled Loader (Ref. C.10.2)	83
Loading sand to Lorry 30t (Ref. C.10.6)	85
Tracked Crusher (C.1.14)	82
Screener (C.10.14)	81
Diesel Generator (C.4.84)	74

The methodology F.2.4 as outlined in BS 5228-1:2009+A1: 2014 was followed for predicting the noise levels for each aspect of the proposed development operating simultaneously. This methodology relates to the method for mobile plant in a defined area. The prediction of the L_{Aeq} from mobile plant operating over a small area or on site can be used for other activities when items of mobile plant are operating in close proximity to the point of interest, taking into account the adjustment of the predicted L_{Aeq} for standing and idling time of

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the plant. It is assumed that over a 1-hour period, all mobile plant will be operational for 80% of the time. Table 9.13 summarises the noise prediction calculations at the noise sensitive locations located 400m from the proposed works area.

The results of the indicative construction calculations show that the resultant L_{Aeq} (1 hour) noise values using the listed plant and machinery would be circa 51dB L_{Aeq} and therefore within the day time ambient limit of 55 dB L_{Aeq} listed in the EPA Guidance.

Table 9.13: Predicted Operational Noise Levels at Noise Receptors

Item & BS5228-1: 2009 Reference	No. Required	Sound Pressure Level L_{Aeq} at 10m	Predicted Noise Levels at Receptors
37t Tracked Hydraulic Excavator (Ref C.10.1)	1	60	41
29t Wheeled Loader (Ref. C.10.2)	1	63	44
Loading sand to Lorry 30t (Ref C.10.6)	1	85	46
Tracked Crusher (C.1.14)	1	82	43
Screener (C.10.14)	1	81	42
Diesel Generator (C.4.84)	1	74	35
Combined Level dB $L_{Aeq,1hour}$			51

Table 9.14 presents the cumulative impact of the existing low baseline, coupled with the contribution from road haulage and the impact of on-site sources. This worst case impact is predicted for the nearest residential property which is located at the northern boundary of the site. All other receptors will experience a lower noise impact than this property. The results indicate that the predicted cumulative levels will be circa 51dB which is within the day time ambient limit of 55 dB L_{Aeq} listed in the EPA Guidance. As such, the combined proposed development will be compliant with the guidance and will not have an adverse impact on the noise climate in the vicinity of the site during daytime hours.

Table 9.14: Predicted Cumulative Noise

Item & BS5228-1: 2009 Reference	Predicted Noise Levels at Receptors L_{Aeq}
Baseline Noise level (using the arithmetic average L_{Aeq} for N3 and N4)	30
Road Haulage Impact	1
Combined On-site Sources	51
Cumulative Noise Level L_{Aeq}	51

9.3.4 Restoration Phase

The main source of noise during restoration of the site will arise from any minor landscaping and planting activities and therefore comprise occasional use of machinery such as tractors. Hence a negligible noise impact is predicted.

9.4 Mitigation Measures

9.4.1 Construction/Operation Phase

The following mitigation measures are proposed in order to reduce noise levels from plant and machinery as well as from HGVs travelling on the L-8006 and L-8007:

- HGVs will only be allowed to export material from the site during the proposed operational hours.
- All equipment will be regularly maintained to ensure that it is operating effectively and not producing additional noise emissions or potential tonal sources;

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- Where practicable the number of machines in simultaneous operation will be minimised;
- All vehicle engines will be switched off when not in use;
- Plant and machinery used on-site will comply with the EC (Construction Plant and Equipment) Permissible, Noise Levels Regulations, 1988 (S.I. No. 320 of 1988), and
- Kilsaran will employ the best practicable means to minimise noise emissions and will be obliged to comply with the general recommendations of BS 5228-1: 2009 and 'Environmental Good Practice Site Guide' 2005 compiled by CIRIA and the UK Environmental Agency.
- Care will be taken when unloading vehicles to reduce or minimise potential disturbance to local residents;
- Access / internal haul roads will be kept clean and maintained in a good state of repair, i.e. any potholes are filled and large bumps removed, to avoid unwanted rattle and "body-slap" from heavy goods vehicles;
- Screening berms will be erected to act as acoustic barriers adjacent to the closest residences along the northern & eastern boundary;
- Existing perimeter hedge planting will be retained;
- Additional vegetation planting will be provided around the perimeter of the site;
- Berms will be inspected on a regular basis and maintained as necessary

9.4.2 Restoration Phase

No mitigation measures are required or recommended for the post-remediation phase.

9.5 Residual Impact

There will be a medium term slight adverse impact for sensitive receptors along the haul route and within the immediate environs of the application site as a result of road haulage and site operations during the day time. However, all predicted levels will remain below the EPA specific noise guidance the *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (2006).

9.6 References

Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, TII, (2014).

Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), EPA, (2016).

Environmental Management in the Extractive Industry (Non-Scheduled Minerals), EPA, (2006).

ISO 1996-2:2007 Acoustics -- Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels (2007).

Calculation of Road Traffic Noise (CRTN), UK Department of Transport, (1986).

ISO1996-1:2016 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedure.

BS 6472-1 (2008) Guide to evaluation of Human Exposure to Vibration in Buildings - Vibration sources other than Blasting

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BS 7385-1 (1990) Evaluation and Measurement for Vibration in Buildings - Guide for Measurement of Vibration and evaluation of their effects on buildings.

BS 7385-2 (1993) Evaluation and Measurement for Vibration in Buildings - Guide to damage levels from Groundborne Vibration.

BS 5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites. Noise.

BS 5228-2:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

Guidelines for Noise Impact Assessment, Institute of Environmental Management and Assessment (IEMA), (2002).

EC (Construction Plant and Equipment) Permissible, Noise Levels Regulations, 1988 (S.I. No. 320 of 1988).

Environmental Good Practice Site Guide, CIRIA and the UK Environmental Agency, (2005).



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10 TRAFFIC AND TRANSPORTATION

10.1 Introduction

This chapter of the EIAR will assess the traffic and transportation aspects of the proposed development in order to establish the impact it could have on the operational capacity of the local road network if planning permission is granted. It includes a comprehensive description of the transportation characteristics of the receiving environment, a first principle assessment of the level of trips associated with the development and an analysis on the impact the trips could on the capacity of the L-8006 and L-8007 local roads and the R418 regional road.

10.2 Assessment Methodology

The scope of this assessment is consistent with Transport Infrastructure Ireland's (TII) 'Traffic and Transport Assessment Guidelines', May 2014.

Traffic Surveys were undertaken in May and June 2019, where two-way traffic flows and speeds were recorded on the L-8006 and on the R418. In addition, 12-hour junction turning counts (JTC) were recorded at the Ballyshannon Crossroads (R418/L-8007). These survey reports are presented in **Appendix 10.1 of Volume III** of the EIAR. This data is used when assessing the scale of traffic impact generated by the operational works.

A road survey of the L-8006 and L-8007 local roads has been undertaken for the section of this road between the proposed site entrance and the junction with the R418. This survey includes a detailed assessment of the road widths throughout this link. In addition, an engineering assessment of the pavement condition of the L-8006 and L-8007 has been undertaken to determine the need, for any pavement interventions to be undertaken on this route to facilitate the proposed haulage. This pavement condition study is included in **Appendix 10.2 of Volume III** of this EIAR.

A Stage 1 Road Safety Audit has been undertaken of the L-8006 and L-8007 from the new site access to the junction R418. This survey was undertaken by a suitably qualified road safety auditor who is independent of the design team. This audit report is included in **Appendix 10.3 of Volume III** of this EIAR. The findings of this Road Safety Audit have been incorporated into the design and impact assessment presented in this chapter.

10.3 Baseline Scenario

10.3.1 Road Network

The site is located in Racefield, Ballyshannon, Co. Kildare, approximately 8.8km southeast of Kildare town. The site will be accessed via the L-8006, L-8007 and the R418 (which is the former N78 National Secondary Road) which connects to the M9 Motorway. The site is an approximate 7.5km by road from Junction 2 on the M9.

10.3.1.1 L-8006 and L-8007 Local Road

The proposed access to the site is located on the L-8006 local road along the northern boundary of the site, approximately 1.52km west of the junction with the R418. Between the junction with the R418 at Ballyshannon Cross Roads and the Racefield site, the road consists of the L-8007 for circa 1300 metres before a north turn of this road with the final 220 metres of east west road designated as the L-8006.

The combined L-8006 and L-8007 road is a cross country local road and it travels west from the R418 serving areas of ribbon residential dwellings. This local road is a two-lane single carriageway with sweeping bends in the horizontal alignment in the vicinity of the site and an undulating vertical alignment. The width of the paved carriageway is circa 5.1m in the vicinity of the development site with circa 2.2m low grass verge spaces on either side of the paved carriageway. **Image 10.1** and **Image 10.2** show the characteristics of the L-8006 road at the location of the proposed development.

Image 10.1: Location of new site entrance on L-8006

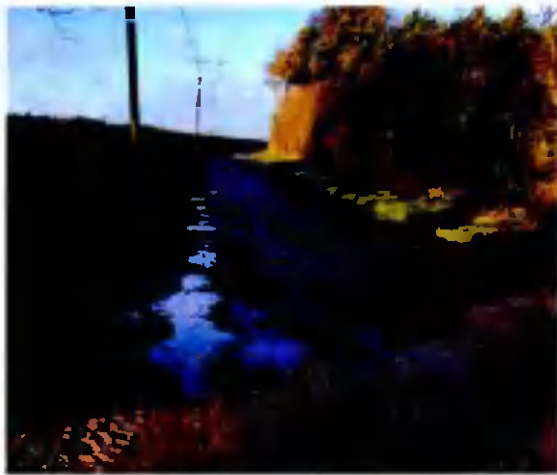


Image 10.2: Location of new site entrance on L-8006



10.3.1.2 R418 Regional Road

The R418 is a regional road that links Kilcullen, County Kildare to Tullow, County Carlow and the section of this route between Kilcullen and Athy was the former N78 National Secondary Road. It is a critical route on the regional road network, and it is a wide single carriageway in the vicinity of the junction with the L-8007 Road. Image 10.3 and Image 10.4 show the characteristics of the R418 road in the vicinity of the existing junction with the L-8007 Road

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Image 10.3: Junction of the L-8007/ R418 looking north



Image 10.4: Junction of the L-8007/ R418 looking south



10.3.2 Existing Road Condition

In September 2019, Milestone Pavement Technologies undertook a Falling Weight Deflectometer (FWD) survey, coupled with some coring investigations, on the section of the L-8006 and L-8007 from the proposed site entrance to the junction with the R418 (circa 1,550 metres). The surveys were carried out to assess the condition and load bearing capacity of pavement structures, to identify weaknesses and to recommend the requirement for any pavement strengthening.

In addition, three cores were taken along the route to investigate the depth of each pavement layer.

The FWD survey was undertaken and assessed in accordance with the NRA HD31/15 guidance for national roads and DTTAS publication 'Guidelines on Depth of Overlay to be used on Rural Regional and Local Roads'. The report is included in **Appendix 10.2 of Volume III** of this EIAR.

The survey recorded that the road condition indicated a reasonably strong structure for a local road with good load spreading ability in the upper layers with a stiff sub-grade throughout. Recommendations for pavement intervention are included in **Section 10.5** as mitigation.

10.3.3 Existing Traffic

Automatic Traffic Counter (ATC) were placed on the R418 and the L-8006 between Tuesday 28th May 2019 and Monday 3rd June 2019 (the surveys on the L-8006 needed to be repeated between Thursday 6th June 2019 and Wednesday 12th June 2019 due to equipment damage) to record the volume, type and speeds of vehicles over a week-long period. The location of the traffic counters on the L-8006 and R418 are shown in **Image 10.5**. The results of the survey are provided in **Table 10.1** and **Table 10.2**.

Image 10.5: Traffic Counter Location



Table 10.1: Traffic Flows on the L-8006

Time Period (24 Hour)	Westbound		Eastbound	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
Monday	242	8	233	8
Tuesday	252	8	249	7
Wednesday	235	4	228	7
Thursday	250	2	237	5
Friday	278	6	248	8
Saturday	239	4	238	3
Sunday	193	3	183	1
Weekly Average Daily Flow	241	5	231	7

Table 10.2: Traffic Flows on the R418

Time Period (24 Hour)	Northbound		Southbound	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
Monday	1355	20	1274	19
Tuesday	2513	67	2260	46
Wednesday	2519	72	2227	60
Thursday	2501	54	2250	45
Friday	2353	73	2176	71
Saturday	1982	35	1794	26
Sunday	1570	11	1253	9
Weekly Average Daily Flow	2113	47	1903	40

10.3.4 Annual Average Daily Traffic (AADT)

Annual Average Daily Traffic (AADT) is the term used to show the average traffic volume in both directions on a section of road, adjusted for seasonal variation and it is a recognised parameter for assessing traffic volumes. The traffic survey data set out in Table 10.1 and Table 10.2 provides the Weekly Average Daily Traffic (WADT) for the L-8006 and R418.

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This data was subsequently expanded in accordance with Transport Infrastructure Ireland's (TII) Project Appraisal Guidance Unit 16.1 — Expansion Factors for Short Period Traffic Counts, October 2016, to derive the 2019 AADT on the L-8006 local road and the R418. As the surveys were undertaken in May 2019 on the R418 and June 2019 on the L-8006 an index factor of 0.98 and 0.96 (Mid-East Region Index Factor) were applied to the WADT to estimate the 2019 AADT. The resulting AADT figures are presented in Table 10.3 and Table 10.4.

Table 10.3: 2019 AADT Calculation – L-8006 Road

Parameter	Two-Way Traffic – L-8006
Weekly Average Daily Traffic (WADT)	484
Monthly Index Factor (from TII PAG Unit 16.1 Annex C)	0.96
2019 Annual Average Daily Traffic (AADT)	465

Table 10.4: 2019 AADT Calculation – R418

Parameter	Two-Way Traffic – R418
Weekly Average Daily Traffic (WADT)	4,103
Monthly Index Factor (from TII PAG Unit 16.1 Annex C)	0.98
2019 Annual Average Daily Traffic (AADT)	4,021

It is also noted that the junction analysis at the L-8007 and R418 allowed for the determination of existing traffic volumes in the section of the L-8007 between Ballyshannon Cross Roads and the junction between the L-8006 and L-8007 east of the site entrance. This allowed for the determination of actual levels of traffic on the L-8007 section of the road and to then determine the fractions of traffic that continue on the L-8007 north and the fraction that proceeds west along the L-8006 past the proposed site entrance.

The calculated 2019 AADT on the L-8007 is 826 vehicles per day (based on the measured value and corrected using TII standards). When compared to the 2019 AADT on the L-8006 (at the site entrance) of 465 vehicles, it is clear that circa 44% of vehicles will travel north/south along the L-8007 while circa 56% will travel east/west along the L-8006 and past the proposed site entrance.

10.3.5 Collision Data

A review of the Road Safety Authority's (RSA's) Road Collision Database for the period 2005 to 2014 inclusive has been undertaken. The database contains information on all reported collisions by severity of injury and year of collision during this period. The review concluded that no collisions were recorded on the L-8006 near the proposed site access between the period 2005 to 2014. A serious collision was recorded (in 2009) and two minor collisions were recorded (in 2005 and 2009) along the R418 in the vicinity of the junction with the L-8007. It is noted that the R418 at this time was the N78 National Secondary Road and prior to the opening of the M9 motorway this road served higher traffic volumes than it does today.

10.4 Impact Assessment

10.4.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. Traffic levels on the local road network will remain largely unaltered from those identified in the traffic counts other than natural growth patterns. The natural growth patterns in traffic on the road network are outlined in the following sections based on TII Guidelines. The growth rates on the L-8006, L-8007 and the R418 show that these roads will continue to cater for the projected volumes and there would be negligible traffic impact.

10.4.2 Future Growth in Traffic Flows

Background future traffic volumes on the L-8006, L-8007 and R418 are determined using growth factors from TII's *Project Appraisal Guidelines for National Roads Unit 5.3, Travel Demand Projections, May 2019*. Information within these guidelines is provided for Region 2 (Mid-East) from 2016-2030, from 2030-2040 and

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from 2040-2050 for low, central and high growth scenarios. Growth factors are provided for heavy and light vehicles and these have been applied to the expanded AADT data to derive future year background traffic flows adjacent to the site. Medium growth factors are set out in Table 10.5 for light vehicles (LVs) and heavy vehicles (HVs).

Table 10.5: TII Traffic Growth Factors (Central) — Region 2 (Mid- East)

Year	Annual Growth Factor — LV	Annual Growth Factor - HV
2016-2030	1.0197	1.0378
2030-2040	1.0062	1.0155
2040-2050	1.0053	1.0187

10.4.3 Assessment Periods

Forecast background traffic levels were derived for each of the following assessment years, in accordance with the principles of the TII's Traffic and Transport Assessment Guidelines (2014):

- Year of commencement of this planning application (Yo0) - assumed to be 2020
- Year of commencement of this planning application +5 years (Yo0 + 5), i.e. 2025
- Year of commencement of this planning application +15 years (Yo0 + 10), i.e. 2035

While the proposed development is for a 14 year duration, the 15 year timeframe is presented to represent and maximum possible impact in terms of background traffic. The forecast background traffic levels on the L-8006, L-8007 and R418 for these years are shown in Table 10.6.

Table 10.6: Background Future Year Traffic on the L-8006, L-8007 and R418

Year	L-8006 Local Road AADT	L-8007 Local Road AADT	R418 AADT
2019 (Base Year)	465	826	4,021
2020 (Opening Year)	474	842	4,185
2025 (Opening Year +5 Years)	522	927	4,623
2035 (Design Year + 15 Years)	594	1055	5,241

10.4.4 Future Traffic Projections

It is considered that the development site has the potential capacity to extract 3,000,000 tonnes of aggregate. Considering the proposed extraction operational period is for 12 years this would equate to an average 250,000 tonnes per annum. It is assumed that the trucks exporting material from the site will have a capacity of 28 tonnes per truck. This would result in circa 8,950 trucks arriving at the site per year. Typically, per annum there is 247 working days so therefore it is estimated that the works at the site would generate circa 36 trucks per day to the site (72 movements in total).

All trucks arriving with material will use the R418, L-8007 and L-8006 as the haul route to the site with trucks going onwards to the M9 to sites in Dublin as shown in Figure 10.1.





Figure 10.1: Proposed Haul Route

It is noted in Section 3.10 of this EIAR that there is a potential application pending for operations at a sand and gravel pit in Usk, County Kildare (EIA Portal ID 2019122). This application was for backfilling of a former sand and gravel pit to its former ground level using imported natural inert soil and stone (as waste and/or by-product). This application was lodged to Kildare County Council on the 14th August 2019 (application 19/920) but has been deemed incomplete – potentially a revised application may be lodged. From a cumulative impact basis, the Usk development is located circa 7.5km south east of the site but it is located east of the M9 motorway and hence, traffic from this pending development will not impact on the haul routes for the proposed development at Racefield. In this regard, there is no potential from cumulative traffic impact from the Usk development. There are no other significant traffic sources identified in the determination of potential cumulative projects.

10.4.5 Predicted Impact

10.4.5.1 Percentage Impact on the R418

AADT volumes on the R418 were estimated for each of the assessment years. Table 10.7 shows the percentage increase which the additional trucks are predicted to have on the AADT of the R418. It is considered by 2035 all the extraction work will be complete at the site.

Table 10.7: Predicted Background and Development Traffic Flow on the R418

Year	R418 AADT	Additional Trucks Travelling to the Site	Percentage Impact
2020	4,185	72	1.7%
2025	4,623	72	1.6%
2035	5,241	0	0.0%

Taking into consideration the thresholds for transport assessments as stated in the TII Transport Assessment Guidelines (*Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road.*) it is concluded that the additional traffic flow generated by the subject site will be insignificant compared to the overall flow on the Regional Road.

10.4.5.2 Percentage Impact on the L-8006 and L-8007

The peak estimated daily number of construction movements (72 HGV trips) will have a greater proportionate impact on traffic on the local roads where existing volumes are low. It represents a temporary 8.6% growth in vehicle numbers on the L-8007 and a temporary 15.2% growth in vehicle numbers on the L-8006. It is noted however that traffic flow on these roads is very low in the first instance thereby inevitably resulting in a significant proportionate increase. However, the low traffic flow on the L-8006/L-8007 will ensure that any development related traffic flow will be accommodated without causing delays/congestion on the local road network.

10.4.5.3 Characteristics of the L-8006/L-8007

A full road width survey of the L-8006 at the site entrance and the L-8007 to the junction with the R418, which is circa 1.55km in length, was undertaken in August 2019. Overall the characteristic of the road varies over the 1.55km distance where the road width narrows and there are prolonged bends in the horizontal alignment between the site and the junction with the R418. **Figure 10.2** outlines the varied pavement width at 50m intervals along the route with **Figure 10.3** providing an overview of the full cross section of the roadway between boundaries taking into consideration the low line grass verges and areas in front of

dwellings

10.4.5.3.1 L-8007 from the R418 - (0m) to 400m

For the first circa 400m of the L-8007 the paved road width is generally in excess of 5.3m, which will be a sufficient width to allow a truck and vehicle to pass simultaneously without causing an obstruction to two-way traffic flow. This is the section of the L-8007 where ribbon development fronts onto the road but the road has a predominately straight alignment and with the adequate paved road width it is considered that the proposed development would not have a significant impact through this section of the L-8007.

10.4.5.3.2 L-8007 from the R418 - 400m to 700m

Through this section of the L-8007 the paved road width reduces to circa 4.5-4.8m (including a spot location where it does reduce to 4.1m). Therefore, with this reduced road width there is a low chance that a development HGV could meet another HGV and they may not be able to pass unobstructed. It is noted that there is significantly low verge space on both sides of the paved road (especially on the northern side) and there is good forward visibility to view any oncoming vehicles. It is considered that the available verge space to the northern side of the road could be used to develop an area of localised road widening to facilitate HGV vehicles passing each other. At a location, circa 500m from the junction with the R418, is a suitable location to widen the road by circa 1.0m for a 20-30m length to allow two HGVs to pass unobstructed.

10.4.5.3.3 L-8007 from the R418 - 700m to 1100m

The road width of the L-8007 through this section can be up to 5.2m wide but predominately it is circa 4.6m wide. However, the distinct characteristics of this section of the road is the prolonged and extended bends in the horizontal alignment which can restrict forward visibility at different sections of the road. There is sufficient low verge space along the northern side of the road to permit the construction stage. At circa 1km from the junction with the R418 there is a suitable location to widen the road by 1m for a 20-30m length to allow two HGVs to pass unobstructed.

10.4.5.3.4 L-8007 and L-8006 from the R418 - 1100m to 1500m

The road width of the L-8007 through this section has improved road paved width (average circa 5.0m) with associated low verge space on both sides of the road. There is a prolonged bend in the alignment and the gable end of a property is located flush with the road. Although the paved road width is improved on this section there is also an additional paved area to the west of the junction of the L-8007 and L-8006, which temporality extends the paved road width of the L-8007 to circa 7.2m. It is considered that the presence of this extended area of paved road width would be sufficient to allow two HGV to pass based on the outline chance that these could meet at this section of the road.



Legend

- Road Width Survey
- Boundaries
- Landownership
- Planning Application
- Limit of Excavation Area

Paved road widths at 50m intervals between the R418 and the proposed Development Site

Client: **Kilsaran build**

Project: **Kilsaran Racefield**

Title: **Figure 10.2: Road Width Survey**

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Checked:	XX	File Ref:	
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Date:	26/08/2019	IRENET95 / ITM	

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L-8007 Road Width

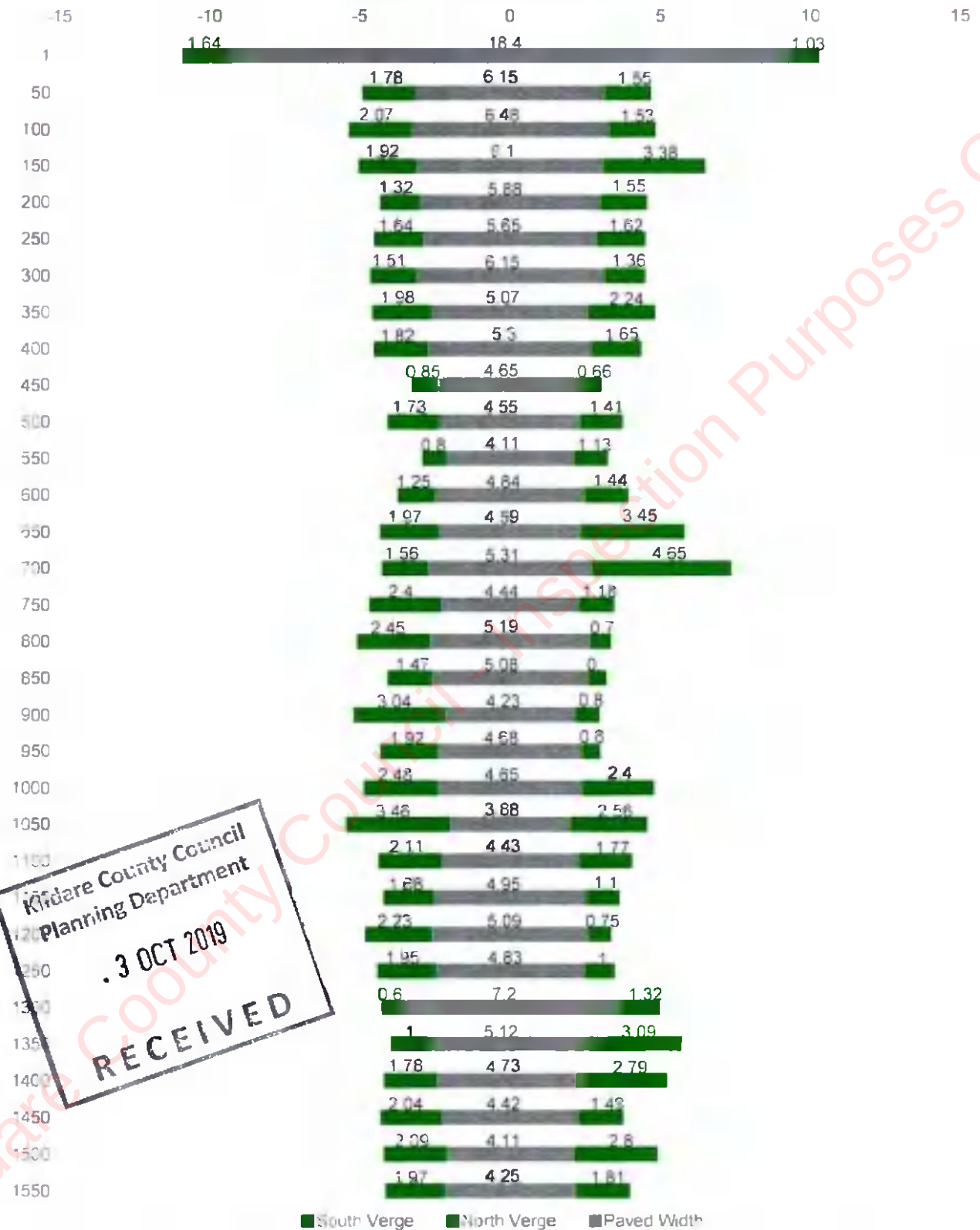


Figure 10.3: L-8007 Road Widths (Note that the road is designated L-8006 at 1300 to 1550)

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10.4.5.4 Junction between the R418/L-8007

The key junction on the haul route is the priority-controlled crossroads junction between the L-8007 Road and the R418 Regional Road. The junction has a wide splay and the R418 has a straight alignment at the point of intersection which optimises sight lines from the junction.

A capacity assessment was undertaken to establish the impact that could be generated by an increase in truck movements along the L-8007. The assessment was carried out using JUNCTIONS modelling software, where the geometric parameters and peak hour traffic flows (based on various scenarios) were inputted into the model and the Ratio of Flow to Capacity (RFC) was established.

An RFC of 0.85 would indicate that a junction is operating at practical capacity. It represents the point at which queuing and delays would occur on the approach arms to a junction. The capacity analysis was undertaken for the AM peak hour (when the development is in operation) and PM peak hour (5:00pm - 6:00pm) based on the predicted traffic flows and the geometric parameters of the crossroads junction.

Table 10.8 and Table 10.9 shows the results of the junction capacity assessment for the long term 2025 AM and PM peak hour assessments. Ratio of Flow to Capacity (RFC), Queue Lengths and Delays are presented for the year 2025. The results indicate that all RFC would operate at well below 0.85 for both the AM and PM peak indicating that the junctions will continue to operate well within the practical capacity and the proposed development will have no significant impact on the capacity of this junction.

Table 10.8: 2025 AM Peak Hour Capacity Assessment Results – with the development in place

Road	RFC	Queue (PCU)	Delays (Secs)
R418 South	0.03	0.03	5.62
L-8007 West	0.12	0.14	7.76
R418 North	0.01	0.01	6.30
L-8007 East	0.12	0.14	7.61

Table 10.9: 2025 PM Peak Hour Capacity Assessment Results – with the development in place

Road	RFC	Queue (PCU)	Delays (Secs)
R418 South	0.01	0.01	6.49
L-8007 West	0.10	0.11	6.99
R418 North	0.03	0.04	5.56
L-8007 East	0.05	0.05	7.46

10.4.6 Access Arrangements

It is proposed to provide a new access to the site directly from the L-8006. The new access will intersect a section of the L-8006 where the horizontal alignment is predominately straight, which will maximise forward visibility of the access along the L-8006. The junction radii will be 15m, which exceeds the standard stated in TII document DN-GEO-03060 Section 5.6.5 for junctions that are frequently used by large commercial vehicles.

It is proposed to cut back the hedgerow and lower the boundary treatments on both sides of the proposed access (which are under the ownership of the applicant) to optimise sight visibility in both directions of the access junction. It is considered that 160m sightlines will be achievable once the hedgerow is cleared. A 160m sightline is in accordance with the standards stated in TII document DN-GEO-03060 for an 85km/h design speed. It is noted that the recorded 85% percentile speed on the L-8006 was 70.4km/h which is

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below the posted speed limit. Therefore, the proposed sightline distances exceed the requirements for the actual recorded 85% percentile speeds on the L-8006.

Oncoming traffic travelling westbound will have forward visibility of the proposed access from circa 175m along the L-8006. Forward sight visibility of a minimum of 180m will be achieved for vehicles travelling eastbound with the cutting of the hedgerow and lowering of the boundary treatments along the subject site.

10.4.7 Road Safety Audit

A Stage 1 Road Safety Audit has been undertaken of the L-8006 and L-8007 from the new site access to the junction with the R418. This survey was undertaken in August 2019 by a suitably qualified road safety auditor, Bruton Consulting Engineers, who are independent of the design team (Kilsaran and RPS). This audit report is included in **Appendix 10.3 of Volume III** of this EIAR.

The Stage 1 Road Safety Audit was carried out in accordance with the requirements of TII Publication Number GE-STY-01024, dated December 2017. The audit considered the aspects of the proposed development that have potential for adverse effect on road safety. Details of projected traffic movements, haul route, nature of vehicles, etc. were provided by the design team to the auditors for the purposes of undertaking the assessment.

The audit identified four issues with the proposed development as follows:

- Passing distances at certain location along the L-8006 and L-8007 whereby two HGVs would have insufficient space;
- Concerns relating to the structure of the on the grassed verge or in the areas of hard standing along the L-8006 and L-8007;
- A concern relating to the unknown integrity of the pavement surface; and
- Impact of foliage growth at the verges during the summer season on driver visibility.

A series of recommendations have been presented for each of the above and the findings have been incorporated into the design and impact assessment presented in this chapter. Further details are presented in the following section on mitigation.

10.5 Mitigation Measures

10.5.1 Management of HGV Movements on L-8006 and L-8007

The proposed access junction is located 1.52km west of the junction with the R418. Assuming a conservative travel speed of 20km/h it is estimated that a development related HGV will take circa 4.5 minutes to complete the journey along the L-8006/L-8007. Based on a uniform distribution of arrivals through a typical working day (9 hours per day as one hour will be excluded due to no hauling during school drop off and collection times) it is assumed that four HGV per hour will access the development site along the L-8006/L-8007 which relates to a potential average of one every 15 minutes arriving at the site. As the travel time for a HGV is envisaged to be only circa 4.5 minutes along the L-8006/L-8007 this will allow the development HGVs to be scheduled to arrive at set time intervals to prevent them meeting on the L-8006/L-8007.

In addition, when a development HGV turns onto the L-8006/L-8007 the driver will notify the site of the imminent arrival and non-HGVs will be permitted to leave the site until the other truck arrives. All Kilsaran vehicles are fitted with a "i-track" Vehicle Tracking System device which is a web based tracker which provides live real-time information allowing vehicles to be tracked at all times. The frequency of traffic to the site can be altered or amended by Kilsaran management and site management to ensure that no two HGVs can meet at the site entrance or along the L-8007.

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10.5.2 Construction of Passing Bays on the L-8007

In order to directly resolve issues one and two of the Road Safety Audit, Kilsaran, in conjunction with or supervision of the local area engineer, proposes to construct two passing bays along the northern side of the L-8007. The proposed passing bays will comprise extending the paved road width by 1.0m for a 20m distance at locations approximately 500m and 1km from the junction with the R418. Full depth pavement construction will be applied to the construction of these passing bays. Figure 10.4 and Figure 10.5 show the preferred locations for the passing bays on the northern side of the L-8007.

These extended areas of road space will allow two HGVs to pass without obstruction. Although the proposed development is estimated to generate a low amount of traffic flow and there was only an average 10 daily HGV recorded on the L-8007, the potential for two HGV passing each other will be very limited.



Figure 10.4: Proposed Passing Bay Location – Circa 500m from the R418



Figure 10.5: Proposed Passing Bay Location – Circa 1km from the R418

10.5.3 Pavement Intervention

Item three of the Road Safety Audit relates to concerns on the pavement structure of the L-8006 and L-8007 from the site entrance to the junction with the R418. As noted in Section 10.3.2, the FWD survey recorded that the road condition indicated a reasonably strong structure for a local road with good load spreading ability in the upper layers with a stiff sub-grade throughout. The levels of pavement upgrade recommended in the report for a 20 year design life are presented in Table 10.10.

Table 10.10: Summary of Pavement Interventions

Chainage	Asphalt Concrete Overlay
0-250	No overlay required
250-350	40mm
350-575	No overlay required
575-700	40mm
700-1000	No overlay required
1000-1150	40mm
1150-1225	No overlay required
1225-1550	40mm

As with the passing bay construction, Kilsaran, in conjunction with or supervision of the local area engineer, will undertake the interventions listed in Table 10.10 at the enabling phase of the development prior to the commencement of the main material haulage. This will ensure that the pavement structure will be fit for purposes to accept the additional HGV volumes associated with the proposed development for the duration of works.

10.5.4 Management of Verges

Item four of the road safety audit recommends that through liaison with the landowners and KCC, Kilsaran should develop and implement a maintenance regime to avoid excessive growth of the vegetation on the verges at certain sections of the L-8006/L-8007.

Section 70 of the Roads Act 1993 places responsibility for the maintenance of roadside hedges on all landowners/occupiers of land. In this regard, Kilsaran is legally responsible for the maintenance of the verges along the northern boundary of the site on the L-8006. Any vegetation maintenance at this boundary will be undertaken outside of the bird nesting season (1st March to 31st August).

Maintenance of verges between the Kilsaran site and the junction with the R418 will be managed by the relevant landowner.

10.5.5 Restrict Hauling during School Hours

Ballyshannon National School is located along the R418 which will be utilised as the dedicated haul route. Although the road has ample width and capacity to cater for the expected truck demand it is considered that hauling will be suspended for half an hour in the morning and two 20-minute periods in the afternoon to prevent trucks travelling during school opening and closing times.

10.5.6 Road Signage

It is proposed to provide advance warning signage of the new access. The signs will be located along the L-8006 at 50m, 100m and 160m distances in both directions. All warning signage will be in accordance with Chapter 6 of the Department of Transport, Tourism and Sports Traffic Signs Manual and will be complemented by supplementary plates stating 'Quarry Entrance Ahead' and the distances.

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10.5.7 Operating Traffic Management Plan (TMP) Development and Implementation

Kilsaran will prepare a full Operating Traffic Management Plan. The characteristics of the Operating Traffic Management Plan will be agreed with the KCC Roads Department.

10.5.8 Hedgerow Cut-back and Boundary Treatment

It is proposed to cut back the hedgerow and lower the boundary treatments on both sides of the proposed access (which are under the ownership of the applicant) to maximise the sight lines along the L-8006 from the proposed access. Any vegetation maintenance at this boundary will be undertaken outside of the bird nesting season (1st March to 31st August).

10.6 References

Transport Infrastructure Ireland's (TII) 'Traffic and Transport Assessment Guidelines', May 2014.

Transport Infrastructure Ireland's (TII) Project Appraisal Guidance Unit 16.1 — Expansion Factors for Short Period Traffic Counts, October 2016.

TII's Project Appraisal Guidelines for National Roads Unit 5.3, Travel Demand Projections, May 2019. Information

Road Safety Authority's (RSA's) Road Collision Database

Department of Transport, Tourism and Sports Traffic Signs Manual

National Roads Authority HD31/15

Guidelines on Depth of Overlay to be used on Rural Regional and Local Roads, DTTAS

11 MATERIAL ASSETS

11.1 Introduction

This chapter of the EIAR examines the material assets of human and natural origin within the vicinity of the proposed development at Racefield, Ballyshannon, Kilcullen, Co. Kildare which could be impacted as a result of the proposed development. A detailed description of the proposal is outlined in **Chapter 3**.

There are a number of chapters within this EIAR that are relevant to material assets including **Chapter 4** on Population and Human Health, which discusses social, amenity and tourism assets and **Chapter 10** Traffic and Transportation which provides a detailed assessment of the potential impacts that the proposed development may have on the transport network. **Chapter 12** Cultural Heritage provides a detailed assessment that covers physical cultural assets including archaeology and architecture effects from proposal. Other relevant chapters include **Chapter 6** Land and Soils, **Chapter 7** Water and **Chapter 8** Air Quality and Climate. This chapter only deals with material assets items and issues not already covered in the aforementioned chapters.

11.2 Assessment Methodology

11.2.1 Assessment Approach

The scope of the evaluation of material assets is based on a desk-top review of online and published resources, guidance documents, legislation, information contained within this EIAR and a consideration of the likelihood for significant impacts arising, having regard to the nature of the receiving environment and the nature and extent of the proposed activities and development at the site.

11.2.2 Assessment Criteria

Material assets are physical resources in the environment which may be of either human or natural origin and make specific reference to the headings built services and road and traffic. In addition, utilities are also considered. The criteria used to assess the potential impacts of the proposal on material assets in the vicinity of the site are outlined in **Table 11.1** to **Table 11.3**.

Table 11.1: Assessment Criteria – Significance

Significance of Impact	Criteria
Imperceptible	An effect capable of measurement but without noticeable consequences.
Not Significant	An effect that alters the character of the environment without affecting its sensitivities.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing or emerging trends.
Significant Effects	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant Effects	An effect, which by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.



Table 11.2: Assessment Criteria - Duration

Duration of Impact	Criteria
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day.
Temporary Effects	Effects lasting less than a year.
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.
Reversible Effects	Effects that can be undone, for example through remediation or restoration.

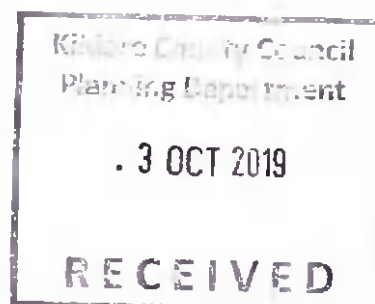
Table 11.3: Assessment Criteria - Quality

Quality of Impact	Criteria
Positive	A change which improves the quality of the environment (for example, by increasing species diversity, or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Negative	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.

11.2.3 Information Sources Used

As part of the desktop study to inform the assessment, the following information sources have been consulted in relation to the assessment of Material Assets:

- Kildare County Development Plan 2017 - 2023;
- OSi 50,000 Mapping;
- Aerial Photography;
- Google Earth™ imagery;
- Site Visit;
- Utility Providers;
- Consultation;
- Chapters of this EIAR.



11.2.4 Definition of Study Area

The study area for material assets has been defined with reference to the area in which there is potential for direct and indirect impact on natural and human material assets as a result of the proposed development and operations at the site.

The assessment focused on 3km area surrounding the site, which takes into account the land and roadways west of the M9 motorway that may be impacted by associated traffic. Other notable material assets that lie beyond this 3km area, such as settlements and industry, have also been considered.

11.3 Receiving Environment

11.3.1 Land Use and Property

The site is situated in Racefield, Ballyshannon, Kilcullen, Co. Kildare. The local area surrounding the subject site features a mix of agricultural, undeveloped lands, detached one-off detached residential properties and small housing clusters/estates.

Land use in the local area of the site is typically agricultural and undeveloped with the surrounding fields employed for a mixture of tillage, pasture and arable uses. The field pattern in the surrounding area is irregular, variable in scale and is delineated by low-lying hedgerows.

In terms of property, An Post GeoDirectory, indicates there is approximately 845 residential and 100 commercial properties were within a 3km radius of the site. Of these approximately 72 residential and 14 commercial properties are located along or just off the L-8006/L-8007 roads.

11.3.2 Existing Site

The subject site is located at Racefield, Ballyshannon, Kilcullen, Co. Kildare, circa 2.5km from Calverstown and circa 7km from Kilcullen. The lands are under the ownership of Kilsaran. The site location is shown in Figure 3.1.

The site is currently an undeveloped greenfield which has been used for agricultural purposes, leased to local farmers for use as pasture and arable lands. An unoccupied two-storey three bed property (Racefield House) and associated farm buildings are located at the north east corner of the site, within the overall land ownership boundary. These are also under the ownership of Kilsaran. The farm buildings include a cut-stone lofted coach house, two corrugated steel farm sheds and some other small farm buildings.

There is a commercial coniferous plantation, Clonmoyle Forest under the ownership of Coillte which forms the southern boundary to the site. A stream, Eaglehill Stream (EPA code: 14E04), flows in a west to north-westerly direction along the southern boundary of the coniferous forest.

11.3.3 Settlements and Housing

There is a relatively low population density in the area surrounding the site. The local area is rural and consists mainly of one-off detached residential properties located along the local roads including the L-8006 (north), L-8007 (east, north east) R418 (east), L4002 (west) and the L-8009 (south). The L-8006 local road forms the northern boundary of the site. There are several residential receptors located along this road with open views to the south across the application area.

A detached property and associated farm buildings are located immediately north of the site boundary (25m) on the opposite side of the L-8006 and is approximately 100m west of the proposed site entrance. Another detached property (and associated buildings) is located across the L-8006, approximately 75m from the north east corner of the site. A small cluster of 11-12 detached properties are located close to the north western boundary of the site, circa 500m west of the proposed site entrance.

Another detached property and associated lands are located to the south east of the site. The property is approximately 110m from the eastern boundary and is accessed by a private lane which runs parallel to the site boundary.

The nearest clustered settlements in the area include Suncroft and Calverstown. Suncroft is designated as a village in the KCDP and is located circa 2km north west of the site on the L-3007.

The KCDP describes Suncroft Village as '*relatively compact form with long established residential developments extending from the core. However, a number of newer developments are located at some distance from the village core and are separated from it by agricultural lands*'. The village comprises of single detached houses, several small housing estates and a main street (L3007) with several commercial premises (shop, public house, etc.). Suncroft National School, Suncroft Community Complex (which includes sports clubs GFC/AFC, pitches and a community playground) and a nursing home are also located in the village.

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Calverstown is designated as a rural settlement in the KCDP and is located circa 2.6km to the east of the site and comprises of several small housing estates and individual detached housing, and shops, a public house etc. in the village centre at the junction of L-8008 and L-8007.

There are several small housing estates located in the area including Lugatanna Park, located c.1km east of proposed site entrance off the L-8006 (300m west of Ballyshannon crossroads) and Carrighill Lower, located 1.6km east of proposed site entrance also off the L-8007 (250m east of the Ballyshannon crossroads).

Ballyshannon National School is located circa 1.3km east of the proposed site entrance, along the R418 circa 170m to the north of Ballyshannon Cross Roads.

11.3.3.1 Agriculture

Much of the land surrounding the site is utilised for various agricultural practices. The fields contiguous to the site have a mixture of tillage and pasture uses, with evidence of livestock in recent aerial photography (google maps) on the lands surrounding the site.

There are also farm buildings dispersed throughout the area and it is evident from aerial photography and site visits that there are several farms situated along the local roads bounding the site.

As noted previously, there is an area of coniferous forest located to the south of the site.

11.3.3.2 Commercial and Industrial Development

An Post GeoDirectory indicates that there are circa 100 commercial properties located within a 3km radius study area of the proposed site entrance. There are several commercial businesses located at the centre of the local settlements in the area at Suncroft, Ballyshannon and Calverstown such as shops and public houses.

Other local businesses identified in the area included Conway Piling Ltd. located north of Ballyshannon Crossroads, circa 2km from proposed site entrance and Casey Group (Cranes & Plant Equipment located beyond the study area circa 4.5km north east of the subject site.

There is a history of and ongoing active extractive industries located in the surrounding landscape. Evidence of the peat extraction can be seen to the north west and south west (Bord Na Mona Kilberry) of the subject site.

Other active Kilsaran extraction/production sites are located to the north east of the subject site; Kilsaran Kilcullen, Kilsaran The Curragh, and Kilsaran Brownstown. A Recycling Centre and Civic Amenity is located opposite Kilsaran Brownstown/Kilcullen at Silliot Hill and is operated by AES. However, these sites are all located circa 4km or further from the proposed development and beyond the study area.

In terms of recreational businesses, several have been identified in the area. Kilrush Air Field is located circa 3km south of the subject site's southern boundary. A vehicle race track (Ballyshannon Hotrod) is located circa 1.8km north east of the proposed site entrance. Curragh Springs Fishery is located circa 4.5km to the north east of the site.

Kildare has a long history of equine industry including horse breeding, training and racing. Ballyshannon Stud is located to the north of the site along Martinstown Road, the L-8007. There is also further evidence of private domestic use equine related activities in the area with evidence of horse gallops, paddocks, horse walkers and stables visible from aerial photography. There is evidence of stables along the L-8009 road, south of the subject site. The Curragh and The Curragh Racecourse are located 6km north of the site.

In terms of the hospitality and tourism industry, there is evidence of B&B accommodation in the area. Three were noted within the study area, however these were all over 2km from the proposed site entrance and not located on the L-8008 or L-8007 roads. A holistic retreat centre (Martinstown Holistic Centre) is located 2km north of the site.

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11.3.4 Utilities

Figure 11.1 outlines the existing Water, Electricity, Telecoms and Gas Network infrastructure at the subject site

11.3.4.1 Power and Fuel

An 400kV overhead powerline and two large pylons traverse the site in a north east direction through the north west section of the site. The nearest pylon is located circa 55m from the northern boundary of the site and circa 300m from the proposed site entrance. This overhead powerline and associated pylons are part of the Moneypoint-Dunstown 400kV network.

ESB Cable Network electricity poles and associated overhead electricity lines are evident along the northern boundary of the site on the L-8006 local road (northern site boundary). A low voltage three-phase overhead electricity power line traverses the site at the unoccupied Racefield House along the northern boundary. An established electricity connection is available on site at the house. A medium voltage overhead electricity power line runs in a north-west direction to the north of the site.

No gas connection is available at the main site address and there are no underground gas pipelines located in the proximity of or traversing the site.

11.3.4.2 Telecommunications

Telecom transmission poles and lines are evident to the north of the site running along the site boundary on the L-8006 local road. There is an existing telecom connection at Racefield House and telecommunications services, including phone and broadband, are available at the site and surrounding area according to the Eir Coverage Map. There is mobile phone coverage available at the site and local area. No telecom masts were identified within the study area. Those that were identified as being closest were located 4km or further from the site according to the Comreg website.

11.3.4.3 Water

A water main runs along the site's northern boundary on the L-8006 local road. No water main traverses the site. An existing connection to the public water mains is available at the site at Racefield House. No sewer main is located within the site. The unoccupied house is connected to a septic tank.

11.3.5 Roads and Traffic

The site is located close to a good transport network including the M9 and M7 motorways. The M9 is located 5.5km east of the proposed site entrance located at the north east corner of the site. The M7 is located circa 7.7km north of the site entrance. The local road network consists primarily of regional and local roads.

The site is accessible from the east via the M9, R418, L-8007, and L-8006 which bounds the north of the site. The proposed site entrance is located approximately 7km from Exit 2 (Killcullen/Kilmead R448) on the M9.

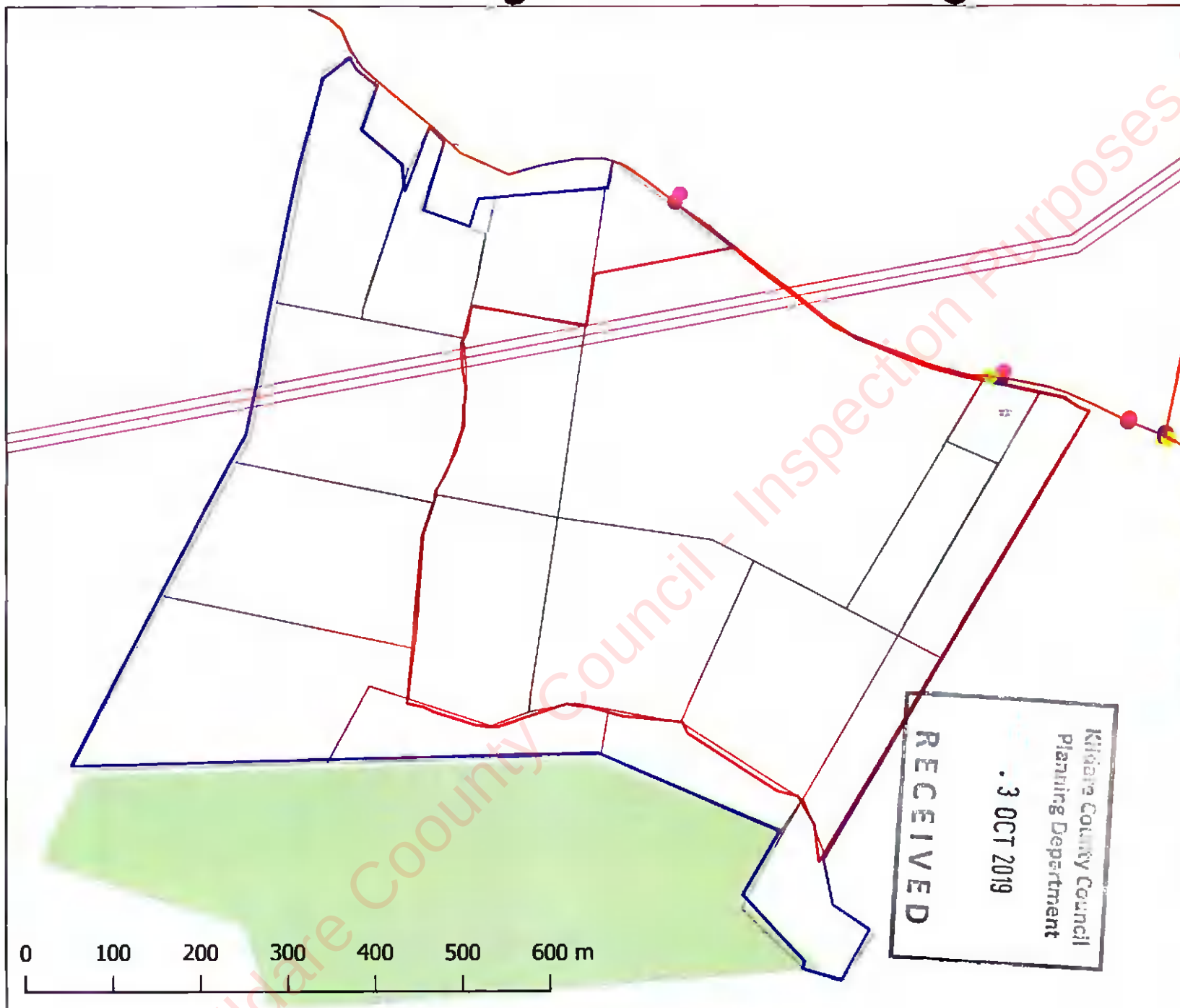
The site can also be accessed from the west via the M7 motorway, exiting the motorway at exit 13 (Kildare/Nurney/Kildangan) and travelling south via the R415, L-7071, L-4002 and L-8006. The proposed site entrance is located approximately 14km from Exit 13.

The haulage routes from the site will be via the existing local road network with the main route selected being via the M9, R418, Ballyshannon Crossroads on to the single lane L-8007 and L-8006 local roads.

Vehicles entering and exiting the facility will be directed to turn right onto the L-8006/L-8007 local road and travel to the Ballyshannon Crossroads where they will turn north onto the R418 and continue north to Junction 2 of the M9.

11.3.6 Waste Management

The site is currently not operational and no waste is being generated at present over and above typical agricultural waste volumes and streams.



Legend

- Power Line
- Water Main Utilities
- Junctions
- Fitting
- Water Meter
- Valve

Boundaries

- Landownership
- Planning Application



Client: **Kilsaran build**

Project: **Kilsaran Racefield**

Title: **Figure 11.1: Utilities**

RPS

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Issue Details

Drawn: DG	Project: MH18057
Checked: XX	File Ref:
Approved: XX	M-18057 RPS DC XX DR-2-000007
Scale: 1:6 000 @ A4	Projection:
Date: 12/03/2019	IRENET95 / ITM

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11.4 Impact Assessment

11.4.1 'Do-Nothing' Scenario

Under the do-nothing scenario, the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. There will be negligible ongoing impact to material assets with limited potential for impact on existing commercial enterprises or settlements and housing in proximity to the site. The surrounding agriculture and land use will remain unaltered with no significant impact.

Transport infrastructure in the local area will not be impacted and will continue to cater for the existing loads identified on the road. Finally, utility infrastructure in the area will not be impacted under this scenario. In short, the evolving baseline under the do nothing scenario will remain largely unaltered and there would be no significant impacts to material assets and no requirement for mitigation.

11.4.2 Land Use and Property

Overall, any impacts of the proposed development on land use and property in the vicinity will be short-term to medium-term in duration with slight/moderate adverse impacts but these are not considered significant. The potential impacts and effects on commercial, residential and agricultural land use and property are outlined in **Table 11.4**.

In short, there are no predicted significant impacts on property or landholdings in vicinity as a result of the medium term (12 year) operations at the subject site. Upon cessation of the activities at the site, the pit void will be restored to an ecological feature with improved material asset value in terms of nature and biodiversity resulting in a positive material asset impact in the long term. **Chapter 4** Population and Human Health and **Chapter 7** Water also provide a more detailed assessment of the potential impacts that the proposed development will have on the inhabitants of the surrounding area.

11.4.2.1 Power and Fuel

The 400 kV Moneypoint-Dunstown power line traverses the application boundary. In terms of Health and Safety, there will be engagement with utility providers regarding exclusion and safe operating distances around electricity infrastructure and the ESB Code of Practice and HSA guidance³⁵ will be adhered to in full. The hazard zone for the 400kV line is a minimum of 10.0m (on both sides of the outside electricity line). The exclusion zone for operating plant and machinery and materials near a 400kV line is 8.0m. Height restriction barriers and equipment will be used onsite to demark electricity infrastructure. These working practices and engagement with ESB Networks will ensure no significant impact on this utility.

An electricity supply to the site buildings and associated infrastructure will be required and will be supplied from the grid network. An established ESB connection exists at Racefield House, which is located within the land ownership boundary. It is proposed that any power supply requirements associated with the on-site facilities will connect to this power supply. The overhead power lines located on the site's northern boundary (L-8006) will be appropriately rerouted underground to accommodate the proposed site entrance and associated infrastructure and a connection will be agreed with ESB Networks.

Fuel will be used on site in the form of marked diesel (for site plant) which will be stored in a doubly contained storage tank at the site compound. All refuelling of road haulage vehicles will take place within a locally bunded refuelling area constructed on concrete hard stand with an associated sump to retain any potential spillage. Any refuelling of mobile plant (crusher/screener) will employ a fuel bowser with a spill kit and drip tray to mitigate any spillage potential.

³⁵ Health & Safety Authority (May 2019). *Code of Practice for Avoiding Danger from Overhead Electricity Lines*, 2nd Edition

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Table 11.4: Land Use and Property Impact Assessment

Impact	Sensitive Receptor	Description of Effects
Traffic	Commercial and Industrial Developments	During the enabling phase of the proposal, there may be a temporary slight, but not significant, effect on the local road network due to increased activity at the site and the construction of the new site entrance.
	Settlements and Housing	During the operational phase there will be a change to traffic volumes due to vehicles entering and exiting the site estimated at an additional 72 HGV movements per day. This will result in a medium-term slight adverse traffic impact for communities in the area. Completion of the extraction activities and restoration of the site will result in the cessation of traffic volumes associated with these operations.
	Agriculture	No significant traffic impact predicted for agriculture from road traffic. Potential impacts on traffic and transport infrastructure in the area are detailed in Chapter 10 Traffic and Transportation.
Air Quality and Dust	Commercial and Industrial Development	During the extraction phase of the proposal there will be intermittent temporary slight effects to ambient dust levels in proximity of the extraction and material processing areas; however, these effects will not be significant.
	Settlements and Housing	Dust minimisation measures will be undertaken onsite to mitigate the potential effects of dust and are detailed in Chapter 8 Air Quality and Climate. There is potential for air quality impacts associated with HGVs on the proposed haul route. However, this impact has been quantified and is considered 'negligible' in Chapter 8 Air Quality and Climate.
	Agriculture	No significant impact predicted for agriculture.
Noise	Commercial and Industrial Development	Temporary/Medium-Term impacts to ambient noise levels during the operational phase as a result of road haulage and on-site plant machinery. This impact will be intermittent, slight/moderate and not significant. No blasting will take place.
	Settlements and Housing	Noise minimisation measures will be undertaken onsite to mitigate the potential negative effects of operational noise. Potential impacts and management procedures are detailed in Chapter 9 Noise and Vibration.

11.4.2.2 Telecommunications

Broadband and telecommunications connections will be required at the new site office location. It is proposed that any telecom requirements associated with the on-site facilities will connect to the existing connection available at Racefield House. There will be communication with the relevant utility provider to identify and agree the connection. There are no telecom transmission poles and lines traversing the proposed site entrance or extraction area. The impact of the construction works on telecommunications infrastructure in area will not be significant. Operational activities on site will not result in a significant impact on the broadband, mobile and telecoms network in the area.

11.4.2.3 Water

The nearest public watermain operated by Irish Water (IW) is located on the L-8006 local road that bounds the site to the north. Racefield House which lies within the proposed application area is connected to this watermain. This watermain will supply potable water for human consumption to the welfare facilities and canteen contained in the portacabin. The design and construction of the connection will conform to the current version of the Civil Engineering Specification for the Water Industry (CESWI), subject to the particular Requirements applied to it by Irish Water, as outlined in the of Code of Practice for Water Infrastructure and outlines design and construction for developers (IW-CDS-5020-03).

REPORT

Wastewater effluent from toilets, urinals, wash basins and canteen facilities will be directed to a proprietary wastewater package treatment unit. All effluent will be collected in a sealed underground pipe network and discharged to a packaged treatment plant with treated effluent percolated to ground. The system will be sized to allow for additional loading.

Water for the processing of gravels will be sourced from the groundwater and will operate as a closed loop system with no requirement for the mains supply to feed this system. Similarly, any water employed for dust suppression and the wheelwash at the site entrance will be sourced from the on-site sump.

Chapter 7 provides a more detailed assessment of the potential impacts that the proposed development will have on water infrastructure, surface water, and storm water drainage in the immediate and surrounding area.

11.4.3 Roads and Traffic

The location of the proposed main site entrance and associated infrastructure will not result in a significant impact on the services levels of the local road infrastructure, traffic and access in the immediate and surrounding areas of the site. A temporary, but not significant, impact on traffic and associated effects may be noted during the period of construction phase for the new site entrance.

During the operational phase there will be a change to traffic volumes in the along the proposed haulage route (via the M9, R418, L-8007, and L-8006) and local area due vehicles entering and exiting the site at peak times. This will result in medium-term, slight/moderate adverse impact on traffic volumes in the area.

Fleet management will be utilised to avoid conflicts with traffic at Ballyshannon National School which is located on the proposed haulage route. The proposed development HGV arrival and departure times will be scheduled to not coincide with early morning drop off and afternoon collection times at Ballyshannon National School.

Overall, activities at the site will not result in a significant impact on road infrastructure, traffic and access in the immediate and surrounding areas of the site. Completion of operations and restoration of the site will result in the cessation of traffic volumes associated with these operations.

Haulage routes and traffic impacts are described in Chapter 10 Traffic and Transportation, which provides a more detailed assessment of the potential impacts that the proposed development will have on the traffic and transportation infrastructure relevant to the proposal.

11.4.4 Waste Management

Waste generated on site will be low levels and will primarily consist of the following waste streams that will derive from either the canteen or the maintenance of on-site mobile plant:

- EWC 20 01 08 biodegradable kitchen and canteen waste
- EWC 20 03 01 mixed municipal waste
- EWC 16 01 07* oil filters
- EWC 16 01 13* brake fluids
- EWC 16 01 99 wastes not otherwise specified
- EWC 13 05 03* interceptor sludges



All waste generated on site will be segregated at sourced and removed by a licensed waste collector(s). All wastes generated by the servicing and maintenance of plant will be immediately removed from site by the service contractor. Sludges from the on-site interceptor and the refuelling area sump will be removed on a regular basis (at least annually) by a suitably licensed operator such as Enva.

11.5 Mitigation Measures

Other than the working practices outlined in this chapter in relation to working in proximity to the 400kV power line and the diversion of the power line at the site entrance, no additional mitigation measures are considered necessary in respect of utilities or waste during the construction, operation and restoration phases of the proposed development.

Measures will be put in place to mitigate potential negative landscapa, visual, air, noise and human health impacts as outlined in the relevant chapters of this EIAR to mitigate impacts on the community.

Dust mitigation measures will be carried out on site to minimise dust nuisance arising from onsite activities. These are outlined in **Chapter 8 Air Quality and Climate**.

Mitigation measures relating to noise management are identified in **Chapter 9 Noise and Vibration**.

Mitigation measures relating to the local road network and site related haulage are identified in **Chapter 10 Traffic and Transportation**.

11.6 Residual Impacts

There are no predicted significant residual impacts on material assets during the construction, operational and restoration phases of the proposed development.

11.7 References

Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA (2017).

Kildare County Development Plan 2017 – 2023.



12 CULTURAL HERITAGE

12.1 Introduction

This chapter of the EIAR provides an archaeological, architectural and cultural heritage background with respect to the proposed development. The objective of the chapter is to assess the impact of the proposed development on the receiving environment and to propose ameliorative measures to safeguard any monuments, features, finds of antiquity or features of architectural or cultural heritage merit. This section should be read in conjunction with the site layout plans for the site and project description provided in Chapter 3 of this EIAR.

12.2 Assessment Methodology

12.2.1 Assessment Approach

12.2.1.1 Desk Study

The desk study availed of the following sources:

- Record of Monuments and Places and Sites and Monuments Record

The primary source of information for the desk study is the Record of Monuments and Places (RMP) of the Department of Culture, Heritage and the Gaeltacht (DCHG). The Sites and Monuments Record (SMR), as revised in the light of fieldwork, formed the basis for the establishment of the statutory RMP pursuant to Section 12 of the National Monuments (Amendment) Act, 1994. The RMP records known upstanding archaeological monuments, their original location (in cases of destroyed monuments) and the position of possible sites identified as cropmarks on vertical aerial photographs. It is based on a comprehensive range of published and publicly available documentary and cartographic sources. The information held in the RMP files is read in conjunction with published constraint maps. Archaeological sites identified since 1994 have been added to the non-statutory SMR database of the Archaeological Survey of Ireland (National Monuments Service, DCHG), which is available online at www.archaeology.ie and includes both RMP and SMR sites. Those sites designated as SMR sites have not yet been added to the statutory record but are scheduled for inclusion in the next revision of the RMP.

- The topographical files of the National Museum of Ireland

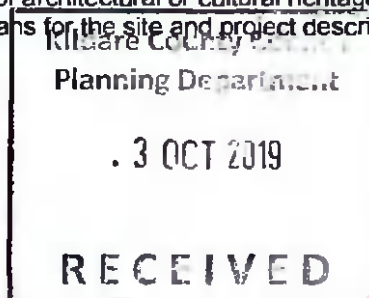
The topographical files of the National Museum of Ireland (NMI) identify recorded stray finds held in the museum's archive. The files, which are donated to the state in accordance with national monuments legislation, are provenanced to townland and sometimes include reports on excavations undertaken by NMI archaeologists earlier in the 20th century.

- Kildare County Development Plan (2017-2023)

The current Kildare County Development Plan was consulted for a list of protected structures, the Record of Protected Structures (RPS sites) comprising schedules of buildings and items of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest that are listed for protection in the study area.

- National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) was established in 1990 in order to fulfil Ireland's obligations under the Granada Convention which states that 'for the purpose of precise identification of the monuments, groups of buildings and sites to be protected, each Party undertakes to maintain inventories of that architectural heritage'. The survey of Kildare was carried out in 2003; this building survey highlights a representative sample and raises awareness of the wealth of architectural heritage in the county. The NIAH surveys can be reviewed at www.buildingsofireland.ie.



- Documentary and cartographic sources

Documentary and literary references were sourced in the National Library and through online sources. The sources used are detailed in the references at the end of the chapter (Section 15.8). The 'Excavations' bulletin published by Wordwell and on the website www.excavations.ie, was consulted for any previous relevant archaeological surveys and excavations that have taken place on or in the vicinity of the proposed development. Historical maps sourced from the Trinity Map Library were examined to determine the changing nature of the land chosen for the proposed development. Cartographic sources consulted for this report include the Down Survey map of the County of Kildare and the Barony of Ballyshannon, c. 1656; Noble and Keenan's map of the County Kildare, 1752; Alexander Taylor's map of the County of Kildare, 1783; and the first and revised editions of 6 Inch and 25 Inch Ordnance Survey maps.

- Aerial photography

A desk based assessment of available aerial photography was undertaken in order to establish recent land use practices and changes in the immediate environment. This analysis can reveal cropmarks created by subsurface features which often indicate areas of archaeological potential. Sources include Ordnance Survey aerial photography, Google Earth imagery and imagery collected in a drone survey carried out in advance of the proposed development.

12.2.2 Standards and Guidelines

The following legislation, standards and guidelines were consulted to inform the assessment:

- National Monuments (Amendments) Acts, 1930-2014;
- The Planning and Development Act 2000, as amended;
- Heritage Act, 1995;
- The UNESCO World Heritage Convention, 1972;
- ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005;
- Council of Europe Convention for the Protection of the Architectural Heritage of Europe (Granada) 1985, ratified by Ireland in 1991;
- Council of Europe European Convention on the Protection of the Archaeological Heritage (Valletta) 1992, ratified by Ireland in 1997;
- The Burra Charter, the Australia ICOMOS Charter for Places of Cultural Significance 2013;
- The European Landscape Convention (ELC), ratified by Ireland 2002 European Landscapes Convention 2010. (The Department of the Environment, Heritage and Local Government 'Landscape and Landscape Assessment Guidelines' have been in draft form since 2000, however the Draft National Landscape Strategy (NLS) was launched in July 2014);
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties – A publication of the International Council on Monuments and Sites, January 2011;
- Guidelines on the information to be contained in Environmental Impact Statements, 2002, EPA;
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements), 2003, EPA;
- EPA: Draft Revised Guidelines on The Information to be Contained in Environmental Impact Statements, September 2015;
- EPA: Advice Notes for Preparing Environmental Impact Statements, Draft. September 2015;



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- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Planning and Development Act 2000;
- Code of Practice between the National Roads Authority (NRA) and the Minister for Arts, Heritage and the Gaeltacht, June 2000;
- Guidelines for the Assessment of Architectural Heritage Impact of National Road Schemes. 2006, NRA;
- Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes. 2006, NRA;
- Guidelines for the Testing and Mitigation of the Wetland Archaeological Heritage for National Road Schemes, 2006, NRA;
- National Landscape Strategy for Ireland 2015-2025, Department of Arts, Heritage and the Gaeltacht;
- Historic Environment Good Practice Advice in Planning, Note 3: The Setting of Heritage Assets, July 2015, Historic England
- Managing Change in the Historic Environment, October 2010, Historic Scotland
- Proposals for Irelands Landscapes, 2010, The Heritage Council;
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, 2011, International Council on Monuments and Sites;
- Code of Practice between the Department of the Environment, Heritage and Local Government and the Irish Concrete Federation, 2009, Irish Concrete Federation.

Excerpts from the relevant legislation are contained in **Appendix 12.1 of Volume III** of this EIAR. The Code of Practice between the Department of the Environment, Heritage and Local Government and the Irish Concrete Federation, of which Kilsaran is a member, is contained in **Appendix 12.2 of Volume III** of this EIAR.

12.2.3 Assessment Criteria

Cultural heritage sites / landscapes are considered to be a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could adversely affect these sites. The likely significance of all impacts is determined in consideration of the magnitude of the impact and the baseline rating upon which the impact has an effect (i.e. the sensitivity or value of the cultural heritage asset). Having assessed the magnitude of impact with respect to the sensitivity / value of the asset, the overall significance of the impact is then classified as imperceptible, slight, moderate, significant, or profound. A glossary of impact assessment terms, including the criteria for the assessment of impact significance, is contained in **Appendix 12.3 of Volume III** of this EIAR.

In accordance with the NRA 'Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes' (2006) the significance (i.e. value) criteria used to evaluate an archaeological site, monument or complex are as follows: existing status (level of protection), condition or preservation, documentation or historical significance, group value, rarity, visibility in the landscape, fragility or vulnerability, and amenity value. The archaeological and cultural heritage environment is assigned a baseline rating, taking into account the importance, value and / or sensitivity of the receiving environment.

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12.2.3.1 Significance Criteria

The significance criteria presented in Table 12.1 can be used to evaluate the significance of an archaeological site, monument or complex. It should not, however, be regarded as definitive, rather it is an indicator which contributes to a wider judgment based on the individual circumstances of a feature. Different archaeological heritage asset types lend themselves more easily to assessment and it should be borne in mind that this can create a bias in the record, for example an upstanding stone monument such as a fortified house is easier to examine with a view to significance than a degraded enclosure site.

Table 12.1: Significance Criteria, NRA Guidelines 2006 (Archaeological Heritage)

Criteria	Explanation
Existing Status	The level of protection associated with an archaeological site / monument is an important consideration.
Condition / Preservation	The survival of a monument's archaeological potential both above and below ground is an important consideration and should be assessed in relation to its present condition and surviving features. Well-preserved sites should be highlighted, this assessment can only be based on a field inspection.
Documentation / Historical Significance	The significance of a monument may be enhanced by the existence of records of previous investigations or contemporary documentation supported by written evidence or historic maps. Sites with a definite historical association or an example of a notable event or person should be highlighted.
Group Value	The value of a single monument may be greatly enhanced by its association with related contemporary monuments or with monuments from different periods indicating an extended time presence in any specific area. In some cases it may be preferable to protect the complete group, including associated and adjacent land, rather than to protect isolated monuments within that group.
Rarity	The rarity of some monument types can be a central factor affecting response strategies for development, whatever the condition of the individual feature. It is important to recognise sites that have a limited distribution.
Visibility in the Landscape	Monuments that are highly visible in the landscape have a heightened physical presence. The inter-visibility between monuments may also be explored in this category.
Fragility/ Vulnerability	It is important to assess the level of threat to archaeological monuments from erosion, natural degradation, agricultural activity, land clearance, neglect, careless treatment or development. The nature of the archaeological evidence cannot always be specified precisely but it may still be possible to document reasons to justify the significance of the feature. This category relates to the probability of monuments producing material of archaeological significance as a result of future investigative work.
Amenity Value	Regard should be taken of the existing and potential amenity value of a monument.

12.2.3.1.1 Determining Significance of Architectural Heritage Assets

The significance of perceived impact on structures and sites of architectural merit is determined by a combination of the architectural heritage importance of the structure and the degree of impact. In each case the structure is given a rating as to its importance and, if higher than 'Record only', the nature of its special interest is given. The rating definitions are in accordance with those given by the National Inventory of Architectural Heritage (NIAH):

- **International:** Structures or sites of sufficient architectural heritage importance to be considered in an international context. Examples include St Fin Barre's Cathedral, Cork. These are exceptional structures that can be compared to and contrasted with the finest architectural heritage in other countries.
- **National:** Structures or sites that make a significant contribution to the architectural heritage of Ireland. These are structures and sites that are considered to be of great architectural heritage significance in an Irish context. Examples include Ardnacrusha Power Station, Co. Clare, the Ford Factory, Cork; Carroll's Factory, Dundalk, Lismore Castle, Co. Waterford; Sligo Courthouse, Sligo, and Emo Court, Co. Laois.

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- **Regional:** Structures or sites that make a significant contribution to the architectural heritage within their region or area. They also stand in comparison with similar structures or sites in other regions or areas within Ireland. Examples would include many Georgian terraces; Nenagh Courthouse, Co. Tipperary; or the Bailey Lighthouse, Howth. Increasingly, structures that need to be protected include structures or sites that make a significant contribution to the architectural heritage within their own locality. Examples of these would include modest terraces and timber shop fronts.
- **Local:** These are structures or sites of some vintage that make a contribution to the architectural heritage but may not merit being placed in the RPS separately. Such structures may have lost much of their original fabric.
- **Record only:** These are structures or sites that are not deemed to have sufficient presence or inherent architectural or other importance at the time of recording to warrant a higher rating. It is acknowledged, however, that they might be considered further at a future time.

Where the rating is deemed to be higher than 'Record only' the category of special interest is noted. It should be noted that the term 'special architectural interest' applies only in the context of this assessment of architectural heritage and does not imply that those buildings and other structures that are not considered to be of special architectural interest are in any way inferior or are of lower value.

The special interest is based on the categories set down in the Planning and Development Act, 2000. While that Act gives no criteria for assigning a special interest to a structure, the National Inventory of Architectural Heritage (NIAH) offers guidelines to its field-workers. This offers guidance by example rather than by definition, and is the system adopted for the present assessment.

There are eight categories set down in the Act, viz. archaeological, architectural, historical, technical, cultural, scientific, social and artistic, and the NIAH guidance for each is outlined in Appendix 12.1 of Volume III of this EIAR.

12.2.3.1.2 Magnitude of Impact

Table 12.2 presents magnitude of impact that is employed in this impact analysis.

Table 12.2: Magnitude Criteria

Magnitude of Impact	Criteria
Very High	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where a cultural heritage asset is completely and irreversibly destroyed by a proposed development.
High	An impact which, by its magnitude, duration or intensity alters an important aspect of the environment. An impact like this would be where part of a cultural heritage asset would be permanently impacted upon leading to a loss of character, integrity and data about the archaeological / cultural heritage feature/site.
Medium	A moderate direct impact arises where a change to the site is proposed which though noticeable is not such that the archaeological / cultural heritage integrity of the site is compromised and which is reversible. This arises where an archaeological / cultural heritage feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.
Low	An impact which causes changes in the character of the environment which are not significant or profound and do not directly impact or affect an archaeological / cultural heritage feature, site or monument.
Negligible	An impact capable of measurement but without noticeable consequences.
No change	No change to the asset or setting.

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12.2.3.1.3 Sensitivity Criteria

The evaluation of the sensitivity / value of sites and features is based on the extent to which assets contribute to the archaeological or built heritage character, though their individual or group qualities, either directly or potentially and guided by legislation, national policies, acknowledged standards, designations and criteria. Table 12.3 presents the scale of sensitivity / value together with criteria.

Table 12.3: Sensitivity Criteria

Sensitivity / Value	Criteria
Very High	Sites of international significance: World Heritage Sites National Monuments Protected Structures of international and national importance Designed landscapes and gardens of national importance Assets of acknowledged international importance or that can contribute significantly to international and national research objectives
High	RMP / SMR sites Designated assets that contribute to regional research objectives Protected Structures of regional importance Architectural Conservation Areas
Medium	Recently / newly identified archaeological sites (not yet included on the SMR / RMP, the importance of the resource has yet to be fully ascertained) Undesignated assets that contribute to regional research objectives NIAH Building Survey and Garden Survey Sites
Low	Undesignated Sites of local importance (e.g. townland / field boundaries) Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value but with the potential to contribute to local research objectives (e.g. potential buried foundations associated with features / structures shown the 1 st edition OS six-inch mapping) Historic townscapes or built up areas of limited historic integrity in their building or their settings
Negligible	Assets with very little or no surviving archaeological interest. Buildings of no architectural or historic note
Unknown	The nature of the resource has yet to be fully ascertained, e.g. sites or areas of specific archaeological potential, greenfield areas or riverine / stream / coastal environs with inherent archaeological potential. Structures with potential historic significance (possibly hidden or inaccessible).

12.2.3.1.4 Criteria for Assessment of Impact Significance

Using both the sensitivity of the heritage asset (Table 12.3) and the magnitude of impact (Table 12.2), the impact significance is established (Table 12.4).

Table 12.4: Significance of Effects

Significance of Effect	Description
Very Significant	An impact which by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment, for example in this case a monument
Not Significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences

12.3 Baseline Conditions (Existing Environment)

12.3.1 Site Description

The site is located in Racefield townland in the parish of Ballyshannon and the barony of West Offaly, Co. Kildare. It is bounded on the north by the L-8006 road (which functions as the townland boundary with Crockaun), on the east by the townland boundary with Ballyshannon Demesne, on the south by a plantation of coniferous trees and on the west by the townland boundary with Crawnglass. The site is adjacent to Ballyshannon Demesne, a former demesne landscape which was created at the site of a Fitzgerald castle and 17th century fortification.

The area is drained by the Eaglehill Stream (south of the site) which feeds into the Kildoon River, a tributary of the River Barrow.

The lands under the ownership of Kilsaran comprise of 17 fields of south-westerly aspect, covering approximately 58.2ha (Figure 12.1). The highest point at approximately 100m OD is in the north-eastern corner in Fields 10, 14 and 15), sloping towards the south and west, with the lowest points occurring in the western fields below the 90m contour in Fields 1, 3, 4 and 5. The land has to date been used for a mixture of arable and pastoral farming. The fields are generally regular, with some curving field boundaries following a possible palaeochannel.

Racefield House is situated in the north-east corner of the application site and is to be retained as part of the development.

The 400kV Moneypoint-Dunstown overhead power line (OHL) traverses Fields 3, 7 and 10, with pylons located in Fields 7 and 10.

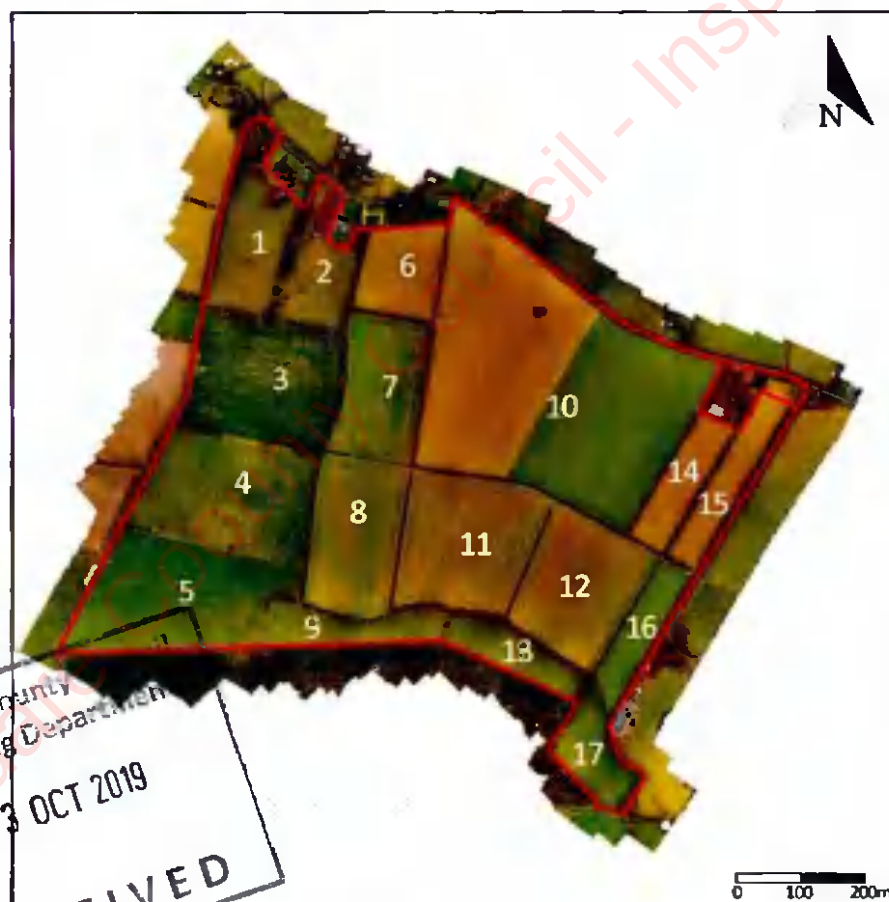


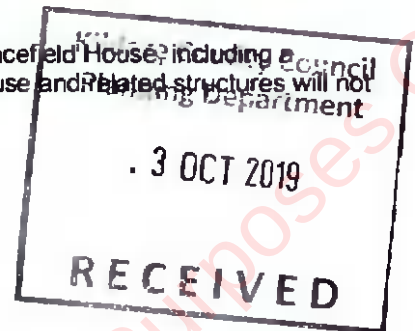
Figure 12.1: Existing Site Layout

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The proposed works are outlined in **Chapter 3** of this EIAR. This work will be contained within fields 7, 8, 10, 11, 12, 14, 15 and 16. Screening mounds will be provided on the north, adjacent to the L-8006 road, and the existing hedgerows and trees on the northern perimeter will be retained and if necessary reinforced.

The central work area will be located in Fields 10, 11, 12, 14, 15 and 16. Fields 7 and 8, and portions of Fields 11 and 12 will function as Overburden Storage Areas, with closed circuit silt disposal lagoons to be located in Field 12.

Ancillary buildings and a site compound will be located within the yard of Racefield House, including a portacabin with a WC and canteen, and parking. The existing Racefield House and related structures will not be affected by these facilities.



12.3.2 Archaeological Heritage

12.3.2.1 Archaeological and Historical Background

Prehistory

The distribution of barrows, c. 2.4km east and southeast of the proposed development site indicates prehistoric occupation of this area (**Figure 12.3**; RMP no.: KD032-078, KD032-079, KD032-080, KD032-015 & KD032-076 illustrated; also KD028-088, KD032-015, KD032-022, KD032-023, KD032-024, KD032-025, KD032-075, KD032-077 and a ringditch KD032-083). Barrows are burial sites, typically of Bronze Age date, comprising of a circular or oval ditch and a level or raised interior, sometimes including an internal mound or external bank. They often occur in groups together or along routeways. This distribution is located along the lower slopes of an upland area around Calverstown, and it has been noted in other locations that upland barrow cemeteries were intended to be visible from the associated settlement zone (Healy & Harding 2007). It is therefore likely that the population associated with these burial monuments lived and farmed in the lowlands around Ballyshannon.

However, very little evidence of lowland prehistoric occupation has been found in this area with the only known evidence comprising of two waste flakes associated with a post-pit containing two post holes in the townland of Ballyshannon. A mound (RMP no.: KD32-001) is located 970m south of the site in the townland of Borough. It is possible that this is a prehistoric site but may also be of medieval date. It is likely that later Anglo-Norman occupation, land management associated with Ballyshannon Demesne and modern farming practices will have eradicated or concealed many prehistoric features if they existed in this landscape, but there is the potential for subsurface features or stray finds to remain.

The National Monument of Dún Ailinne (or Knockaulin; RMP no.: KD028-038001; PO No. 200/1954) is located 5.4km northeast of the application site on a moderately steep-sided, round-topped hill (OD c. 183m). O'Donovan, jointly compiling the Ordnance Survey Letters for Co. Kildare in 1837, noted that the name 'Ailinne' was said to derive from an 'ail' or stone on the site (KD028-038004-). A substantial earth and stone bank (H 5m) and deep internal fosse encloses a very large oval area (c. 470m N-S; c. 385m E-W, c. 13 hectares), with a causewayed entrance (unexcavated bedrock) at E, approached externally by a revetted/kerbed roadway (L c. 40m; Wth c. 8m) which continues internally (L c. 70m) towards the summit of the monument. The earliest activity uncovered on the hilltop was a small Neolithic enclosure (KD028-038007-), a possible Neolithic burial (KD028-038005-) and possible Neolithic and Bronze Age habitation evidence (KD028-038003-). Later, and far more extensive Iron Age activity comprised three major successive phases of construction, each partly cutting through the previous and all defined by circular trenches, representing large post and palisade structures. Evidence, perhaps, of periodic feasting in the latest phase. Radiocarbon dates and finds, including an iron sword, an iron spear-head, iron needles, fragments of bronze fibulae and glass beads, indicate a late-prehistoric date (c. 390 BC - c. 320 AD ?) for the ritual activity at Dún Ailinne. Segment of the rock-cut ditch of O'Donovan's 'Rath' (KD028-038006-) in the centre of the enclosure cut through all the later prehistoric levels on the hilltop. Of the substantial bank and fosse enclosing the hilltop, one radiocarbon date obtained from the humus beneath the rampart gives a terminal date for its construction of probably sometime after 700 BC (Waddell 1998, 344). Partial views of Dún Ailinne were noted from the south and southwest of Field 10, but existing vegetation and planned screening mounds will obscure the visual impact on the National Monument.

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Early Medieval period

The barony name of Offaly refers to the Gaelic *Ui Failge*, who would have occupied the area in the Early Medieval period. Secular and ecclesiastical activity is evident in this landscape in the Early Medieval period. Three ringforts are located in the vicinity (**Figure 12.3**; RMP no. KD028-044, KD028-050, KD028-052). These are medieval Gaelic Irish habitation sites, typically located in well-drained area of good agricultural land, although KD028-050 is noted for being located in an area of low-lying marshy ground. They are composed of one or more earthen banks and ditches, enclosing an internal area in which dwellings and other structures were located. They typically date to the Early Medieval period, and excavations have increasingly shown Iron Ages phases to the use of some of these sites. Although they were occupied into the Late Medieval period in other regions, eastern areas of good agricultural land such as this would have come under Anglo-Norman control quite early, followed by later English land redistribution, and as such would have seen a discontinuation of the use of ringfort habitation much earlier.

Two field systems are located south of the proposed development site (RMP no. KD032-067, KD032-074). They are visible on aerial photography as linear features which apparently form rectilinear fields with circular and subcircular associated enclosures. Although they are not located near any ringfort sites, they are located between a burial ground (RMP no. KD032-002) and a medieval church site (RMP no. KD032-005) and their appearance is consistent with early field systems.

Three early church sites and a holy well are recorded in the area. All three church sites comprise of a later church on the site of an earlier medieval one. The first is within the Ballyshannon Demesne (RMP no. KD028-058002) and was replaced in the 19th century with the existing Church of Ireland St. James' Church.

A ruined church and graveyard (RMP no. KD032-013, KD032-013001) are located in Castlefarm 2.4km southwest of the development site. Portions of the north and south wall of the nave still stand, with a chancel arch on the east gable. An octagonal font (RMP no. KD032-013002) is housed in the church. It was associated with a cell of the Augustinian Carmel Priory in Lancashire and was founded in 1201-2 but may have been built on the site of an earlier church, built by St. Briga in the 5th century.

In Davidstown, a church and graveyard (RMP no. KD032-005, KD032-005001) are located 175m from a holy well known as St. John's Well (RMP no. KD032-006), 2.8km southeast of the development site. It comprises of an original medieval structure attached to a later 19th century church. The presence of holy wells usually indicates an early ecclesiastical site which may have had pre-Christian origins as a place of worship.

A burial ground (RMP no. KD032-002) is located in Tippeen Lower, 1km south of the development sites. Historical mapping shows it surrounded by an oval-shaped wall. The site is not associated with any church remains or saint's dedications, and may therefore be a secular burial ground, but the townland name of Tippeen is derived from Teach Fionán (St. Finan's Home; www.logainm.ie) and it is therefore possible that there was originally an associated saint's dedication.

The National Monument at Dún Ailinne (or Knockaulin; RMP no. KD028-038001; PO No. 200/1954) continued to be an important regional centre in the Early Medieval period as was one of the 'Royal' sites of this period. O'Donovan noted in the Ordnance Survey Letters of County Kildare that Dún Ailinne was referred to in the literature as, 'a place of assemblies, a Rath with royal roads, ... a Grianan [palace] and a Royal Dún (Herity 2002, 102-3 [46-7]).

Late Medieval period

The arrival of the Anglo-Normans in 1169 brought about the introduction of new fortifications and new forms of settlement, particularly in the fine agricultural land in the east of Ireland. The initial phases of Anglo-Norman activity would have involved rapid expansion and the erection of simple earth and timber fortifications to maintain control of an area. A motte is a flat-topped earthen mound on which a timber keep was constructed to function as the earliest castle sites. Below the mound, an enclosed area known as a bailey accommodated additional structures. These sites typically date to the late 12th century, and more important sites began to be replaced in the 13th and 14th centuries by masonry castles.

The motte in Ballyshannon (RMP no. KD028-058001) dates to this initial Anglo-Norman phase, when much of Kildare came under the control of the Fitzgerald family. Ballyshannon was probably under Fitzgerald

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control at this time, but it was certainly one of their strongholds in the latter half of the 14th century (Fitzgerald 1899). The motte was replaced by a masonry castle (RMP no.: KD032-003001) as Ballyshannon became an established settlement. This castle is depicted in an 1853 sketch of a 1650 illustration of the castle and post medieval fortifications under siege (Figure 12.2).

Two other castles are recorded nearby. One in Castlefarm (RMP no.: KD032-014) is recorded on Taylor's map of Kildare (1783), but no visible trace survives. The remains of a tower house are evident in Calverstown Demesne (RMP no.: KD032-047001), where it is incorporated into the north corner of a later 17th century house (RMP no.: KD032-047002). The tower house was a later phase of castle, dating from the late 14th to the 16th centuries, and occupied not just by nobility, but also by prosperous families and merchants. The proximity of three castle sites so close together indicates a prosperous area which is due to the fertile agricultural land of Kildare.

In 1428, Ballyshannon was in the King's hands, as Gerald, the 6th Earl had died in debt. He ordered the Bishop of Ossory and Treasurer of Ireland to appoint John Drew and John Crone receivers over Ballyshannon. It was granted in 1498 by the 8th Earl to Gerald FitzJohn FitzWilliam FitzThomas FitzGerald and it remained in that family until the Confederate War (Fitzgerald 1899).

Post Medieval period

A number of pardons are recorded of Sir Pierce Fitzgerald (styled Piers FitzJames of Ballisonane) between 1573-91 for offences including rebellion, intercourse with the Irish, alienations of land, marrying an heiress or widow without sanction from the Crown etc. (Fitzgerald 1899). At the same time, he served as High Sheriff as a defender of the Crown against rebels and had the power to execute ~~marshall~~ law against rebels and vagabonds in Kildare. He died in 1593 in an attack on his castle near Athy by Walter reagh Fitzgerald. He was succeeded by Sir James Fitzgerald, who also served as High Sheriff. His heir was his grandson, Pierce Fitzgerald, who remained a Catholic though his grandfather had been Protestant. At the outbreak of the Confederate War of 1641-53, he was appointed Commander of the Garrison at Castledermott by George, 16th Earl of Kildare and was provided with store of arms and ammunition for 100 men. He then defected to join the army of the Catholic Confederation in Kilkenny, where he was appointed Commander of the Leinster Horse (Fitzgerald 1899).

A number of prominent fortresses were constructed in Leinster at this time. Pierce Fitzgerald constructed a bastioned fort around the castle (RMP no.: KD032-003001), with a water-filled moat and additional earthworks and outworks in the surrounding area. A sketch was drawn in 1853, based on an original from 1650, which depicted the castle under siege and the features within the demesne entitled 'Plan of the Castle of Ballyshannon, with its Outworks, in 1650 (Figure 12.2). An accompanying description describes the feature as 'an inner 'moat ... in some places 40 foot [c. 12m] broad ... the graft [ditch] 25 foot [c. 7.6m] in five places and 12 foot [c. 3.6m] deep (with a drawbridge near the NW angle) ... the Rampire and Parapet 30 [c. 9m] foot thick and in some places 25 foot [c. 7.6m] high'.

Two outworks are also depicted, and are annotated, 'The workes of the Towne'. The first, L-shaped, encloses all but the east side and portion of the south-east angle of the bastioned fort (RMP no.: KD032-003001). The earlier ~~motte~~ is shown to the north (RMP no.: KD028-058001) with a palisade on its summit surrounding a tree. The church is depicted (RMP no.: KD028-058002) adjacent to a second unnamed building. An entrance is shown mid-way along north side of the outworks. The road outside this boundary is the existing L-8007. A second outwork, with projecting bastions, runs outside and parallel to the west and north sides of the first, extending across the road to Ballyshannon townland. 'The Black Castle' (RMP no.: KD032-003003-) is shown defending a gateway on its W side. No visible surface traces survive of any of these features apart from the motte and a sub-rectangular cropmark at the site of the castle.

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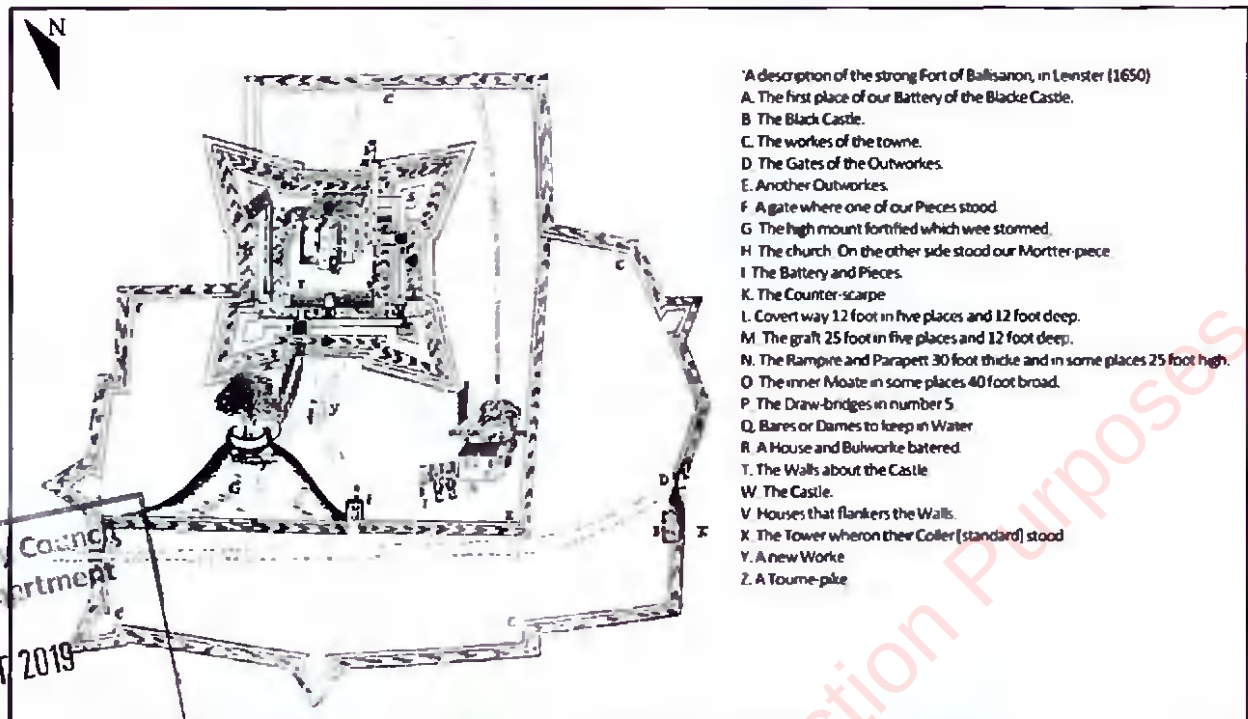


Figure 12.2: 'Plan of the Castle of Ballyshannon, with its Outworks, in 1650' (Source Nolan & McGrath 2006)

A letter from Colonel Hewson to the Honourable William Lenthall, dated 3rd March 1649 from Ballyshannon reads;

'Upon the 28th of February, I marched from the Naas, and about four o'clock, with the van of the party, I came to Ballisanon, a strong garrison, double works and moted, full of water one within another, and a mount with a fort upon it. Most of the officers with me esteeming the taking of it to be unfeazable, it being late, and I unwilling to lose time, did send in a summons a copy- whereof is here inclosed, and the inclosed answer under the Governour's hand was presently returned, and the town which was without [i.e., outside of] his works by him was burned that night.

I caused a battery to be made, and planted the artillery, and made a fort for the security thereof, having intelligence that the lord of Castle- haven with 4,000 horse and foot would come to raise me within two dayes, in which fort I could secure the guns and batter their works, whilst I drew off to fight the enemy if need were.

We played our guns and mortar pieces at the fort upon the mount, intending before night to storme it ; having ladders and all necessities ready, but before any breach was made, the Governour did send me paper, which is here inclosed, whereunto the inclosed answer was returned, and he treated with me about the surrender, which was concluded accordingly. The articles signed with both our hands herewith is represented unto you.'

Excavations west of the castle were undertaken in advance of a development (Licence no.: 98E0345) and it was expected that some of these outworks would be identified, but no trace of them was revealed. It is possible that they were further west within the boundaries of the proposed development.

The castle was held by English forces in 1649, but Fitzgerald managed to regain it for a time. During the redistribution of lands by Cromwell, the Fitzgeralds of Ballyshannon lost control of their lands. By the time of Petty's (or Pender's) census of 1659, John Anesley Esq. is recorded as the title holder of Ballyshannon. It is not known when Pierce Fitzgerald died; it possibly occurred overseas having fled after the war.

The Anesley family demolished the castle in order to build the castellated Ballyshannon House. It was passed to the Palmers before being purchased by the Kennedys in 1800 (Dean 2016). Griffith's Valuation

records the properties and occupants of the area in 1852 which names Barbara Kennedy as the occupant of Ballyshannon House. The occupants of Racefield townland are also noted, including Thomas Morris, James McLoughlin, Thomas Flynn and Patrick Morris, with the owner listed as Robert H. Borrowes. An account of the grounds of Ballyshannon by Sir Erasmus D. Borrowes from a visit in 1857 notes that there were no remains of the castle at that time, although some of the defences were still extant (Fitzgerald 1899).

12.3.2.2 RMP / SMR Sites

There are no registered monuments (RMP / SMR sites) within the proposed sand and gravel extraction site. It is, however, located within a landscape which is rich in prehistoric burial monuments, medieval defensive sites and ecclesiastical sites. A full inventory of sites within 2km of the development area is provided in **Appendix 12.4 of Volume III** of this EIAR and the monuments are discussed in their contexts in **Section 12.3.2.1**.

The closest monuments are a cluster within Ballyshannon Demesne, east of the application site. The 1998 Archaeological Constraints maps illustrate a polygon around all of the sites of this cluster, but the current zones of archaeological potential, as depicted on www.archaeology.ie, have been revised to a smaller area (Figure 12.3).

A church and graveyard (RMP no.: KD028-058002, KD028-058004) are located 830m east of the site within Ballyshannon Demesne. The existing 19th century St. James' Church is on the site of an earlier Medieval church. The 'Plan of the Castle of Ballyshannon' (Figure 12.2) depicts a roofed rectangular structure, labelled 'The Church', lit by three windows in the north wall and one in the west gable wall with a doorway near the western end of the north wall. A second structure is shown south of the church. The graveyard is not depicted in the plan. It comprises at present of a sub-rectangular area (c. 50m by 30m), enclosed by a mortared stone wall with entrance gate on the north side. Legible burial markers date from the 18th to the 20th century (www.archaeology.ie).

An Anglo-Norman motte (RMP no.: KD028-058001) is located 910m from the site, adjacent to the church and graveyard. It was depicted on the plan of Ballyshannon as a steep-sided conical mound with a palisade and possible bank enclosing the summit which contained a large tree. It was annotated 'The high mount fortified which wee stormed'. Outworks were illustrated around the mound. The site appears at present as a low denuded, grass-covered and partially tree-clad oval, earthen mound on a gently sloping south facing pasture.

An unclassified castle (RMP no.: KD032-003002) is located 885m east of the application site, to the south of the church, graveyard and motte site. It was a Fitzgerald castle, described as 'The Castle of Ballyshannon' on the plan. It was depicted as a large double-gabled building of three stories plus attic with crenelations on the northern façade and crenelated rectangular tower on the northern wall with a tall circular turret projecting from the southwest angle. It stood on the northeast corner of a square bawn with a crenelated wall and towers on the northwest and southeast angles. An entrance with drawbridge was located on the north wall. No visible trace survives except for a square cropmark which is visible on occasional aerial imagery.

A bastioned fort (RMP no.: KD032-003001) surrounded the site of the castle. It is depicted on the plan of Ballyshannon under attack during the Confederate War (1641-53). It is shown as a rectangular area with triangular bastions on each corner with Ballyshannon Castle on the interior. It is depicted on Ordnance Survey historical mapping as an earthen bank enclosing a rectangular area (c. 40 N-S by 30m E-W) with entrance on the west. No visible trace survives.

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12.3.2.3 Previous Archaeological Investigations

There have been four excavations recorded in the vicinity of the proposed development site (Figure 12.4). The closest was 100m east of the site boundaries in Ballyshannon Demesne (Licence no.: 98E0345; excavations' ref.: 1998:295; Byrne 1998). Ten test trenches were excavated, which revealed sherds of medieval and post medieval pottery. It was expected that parts of the outer defences associated with the 17th century fortifications at Ballyshannon Castle would be revealed, but no such features were found. It was concluded that such features must lie to the west of the tested area, possibly within the boundaries of the proposed development site. However, the 'Plan of the Castle of Ballyshannon' depicts extant remains (the motte and church site), and the scale of the drawing suggests the defences would have been within the townlands of Ballyshannon Demesne and Ballyshannon.

A programme of monitoring of topsoil stripping was undertaken in Ballyshannon townland (Licence no.: 00E0277, 'excavations' ref.: 2000:0464). Agricultural features were identified which may have pre-dated the existing field system, including a complex of three hand-cut ditches of uncertain date, a post structure, post holes, fire spots, pits and narrow trenches. Most features are of unknown date as there were no associated finds and may be quite recent. A post-pit containing two post-holes may be of prehistoric origin as it contained a waste flake with another nearby.

A programme of monitoring was undertaken as part of the Kildare Water Supply Strategy which included two segments along the R414 road between 1-1.4km east and south-east of the application area (Licence no. 11E0447; 'excavations' ref.: 2012/329). A post-medieval stone culvert was identified outside of Ballyshannon Demesne which may have been a drainage feature associated with the demesne. An archaeological investigation was undertaken 2.7km south-west to investigate crop marks in the vicinity of the barrow distribution (Licence no. 94E0013; 'excavations' ref.: 1994/132). The features were not of archaeological significance.

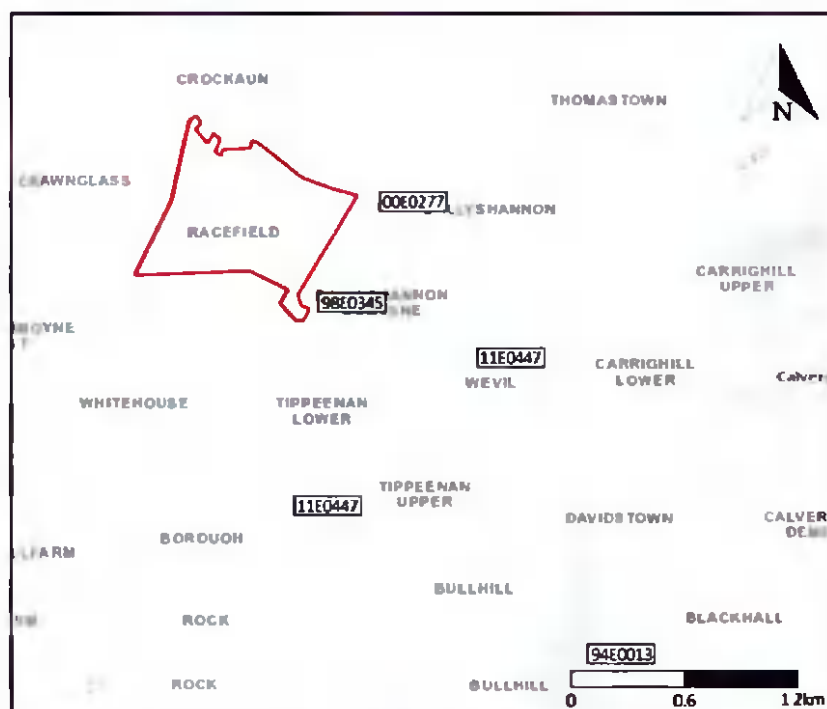


Figure 12.4: Previous excavations

12.3.3 Built Heritage

12.3.3.1 Record of Protected Structures / NIAH Survey

There are no protected structures within the site boundaries (Figure 12.5). The late 19th century Racefield House and associated farm buildings are located within the northeast corner of the site boundary (Section 12.3.3.2).

The closest protected site is located approximately 775m east of the site within Ballyshannon Demesne. The now disused St. James' Church (RPS no.: B28-24; NIAH no.: 11902811) is located on the site of an earlier medieval church (RMP no.: KD028-058002). It comprises of a three-bay double-height Gothic-style Board of First Fruits Church of Ireland church, c.1820, with pointed-arch openings, single-bay single-storey rubble stone vestry projection to north-east, single-bay double-height gabled projecting lower porch to west and bellcote to gable to west. The graveyard to site includes various cut-stone grave markers, c.1700-c.1950, with a gateway, c.1820, to the north comprising pair of cut-stone piers with cast-iron gates (www.buildingsofireland.ie).

Other protected sites in the hinterland include two rectories / parochial houses to the north (NIAH no.: 11902807, 11902809), St. Brigid's Catholic Church in Suncroft (RPS no.: B28023; NIAH no.: 11902806) and a farmhouse in Martinstown. Calverstown Demesne to the south-east contains Calverstown House, a middle-sized Georgian house dating to c. 1780. Calverstown saw further development in the 19th and early 20th century, with Grove Villa (c. 1880, RPS no.: B32-30; NIAH no.: 11903210) and Calverstown Cottage (c. 1920, RPS no.: B32-31, NIAH no.: 11903209) listed among the protected structures.

Ballyshannon House is no longer present, but the former gardens are recorded in the NIAH Garden Survey (Garden Survey ref.: KD-55-N-787043). It is a paper survey based on digital aerial photography and indicates that the site footprint is no longer visible, with no surviving architectural features or landscape features (cf. Section 12.3.5.4) for description of house and demesne on historical mapping). A description of the house from 1899 records that it was built from the material salvaged from the demolished castle by the Anesley family and was a plain, square, featureless building, covered with dashing and battlements. A limestone slab was placed in an angle of the wall on the south-east side with the inscription 'MOM (a horse) 1620'. A horse-like carving was next to the inscription. It was probably taken from the castle (Fitzgerald 1899). The house passed to the Palmers and was purchased by the Kennedy family in 1800.

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A pile of granite masonry was noted beyond the site boundary within the Ballyshannon Demesne site boundary which is likely to have come from the demolished Ballyshannon House, and originally from the castle.

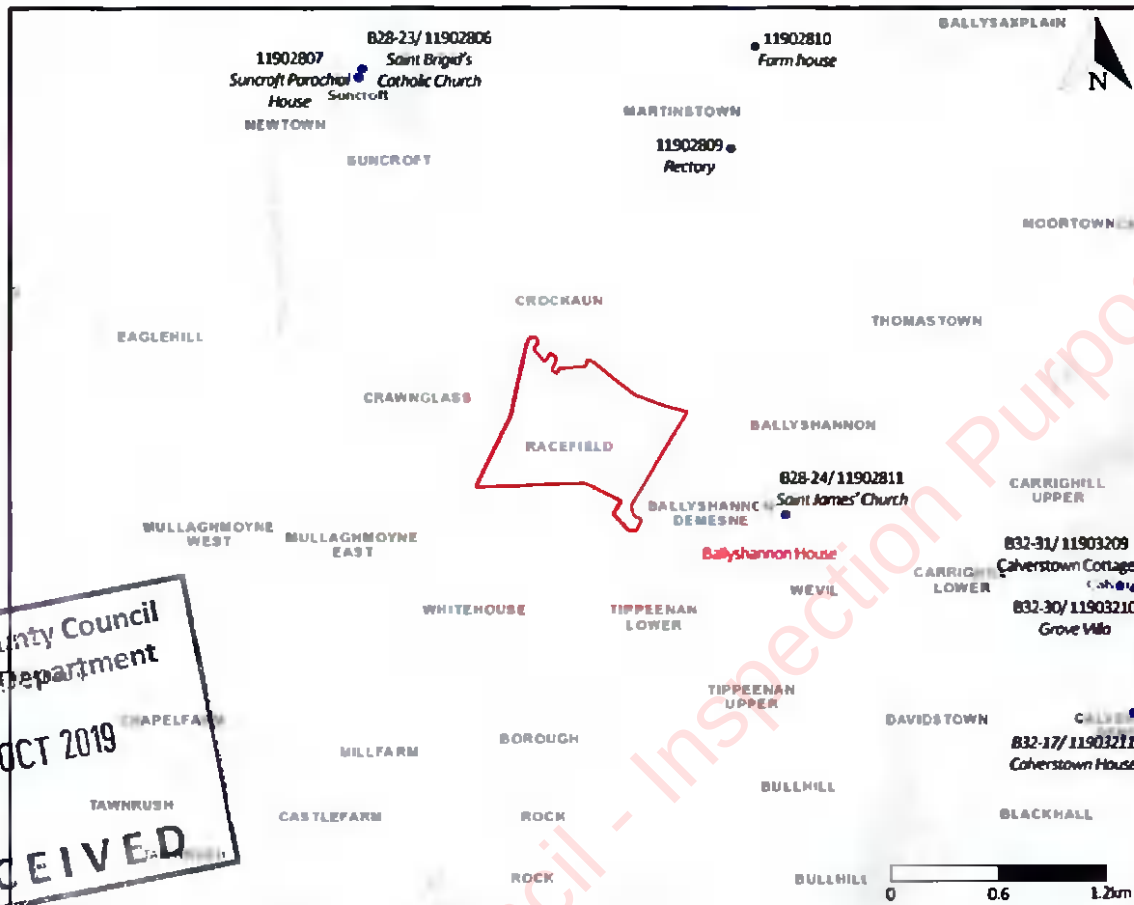


Figure 12.5: RPS / NIAH sites

12.3.3.2 Racefield House

Racefield House and its associated barn, sheds and farmyard are located within the northeast corner of the application site, accessed by a wrought iron gateway on the road (L-8006) (Images 12.1-12.12). It appears in the 25-inch Ordnance Survey map of 1907-9 and was noted in the 1901 and 1911 Census as the residence of William Jackson, and the property remained in his family for over 100 years.

It is a late 19th century three-bay, two-storey farmhouse with a central porch and chimney stack on each gable end, with two-storey extension to rear originally creating an L-shaped building. An additional abutting one-storey extension is located on the south and a small pumphouse / shed is attached to the west wall.

A high east-west wall to the rear of the house has the appearance of a garden wall and appears on historical mapping. This wall has been incorporated into a long east-west outbuilding / shed with a galvanised roof. A small shed is located on the western extent of this building, with a double set of wrought iron gate (similar to the main entrance gate) leading to the working area and farmyard.

A two-storey gable-ended stone barn is located in the farmyard, behind the 'garden' wall, with red brick detail on opes and edges and glass windows. It is abutted by a one-storey stone extension on the south. It is in excellent condition with an intact roof and good quality timber beams, with features such as half doors, brick feeding troughs, iron rings, a hanging light, timber fixtures remaining and cobbled surface remaining.

Image 12.1: Racefield House



Image 12.2: Rear of Racefield House



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Image 12.3: East wall of Racefield House



Image 12.4: 'Garden wall' and abutting sheds



Image 12.5: Stone barn



Image 12.6: Barn rear



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Image 12.7: Barn rear



Image 12.8: Barn interior



Image 12.9: Brick feeding trough

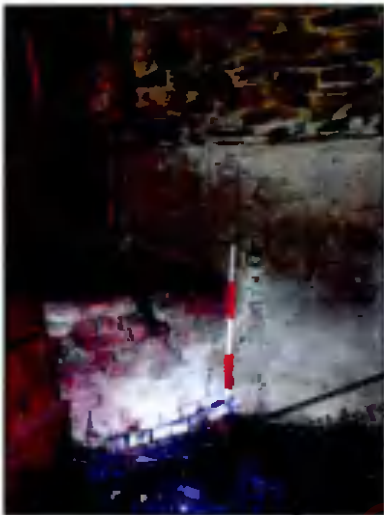


Image 12.10: Barn interior



Image 12.11: Stone barn, front



Image 12.12: Stone barn



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12.3.4 Cultural Heritage

12.3.4.1 Townland Boundaries

Townlands are land divisions that form a unique feature in the Irish landscape. For the majority, their origins are undoubtedly of great antiquity, most certainly pre-Anglo-Norman, and they existed well before the establishment of parishes or counties. Townlands can take the form of natural boundaries, such as rivers or routeways, as well as artificially constructed earthen banks and ditch divisions. They are predominantly formed by well-built boundaries that demarcate the townland and are usually distinguishable from standard field-division boundaries. Townland boundaries recorded by the 19th century Ordnance Survey may be aligned on older land divisions that date to early historic times and may physically overlie archaeological evidence for such early forms of land division. For this reason, they are considered areas of archaeological potential.

The proposed development area is located within the townland of Racefield, taking up almost the entirety of the townland and delimited on three side by the townland boundaries of the neighbouring townlands of Crawnglass, Crockaun, Ballyshannon Demesne and Tippeen Lower (Figure 12.9). The Down Survey (Figure 12.6) suggests that the townlands of Carrighill Upper, Carrighill Lower, Ballyshannon, Ballyshannon Demesne, Wevil, Racefield and Crockaun were once part of a larger townland of Ballyshannon. As such, the boundaries which surround the proposed development site may post-date the Down Survey. However, the Gaelic Irish place name format of some of these townlands may suggest older divisions or place names existed.

The boundary with Crawnglass is composed of a mature hedgerow and trees. Alexander Taylor's map of Kildare (1783; Figure 12.8) indicates a line of trees in approximately this location suggesting the boundary was in place at that time.

The L-8006 road which delimits the northern extent of the site forms the Racefield / Crockaun townland boundary. This road was present at least as early the 1650 siege of Ballyshannon (Figure 12.2).

The townland boundary with Ballyshannon Demesne is comprised of a line of mature trees and hedgerow (Image 12.13). This forms the edge of the former designed landscape associated with the demesne, and the very straight nature of this boundary suggests a relatively late date. A line of trees appears to be illustrated at this location on Taylor's map of 1783 (Figure 12.8). A curve in the southern end of the boundary follows a series of serpentine field boundaries running along the northern edges of Fields 9, 13 and 17. This has the appearance on mapping and aerial photography of a former watercourse, but field inspection revealed it to be a very dry shallow ditch, with slight banks noted on either side on the portion which makes up the townland boundary (Image 12.14). It may be a long-drained palaeochannel or could have functioned as a pathway.

A very small portion of the Tippeen Lower boundary borders the south-eastern edge of the site in Field 17 (Image 12.41). This boundary also functions as the Ballyshannon / Fontstown parish boundary. A natural spring is located in this location, as well as the Eaglehill Stream and a low bank on the south side.

Image 12.13: Racefield / Ballyshannon Demesne townland boundary

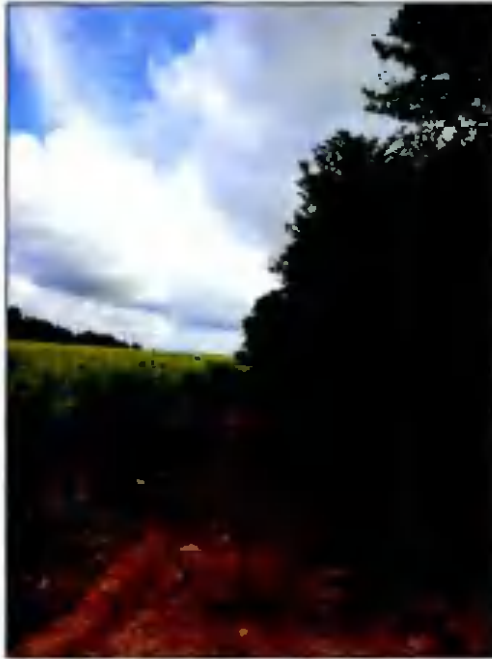
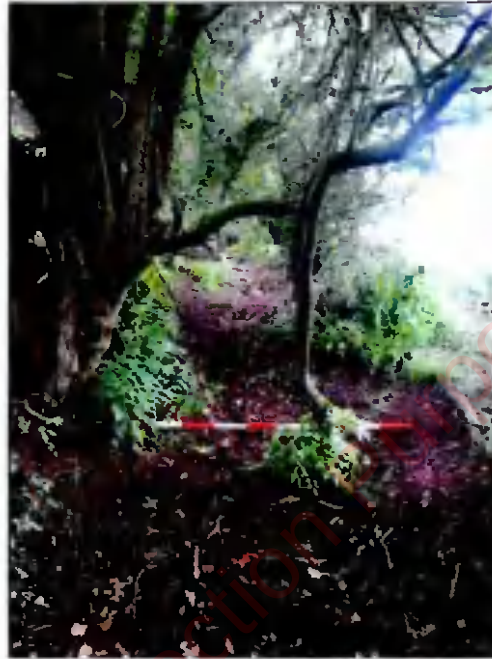


Image 12.14: Racefield / Ballyshannon Demesne townland boundary

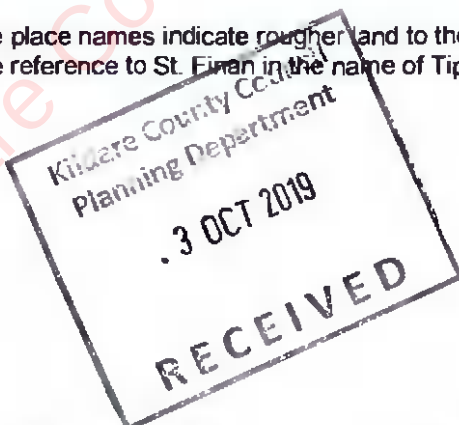


12.3.4.2 Townland Names

Townland names provide reference to the historical heritage of an area. They are an invaluable source of information on the topography, landownership and land use of an area, and provide a background to the history, cultural heritage, archaeological monuments and folklore. The surrounding townlands comprise of a mixture of Irish and English place names. Although the Down Survey suggests the surrounding townlands were once part of a larger townland known as Ballyshannon, the Gaelic Irish place names suggest older names were in use in these areas.

The name of Racefield itself is quite late in origin and refers to the use of the land as a racecourse when the British army was garrisoned in the Curragh. Ballyshannon is noted on www.logainm.ie as being derived from Baile Sonnáin, which would imply a Gaelic Irish habitation in this location before the arrival of the Anglo-Normans. It is likely that any trace of this habitation, which would have comprised of ringforts similar to those in neighbouring townlands, would have been eradicated by Anglo-Norman occupation and the later development of the Ballyshannon Demesne. However, it has been suggested that Béal Átha Seanaith (The Mouth of Shannagh's Ford) as recorded in the Annals of the Four Masters, refers to Ballyshannon. This was reputedly the site of The Battle of Uchba in 733. However, the Béal element of the place name would seem to suggest quite a large ford, but the area is drained by modest streams and there is no obvious fording point associated with the area.

The place names indicate rougher land to the west in Crawnglass and higher land in Crockaun to the north. The reference to St. Finan in the name of Tippeenán suggests early ecclesiastical activity in the area.



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Table 12.5: Townland names

Townland	Meaning
Racefield	English name which related to the use of the land as a racecourse by the British Army.
Crawnglass	<i>An Carrán Glas</i> (Green craan). 'Craan' is a common occurrence in the topographical name in the east of Ireland, meaning 'rough land'. The name is noted the Registry of Deeds in 1725.
Knockaun	<i>An Cnocán</i> (A hillock). The name is noted by O' Donovan in the Ordnance Survey Name Books.
Ballyshannon	<i>Baile Sonnáin</i> (Town / Homestead of Sonan). Noted as 'Ballythosenan' in Papal Taxation documents of 1302-6 (www.logainm.ie). A place recorded in the Annals of the Four Masters as <i>Bél Átha Seanaith</i> (The Mouth of Shannagh's Ford) is suggested to refer to Ballyshannon.
Wevil	Noted by O' Donovan not to be an Irish name. Recorded in the Registry of Deeds in 1812.
Tippeenán Lower / Upper	<i>Teach Fionáin</i> (St. Finan's Home). Noted in Crown Survey of Lands 1540-1541.

12.3.4.3 Folklore

The name *Bél Átha Seanaith* (The mouth of Shannagh's Ford) is recorded in the 17th century Annals of the Four Masters and is suggested to refer to Ballyshannon. A older name for this place was Ocha or Ucha. The Battle of Uchba is thought to have been fought here in c. AD 733). Aedh Allan, King of Ireland, assembled forces from Leth Chuinn (the northern half of Ireland) against the Leinstermen, with 9000 men said to have died in the conflict. It is recorded in The Annals of the Four Masters as follows;

'The age of Christ 733. The fourth year of Aedh Allan, son of Fearghal, son of Maelduin, in the Sovereignty of Ireland. Aedh Allan, King of Ireland, assembled the forces of the Leath Chuinn (i.e., the northern half of Ireland) to proceed into Leinster, and he arrived at Ath-Seanaith. The Leinstermen collected the greatest number they were able, to defend their right against him. A fierce battle was fought between them. The King, Aedh Allan himself, went into the battle; and bloodily and heroically was the battle fought between them both. Heroes were slaughtered, and bodies were mutilated. Aedh Allan and Aedh, son of Colgan, King of Leinster, met each other in single combat, and Aedh, son of Colgan, was slain by Aedh Allan. The Leinstermen were killed, slaughtered, cut off, and dreadfully exterminated in this battle, so that there escaped of them but a small remnant and a few fugitives. The following were the leaders and chieftains of the Leinster- men who fell, namely: Aedh, son of Colgan, King of Ui-Ceinnsealaigh; Bran Bog, son of Murchadh, the second King who was over the Leinster-men; Fearghus, son of Maenach, and Dubhdacrich, two lords of Fotharta; the son of Ua Ceallaigh; the son of Train; Fiangelach Ua Maeleath-gin; Oonall Ua Aithechdaí; the four sons of Flann Ua Conghaile; Eladhach Ua Maeluidhir; and many others, whom it would be tedious to enumerate.'

However, the topography of the landscape of Ballyshannon casts doubt on the theory that this battle was fought here. The name *Bél Átha Seanaith* suggests a rather large ford and there is no obvious contender for this in the vicinity of Ballyshannon. The area is drained by modest streams which feed into the Kildoon River, some distance away. Alternative theories suggest Shannonbridge for the location of this battle, although that ford had formerly been known as the ford at Raghra.

12.3.5 Cartographic Sources

12.3.5.1 The Down Survey (1656-1658)

The Down Survey of the 1650s was at the time the most coherent mapping project ever undertaken in the world. The aim was to measure lands forfeited by the Catholic Irish in order to redistribute it to Merchant Adventurers and English soldiers. The Down Survey map of the Barony of Ophaly illustrates the Parish of Ballisannan (Ballyshannon), containing the townlands of Mullaghmoy (Mullaghmoyne), Tippeenán (Tippeenán), Ballisannan (Ballyshannon) and Martinstowne (Martinstown) (Figure 12.6). These townlands were much larger than at present and have since been subdivided, with the townland of Ballisannan now containing of Carrighill Upper, Carrighill Lower, Ballyshannon, Ballyshannon Demesne, Wevil, Racefield and Crockaun. A large structure is indicated in the approximate location of the castle, with no other features indicated in the lands of Ballyshannon.

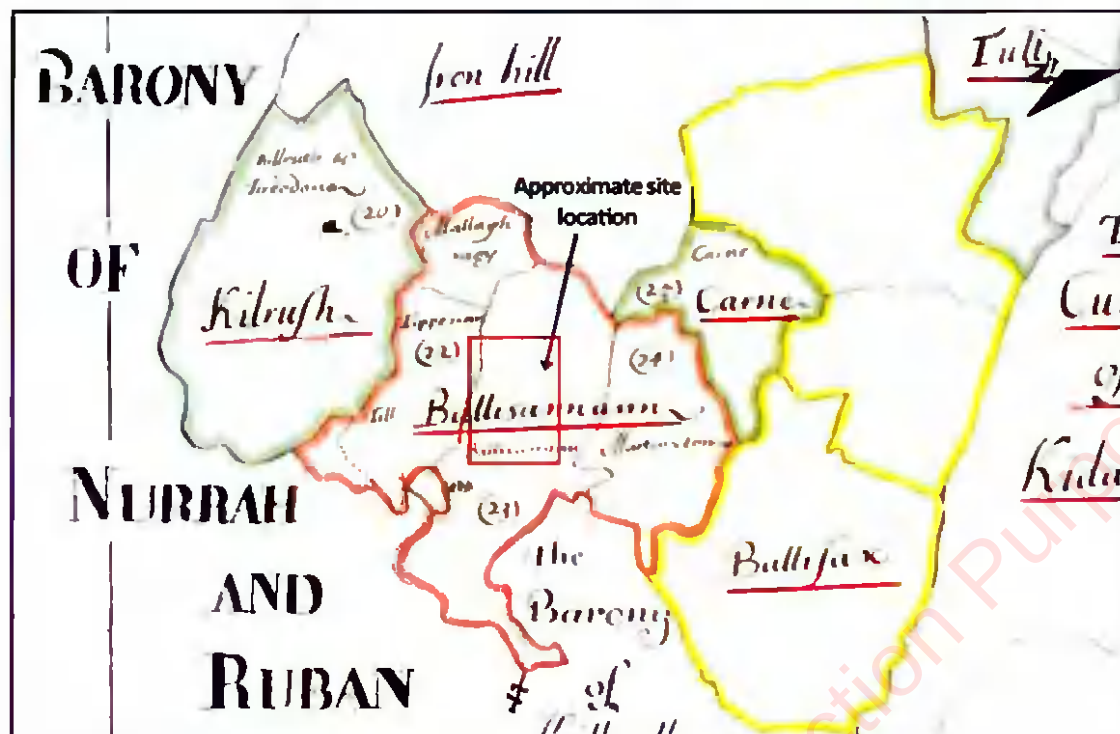


Figure 12.6: Down Survey map of the Barony of Ophaly

12.3.5.2 Nobel & Keenan (1763)

The Nobel and Keenan map of 1763 illustrates the system of roads in the area which is almost unchanged today (Figure 12.7). The L-8006 which runs along the northern boundary of the site and forms the townland boundary with Crockaun is depicted, as well as the L8009 south of the site and the R418 to the southeast. Ballyshannon House is indicated as a two-storey building surrounded by trees. No structures or features are indicated within the proposed development area.

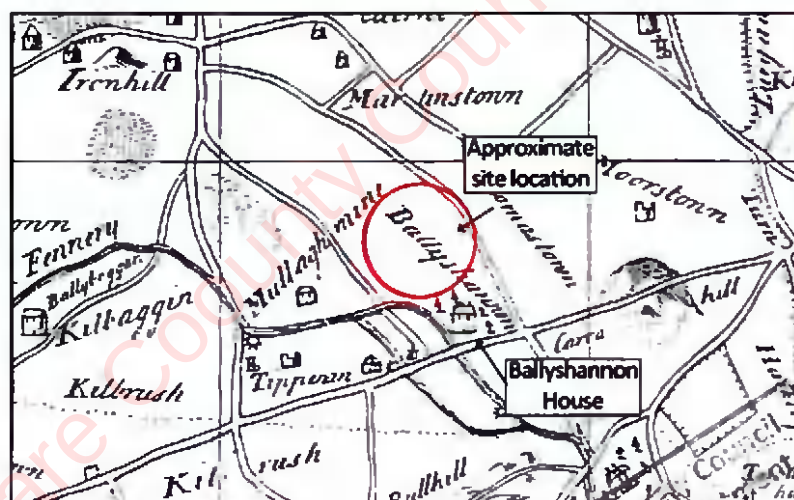


Figure 12.7: Nobel & Keenan (1763)



12.3.5.3 Alexander Taylor (1783)

Alexander Taylor's map of Kildare shows more detail of Ballyshannon Demesne and the surrounding lands (Figure 12.8). The house is similarly depicted as a two-storey structure, with the additional detail of surrounding woodland and an avenue to the north, leading to the L-8007. The lands to the northwest (comprising of Racefield and Crawnglass), appear to be subdivided by lines of trees. These may indicate the current townland boundaries.

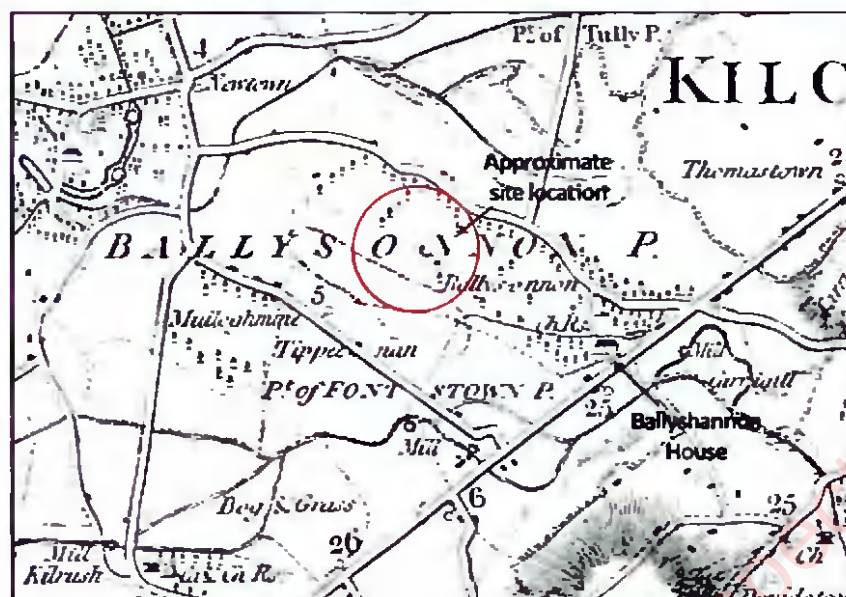


Figure 12.8: Alexander Taylor's map of County Kildare (1783)

12.3.5.4 Ordnance Survey Historical Mapping

Ordnance Survey Ireland completed their first map survey of Ireland between 1829 and 1842, producing the First Edition 6-Inch to the Mile maps which are renowned for their accuracy and level of detail. The map indicates an area of open farmland, with a line of trees separating Racefield from the edge of the designed landscape of Ballyshannon Demesne (Figure 12.9). The field divisions are more or less consistent with the existing field pattern, with the exception of a rounded field boundary on the west side of Field 4 (see inset Figure 12.9). This may have been a drainage feature, as it returns to a field boundary which follows an irregular course which has the appearance of a watercourse. Field inspection revealed no trace of the curving boundary, but the adjoining existing field boundary comprises of a shallow, very dry ditch. It may be a dried out palaeochannel, or potentially functioned as a pathway.

Two structures are in the south-west corner of Field 8, adjacent to the rounded boundary, with two small enclosed areas or yards to their east. This house was noted in Griffith's Valuation in 1852 as being the residence of James McLoughlin. The possible pathway may have been related to this residence. Another structure is located in the north-eastern corner of the proposed development area (occupied by Thomas Flynn at the time of Griffith's Valuation), but this area will not be impacted by the proposed development. A further two structures are located along the L-8006 outside of the site boundary.

Some of the field boundaries contained trees, with a copse of trees depicted in the north-western corner of the proposed development area.

Ballyshannon Demesne appears as a designed landscape with lines and copses of trees across the grounds. Decorative features include a tree ring in the north-western corner of the demesne and a long ornamental fish pond east of the house. To the north of Ballyshannon House, a pigeon house is indicated within the squared earthworks of the bastioned fort (RMP no.: KD032-003001). A pathway links the house to the church (RMP no.: KD028-058002), with a small square feature indicated in the location of the motte (RMP no.: KD028-058001).

The 25-Inch Ordnance Survey map of 1907-9 shows some changes to the field boundaries (Figure 12.10). The rounded boundary in Fields 4 and 5 had been removed and the large field which had occupied the north-western corner of the lands had been subdivided into smaller fields. The field boundaries which divide Racefield from Cragglass are shown as a watercourse.

The structure in Field 8 is no longer present, but Racefield House is now indicated in the north-eastern corner of the proposed development area. It comprises of the main dwelling, facing the road, with a pump house and ancillary structures to the rear. The 1901 and 1911 Census records William Jackson as the occupant of this house. This area will not be affected by the proposed development, although two related structures are on the west boundary of Field 15 which may be affected, including the site of a ruined shed and possible pump house (see inset in **Figure 12.10**).

A spring is depicted in the south-eastern extent of Field 17, adjacent to the field boundary which is composed of a water course (see inset in Figure 12.10).

Other additions include Ballyshannon Lodge, on the north side of the L-8006. Within Ballyshannon Demesne, the house appears to have been extended and annotations appear of 'Ballyshannon Castle (Site of)' (RMP no.: KD032-003002), 'Moat' (RMP no.: KD032-003001), 'Church on Site of St. James' Church' (RMP no.: KD028-058002) and 'Mound' (RMP no.: KD028-058001). The 1901 Census records Ellen Kennedy as the owner of Ballyshannon Demesne, and her grand nephew Richard E. Price who inherited the lands by the 1911 Census was resident with her. Ballyshannon House was still present on the Revised 6-Inch Edition of 1939 but was demolished in the 20th century.



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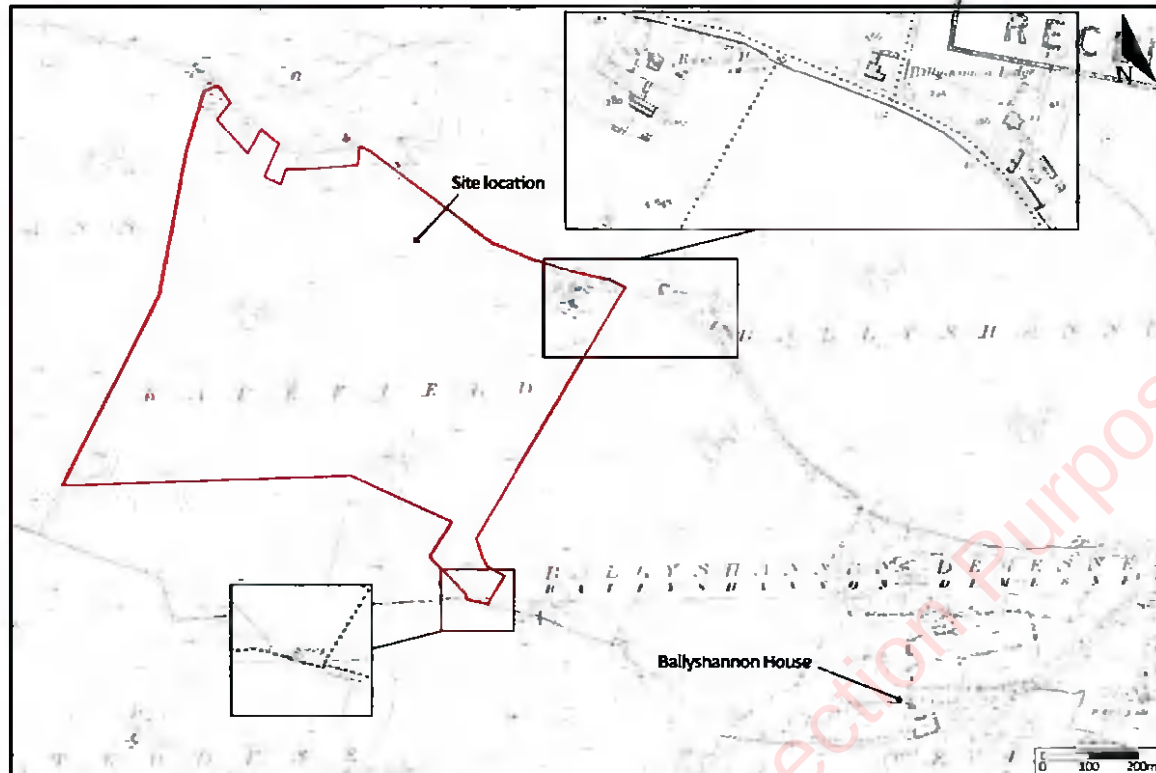


Figure 12.10: 25 Inch Ordnance Survey map (1907-9)

12.3.6 Aerial Photography

Aerial photography can often indicate the presence of subsurface archaeological remains which have no visible trace at ground level. Given the fact that the castle and 17th century defensive features of Ballyshannon Demesne have now been completely levelled, it is useful to review aerial photography for any trace of such features. In particular, it was noted following an excavation at Ballyshannon Demesne (Licence no.: 98E0345; Excavations 1998:295) that the 17th century fortifications may have extended further west, which could include the study area. A series of aerial surveys are described below.

The 1995 Ordnance Survey aerial photos reveal large open fields, including a mixture of pasture and crops (Figure 12.11). The rounded boundary in Field 4 evident in the First Edition 6 Inch map is barely visible as a crop mark but there is no trace of the adjacent structure in Field 8. A dark area is visible in Field 2 and an isolated tree stands alone in Field 13. The overhead power lines are just visible traversing Fields 3, 7 and 10. The earthen bank which marked the site of the castle (RMP no.: KD032-003002) and bastioned fort (RMP no.: KD032-003001) has been levelled and is only visible as part of the field boundaries. Ballyshannon House has been levelled with no visible trace remaining.

In successive photos (Ordnance Survey 2000, 2005; Ordnance Survey Digital Globe 2011-2013; Google Earth 2009, 2011, 2013, 2016, 2017, 2018) it appears that the downslope Fields 1-5 on the west are wetter than the rest of the lands (Figure 12.12). Field 4 appears to be particularly discoloured, in general limited to the area west of the curving field boundary which had appeared in First Edition Ordnance Survey mapping.



Figure 12.11: 1995 Ordnance Survey Aerial photograph



Figure 12.12: 2005 Google Earth image (April 2009)

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The western fields have been used as pasture, while the drier fields have been used for crops and pasture. Field 10, being the largest field, has been subdivided in different arrangements over the years, presumably with wire fencing, and these old divisions sometimes appear as linear features on later aerial photograph. A slight north-east by south-west linear feature is visible in Field 11 in the Google Earth imagery of June and August 2016. The site of the house in Field 8 which was depicted on the First Edition Ordnance Survey map is not visible on any aerial photography.

A new dwelling was constructed east of the application lands between 1998 and 2000, which was followed by an access road along the eastern site boundary to facilitate access to the forestry.

The site of the castle is discernible in some aerial photography, with the outline of the sub rectangular earthen bank visible in the OSI 2000 and 2005 photos and in Google Earth imagery dated to August 2016, March 2017, and June 2018. There are no visible cropmarks related to Ballyshannon House or of the fortifications related to the Confederate War.

An aerial survey carried out in advance of this development has provided a more detailed image of the site than previous photography (Figure 12.13). A series of linear and curving features are apparent in Field 4, potentially extending into Field 3 and Field 5. These may represent the remains of an early field system, similar to those recorded in Tippenan Upper to the southeast of the application lands (RMP no.: KD032-067, KD032-074). As noted previously, Fields 1-5 are wetter than the rest of the lands and were generally used as pasture. While other fields have been ploughed and levelled, the land use of the pasture will have protected subsurface remains. It is probable that if these subsurface features represent an ancient field system, then they would also have extended east across the better agricultural land to the east. More intensive farming and ploughing in the rest of the fields which make up the application lands have eradicated any visible trace of these features if they exist.

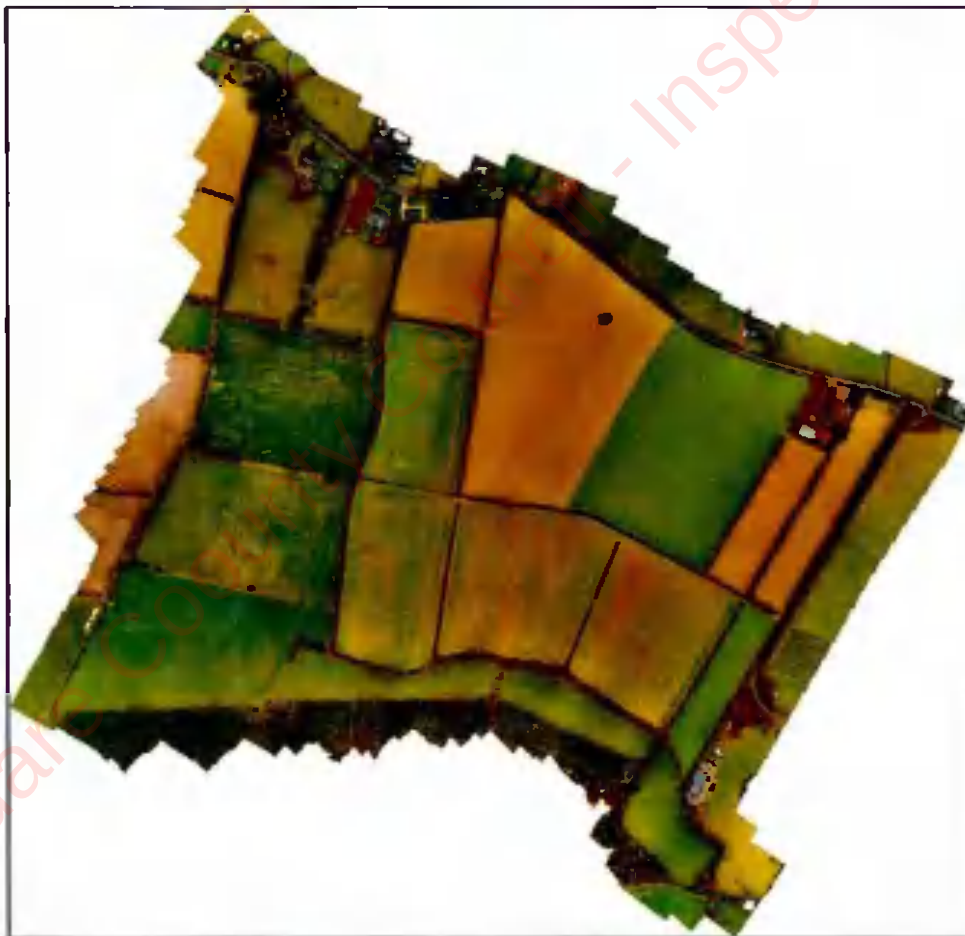


Figure 12.13: Racefield Orthomosaic (January 2019)

12.3.7 Field Survey

A field survey was carried out on the 11th of June 2019 in dry, sunny conditions. Field observations are outlined in the following sections.

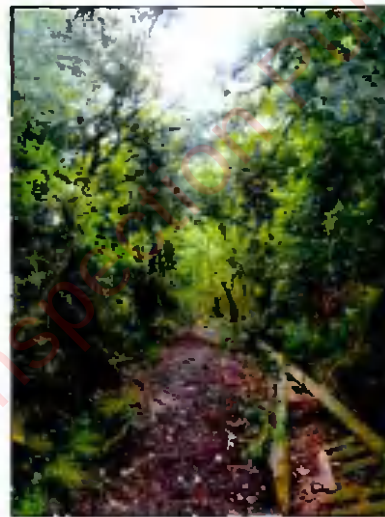
12.3.7.1 Field 1

Field 1 is a flat rough pasture which was being grazed by calves at the time of site inspection. The western boundary which make up the Racefield / Crawnglass townland boundary is composed of tall trees and mature hedgerow (Image 12.15). Part of the east field boundary is composed of a broad, wet ditch with slight bank on the west edge (Image 12.16). Another portion of the same boundary is composed of a double ditch. There are no views owing to the topography and screening from vegetation. While this field is within the ownership of the applicant, it lies outside and to the west of the planning application boundary.

Image 12.15: Field 1, Racefield / Crawnglass townland boundary in background, wet ditch in foreground (facing west)



Image 12.16: Double-ditched field boundary between Fields 1 & 2



12.3.7.2 Field 2

Field 2 is undulating pasture with low natural ridges traversing it and sloping southwest (Image 12.17). The field boundaries are comprised of mature trees and hedgerows, with the broad, wet ditch and partial double ditch on the west as noted in the description for Field 1. There are two adjacent properties on the northern side of the field. There are no views owing to the topography and screening from vegetation. While this field is within the ownership of the applicant, it lies outside and to the west of the planning application boundary.

Image 12.17: Field 2 (facing east)



Image 12.18: Field 3 (facing south)



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12.3.7.3 Field 3

Field three is undulating pasture being grazed by cattle at the time of site inspection and traversed by an overhead powerline (Image 12.18). There is a slight rise on the north above the level of Field 2, and slopes southwest. The field boundaries on the east and west are composed of mature hedgerows and trees, with the vegetation on the northern and southern boundaries partially disrupted by wet drainage ditches. This field was composed of good, well-drained land, and while some aerial photography suggests it has been wet in the past, this did not appear to be the case on-site inspection, with the drainage ditches obviously fulfilling their function well. There are no views owing to the topography and screening from vegetation. While this field is within the ownership of the applicant, it lies outside and to the west of the planning application boundary.

12.3.7.4 Field 4

Field 4 is composed of fairly flat pasture being grazed by cattle at the time of inspection (Image 12.19). The east and west boundaries are composed of mature trees and hedgerows, but the northern and southern vegetation is disrupted in places, possibly because of the addition of drainage ditches. Part of the southern boundary is disrupted on its eastern extent and continues as a post and wire fence. There are no views owing to the topography and screening from vegetation. While this field is within the ownership of the applicant, it lies outside and to the west of the planning application boundary.

12.3.7.5 Field 5

Field 5 is a fairly flat pasture with some uneven areas and occasional hollows evident (Image 12.20), including in the approximate location of the curving boundary noted in Fields 4 and 5 in the First Edition 6-Inch Ordnance Survey map (Figure 12.9). Some uneven patches may have the potential to be subsurface archaeological features. The N-S eastern boundary with Field 9 is comprised of a broad, wet ditch with concrete revetment which carries water towards the Eaglehill stream (Image 12.21). The E-W boundary with Field 9 is a very wide, dry ditch and flanking banks – the western extent of the irregular field boundary which runs eastwards to the Ballyshannon Demesne townland boundary (Image 12.22). The southern extent of the field is adjacent to commercial coniferous forestry. While this field is within the ownership of the applicant, it lies outside and to the west of the planning application boundary.

Though it is a good quality, well-drained field at present, aerial photography and the topography suggest it has been wet in the past but has been drained by modern drains. There is a slight view of the roof of a farm building to the southwest, but there are otherwise no views owing to the topography and screening from vegetation.

Image 12.19: Field 4 (facing northwest)



Image 12.20: Field 5 (facing northwest)



Image 12.21: Drain between Field 5 & Field 9, concrete revetment on left

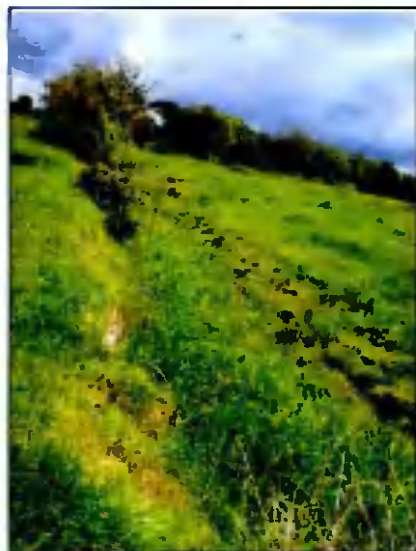


Image 12.22: Ditch & banks between Field 5 & Field 9



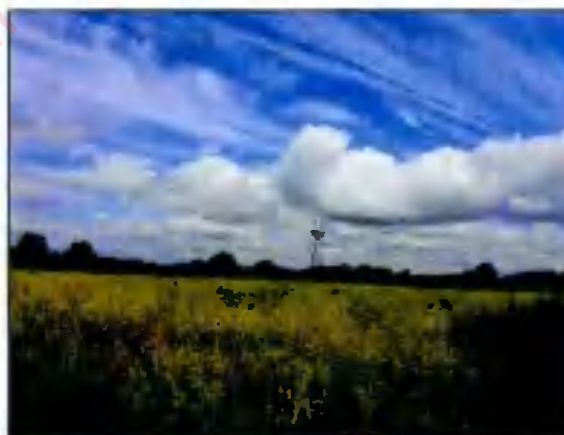
12.3.7.6 Field 6

Field 6 is a flat arable field under wheat crop (Image 12.23). There are no views owing to the topography and screening from vegetation. While this field is within the ownership of the applicant it lies outside and to the west and north of the planning application boundary.

Image 12.23: Field 6 (background) & Field 10 (foreground) (facing west)



Image 12.24: Field 7 with pylon in background (facing NW)



12.3.7.7 Field 7

Field 7 is a formerly ploughed field which has become very overgrown (Image 12.24). The OHL traverses the northern portion of the field and a pylon structure is located in the northwest corner. The field boundaries are composed of mature trees and hedgerows. There are no views owing to the topography and screening from vegetation.

12.3.7.8 Field 8

Field 8 is a formerly ploughed field which has become extremely overgrown with the remnants of a pulse crop (Image 12.25). There are some views to the hills to the southeast from the northeast corner, but for the

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most part, there are no views owing to the topography and screening from vegetation. There is no trace of the former structure in the southeast corner, but the area is completely obscured by vegetation.

Image 12.25: Field 8 (facing north)



Image 12.26: Field 9, farm building in background (facing west)



12.3.7.9 Field 9

Field 9 is a long, level pasture, bordered on the south by commercial coniferous plantation (Image 12.26). The northern boundary is composed of very tall trees and the dry, serpentine ditch which continues towards the Ballyshannon Demesne townland boundary. The east boundary has changed since the First Edition map, with the former boundary visible as a slight rise. The new east boundary is a broad, shallow ditch.

A possible palaeochannel was noted in the eastern third of the field, running south towards the forestry and the Eaglehill stream. A barn is visible to the southwest, but there are otherwise no views owing to the topography and screening from vegetation. While this field is within the ownership of the applicant, it lies outside and to the south of the planning application boundary.

12.3.7.10 Field 10

Field 10 is the largest field within the application site. The highest point is its northeast corner, with the land sloping towards the south and west. The east half of the field is planted with young crop, with the western half under more mature arable crop (Images 12.27, 12.28). The field is traversed by the OHL, with one pylon located in the northwest.

The field boundaries are composed of mature hedges and tall trees, with a wide, shallow ditch on the east. There are restricted and partial views of the Dún Ailinne National Monument from the central point of the southern field boundary (Image 12.29). A gap in vegetation, due to OHL pylons allows a view towards the hill of Dún Ailinne. Additional screening is planned for the northeast corner of Field 10 which may alleviate this issue, and the nature of the topography and existing vegetation conceals the view in other parts of the field (Image 12.30).

12.3.7.11 Field 11

Field 11 is a formerly ploughed field which has become overgrown with up to 1m of overgrowth (Image 12.31). The ground slopes to the south and west and the field boundaries are composed of hedgerows. The hedgerow separating Field 11 and Field 12 appears younger than other examples on the lands, with no tall trees noted (Image 12.34). There are views to Bullhill 2.3km to the southeast, and as far as Keadeen Mountain, Co. Wicklow (Image 12.32).

Image 12.27: Field 10 (facing south)



Image 12.28: Field 10, pylon & mature crop in background (facing NW)



Image 12.29: Field 10, view of Dún Ailinne from southern boundary



Image 12.30: Field 10, topography & vegetation screen the view to Dún Ailinne (facing NE)



Image 12.31: Field 11 (facing SW)



Image 12.32: Field 11, view of Bull hill and Keadeen Mountain (facing SE)



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12.3.7.12 Field 12

Field 12 is a formerly ploughed field which has become overgrown (Image 12.33). The ground slopes to the south and west and the field boundaries are composed of hedgerows. There are views to Bullhit to the southeast, and as far as Keadeen Mountain, Co. Wicklow.

Image 12.33: Field 12, view of Bullhill and Keadeen Mountain (facing SE)



Image 12.34: Field 12, field boundary with Field 11 (facing south)

**12.3.7.13 Field 13**

Field 13 is a flat paddock with commercial forestry on the south and dense hedgerows creating a very enclosed area with no views (Image 12.35). A possible palaeochannel was noted adjacent to a large isolated tree. The northern boundary is part of the dry ditch with low bank that leads to the Ballyshannon Demesne townland boundary. The eastern boundary with Field 17 is comprised of a substantial earthen bank and tree line / hedgerow, with water-rolled stones noted on the ground (Image 12.36). While this field is within the ownership of the applicant, it lies outside and to the south of the planning application boundary.

Image 12.35: Field 13 (facing NW)

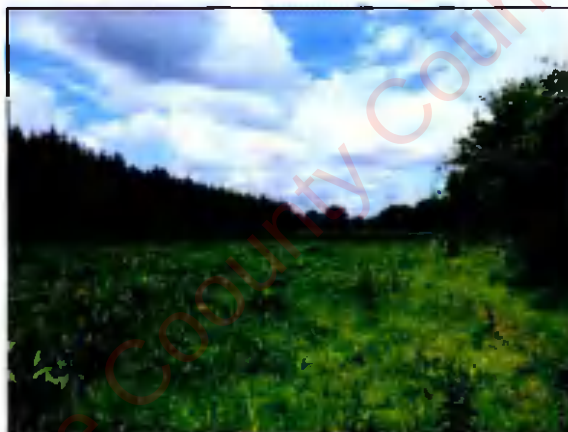


Image 12.36: Bank between Field 13 & Field 17

**12.3.7.14 Field 14**

Field 14 is a long field containing arable crop (Image 12.37). Mature hedgerows and trees, and the southeast rolling topography conceal views.

Image 12.37: Field 14 (facing north)



Image 12.38: Field 15, shed & Racefield House in background (facing west)



12.3.7.15 Field 15

Field 15 is a long, southeast sloping field containing arable crop. The field boundaries comprise of mature hedgerows and trees, with the eastern hedgerow also functioning as the Racefield / Ballyshannon Demesne townland boundary (Image 12.13). A small overgrown ruined structure is located on the western field boundary and a shed / pumphouse are located on the western field boundary (Image 12.38). The pumphouse will not be affected but the overgrown ruin will be situated within the extraction area.

12.3.7.16 Field 16

Field 16 is a long, southward sloping field planted with young crop (Image 12.39). Mature hedgerows create a very enclosed field and there are no views owing to the vegetation and topography.

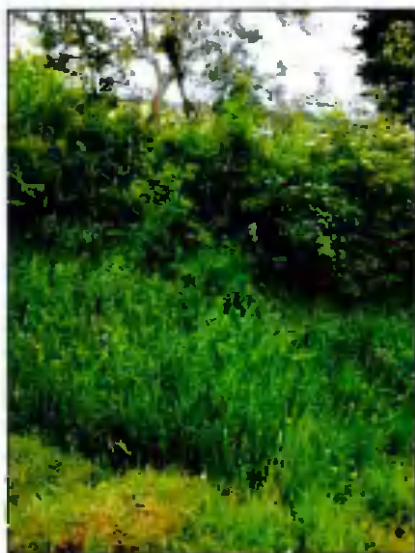
Image 12.39: Field 16 (facing south)



Image 12.40: Field 17 (facing southwest)



Image 12.41: Field 17, spring & Racefield / Tippeen Lower boundary



12.3.7.17 Field 17

Field 17 is an enclosed paddock (Image 12.40). The northern boundary is the dry ditch, with the portion forming the townland boundary comprising of a flanking hedgerow on either side of the ditch with slight banks visible (Image 12.41). The hedgerows are composed of very tall, mature trees. A spring is located on the southern boundary, which is part of the Racefield / Tippeen Lower townland boundary and the Ballyshannon / Fontstown parish boundary (Image 12.41). It is a natural spring with no super structure, visible as a low, wet hollow, with lush water-loving vegetation with a bank on the south side. While this field is within the ownership of the applicant, it lies outside and to the south of the planning application boundary.

12.3.8 Summary of Archaeological, Architectural and Cultural Heritage Features

12.3.8.1 Archaeology

There are no recorded archaeological monuments within the application boundaries. A series of linear and curvilinear features were noted in aerial photography of Field 4, which may extend into Field 3 and Field 5. These have the appearance of an early field system, and while they fall outside of the proposed extraction area, it is possible that they extend into the extraction area and planning application area and are no longer visible due to many years of ploughing.

The outworks associated with Ballyshannon Castle (Figure 12.2) have never been located and it has been suggested (Byrne 1998) that they may lie within the application site. Comparison of upstanding remains at Ballyshannon with pictographic depictions would, however, suggest that they were situated east of the application site.

The National Monument of Dún Ailinne (KD028-038001) is located 4.5km to the northeast. The nature of the topography and existing vegetation provide screening for much of the application site, but at one particular point there is inter-visibility from the centre-south of Field 10 along the corridor of the 400kV Moneypoint-Dunstown overhead power line. This is a long-distance, restricted and partial view towards the hill of Dún Ailinne and results in a slight visual impact along an existing infrastructure corridor in one direction to and from the proposed development and the hill that Dún Ailinne occupies.

Racefield House (built c. 1900) a stone barn and associated structures are located within the farmyard in the northeast of the application area. Two small structures are located within Field 15; one (a pumphouse / shed)

will not be impacted by the proposed sand and gravel extraction. The other, a shed, is overgrown and in a ruined state and will be impacted by the extraction.

Two structures were noted within the southeast corner of Field 8 in the First Edition 6-inch Ordnance Survey map. Site inspection revealed no visible remains of this site in the overgrown field.

12.3.8.2 Cultural Heritage

While the field boundaries are typically composed of mature hedgerows and tall trees, most are very straight and appear to form a relatively modern field system. The exception is the irregular field boundary which forms the southern boundary of the proposed extraction area and the northern boundary of Fields 9, 13 and 17, and part of which forms the Racefield / Ballyshannon Demesne townland boundary. Its serpentine form has the appearance on maps and aerial photography of a watercourse, but it was found during field inspection to have been a very dry ditch, flanked in parts by low banks. It may be a dried-out watercourse, with extensive historical drainage works in the landholding redirecting water, and possibly functioned as a pathway from the house/ structure in Field 8.

The adjacent road acts as the Racefield / Crockaun townland boundary, while the eastern edge of the site is formed by the Racefield / Ballyshannon Demesne townland boundary and the western edge follows the Racefield / Crawngalss townland boundary. A very short segment of the Racefield / Tippeen Lower townland boundary and Ballyshannon / Fontstown parish boundary is located in the southeastern extent of the site. These boundaries will not be impacted by the development.

12.4 Impact Assessment

12.4.1 'Do Nothing' Scenario

Under the do-nothing scenario, the site will remain in its current state and continue to be utilised for agricultural activity in keeping with surrounding agriculture activity and land use. There will be negligible ongoing impact to cultural heritage. The surrounding agriculture and land use will remain unaltered with no significant impact.

12.4.2 Construction/Operation Phase

The construction phase will involve some activity within the existing farmyard of Racefield House. It is proposed that Racefield House and the existing stone structures within the farmyard be retained, with no plans to demolish any buildings.

Portacabin facilities will be installed for the provision of a canteen / welfare facilities within an existing corrugated steel farm shed which will be retained. Parking for five vehicles will be hardstanding, and some construction work will be required for the provision of drainage with a hydrocarbon interceptor etc. With appropriate mitigation measures, this should cause no impact to the house and structures. Groundworks will be minimal but have the potential to directly impact subsurface remains related to the house and farm, or other pre-existing features.

Site access will be provided from the northeast corner of Field 10 and will involve the construction of a gravelled entrance set back 20m from the road edge, a hard surface access road, a weighbridge and a wheelwash. This will require the removal of a portion of the hedgerow, and groundworks will have the potential to impact subsurface remains. It should be noted, however, that the ploughing of this field over many years may have reduced the potential for the survival of subsurface remains.

Other activities in advance of the operational phase will require the removal of hedgerows, topsoil and overburden within the working area and the installation of silt disposal lagoons in Field 12. The topsoil and overburden will be used either to construct perimeter berms on the northern edge of the site or held in designated overburden storage areas in Fields 7, 8, 11 and 12. Overburden will be used for the construction of temporary topsoil storage and screening mounds, placed in the overburden storage area or used in the construction of the silt disposal lagoon side walls. These works have the potential to directly impact subsurface remains. However, all of the fields which will fall within the proposed working areas have been ploughed over many years, which may have reduced the potential for surviving subsurface remains.

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Mitigation measures are proposed in order to assess the potential below ground archaeological risk and the results from these surveys will inform the statutory authorities in their decision making.

The hedgerows which will require removal are mature but are very straight which indicates a relatively recent field system. The irregular boundary which runs along northern edges of Fields 9, 13 and 17 and which forms part of the Racefield / Ballyshannon Demesne boundary may be a much older field boundary, possibly related to a former watercourse or pathway. This boundary feature will not be removed.

There will be no impact to Fields 1-6, 9, 13 and 17 as they lie outside of the proposed extraction area.

There is the potential for a slight visual impact towards the hill of Dún Ailinne (National Monument). The existing vegetation and nature of the topography successfully screen most of the proposed extraction area from Dún Ailinne, but there is a view from the centre south of Field 10 towards the National Monument along the corridor of the existing Moneypoint-Dunstown overhead power line (OHL). Mitigation measures are proposed in the form of proposed screening mounds on the northern perimeter of the site to alleviate this issue.

Following the removal of hedgerows, topsoil and overburden with appropriate mitigation in advance of the operational phase, there will be no further impact on subsurface remains. The extraction method will not utilise blasting but use a combination of dry working and wet working, with processing involving the crushing, washing and stockpiling of aggregates over a course of 12 years.

It is not anticipated that there will be any impact on Racefield House and ancillary structures from the sand and gravel extraction process, but the movement of vehicles within the farmyard has a low potential for impact on the house and structures.

12.4.3 Restoration Phase

The restoration phase will restore the site to a mix of terrestrial and freshwater wildlife habitat over a course of two years. The removal of portacabins from the farmyard has a low potential for impact on the house and structures. There is no further impact predicted on archaeological or cultural heritage.

12.5 Mitigation Measures

12.5.1 Construction/Operation Phase

The Department of Culture, Heritage and the Gaeltacht (DCHG) have recommended that due to the large scale of the development that an archaeo-geophysical survey should be carried out on site. In addition, in order to examine any possible archaeological features identified by geophysics and to investigate further, the overall archaeological potential of the proposed development site, test excavations, as described below, should be carried out across the site. Further to this the DCHG have stated that the geophysical survey and predevelopment testing shall consist of the following:

- Geophysical survey should be carried out across the entire site.
- The applicant is required to engage the services of a suitably qualified archaeologist (licensed under National Monuments Acts 1930-1994) to carry out predevelopment testing at the site. No subsurface work shall be undertaken in the absence of the archaeologist with his/her express consent.
- The archaeologist is required to notify the DDCHG in writing at least four weeks prior to the commencement of site preparations. This will allow the archaeologist sufficient time to obtain a licence to carry out the work.
- The archaeologist shall carry out any relevant documentary research and shall excavate test trenches at locations chosen by the archaeologist, having consulted the proposed development plans.
- Having completed the work, the archaeologist shall submit a written report to the Planning Authority and to the DCHG.

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- Where archaeological material is shown to be present, avoidance, preservation insitu, preservation by record (excavation) and/or monitoring may be required. The DCHG will advise the Applicant/Developer with regards to these matters.

It is proposed that these surveys will be undertaken when the appropriate ground conditions are in place. Currently Fields 7, 8, 11 and 12 are overgrown and would need to be cut and fields 10, 14, 15 and 16 are under crop which would need to be harvested in advance of the geophysical survey and test excavation taking place.

In addition to the above and as a result of the site inspection that has taken place for the EIAR, the following measures are suggested as part of the mitigation for built and cultural heritage features on the site:

- It is recommended that appropriate measures be put in place for the protection of Racefield House and ancillary structures from inadvertent damage during the operational stage of the site i.e. buffer zones, signage, fencing etc.

- It is recommended that all groundworks within the farmyard be undertaken with supervision from a licensed archaeologist.

- It is recommended that the ruined structure in Field 15 be cleared of vegetation and be surveyed with a photographic and written record in advance of the construction phase.

- It is recommended that the proposed screening be sufficient to remove the slight visual impact of the extraction area on the hill of Dún Ailinne (National Monument).

12.5.2 Restoration Phase

It is recommended that appropriate measures be put in place for the protection of Racefield House and ancillary structures i.e. buffer zones, signage, fencing etc.

12.6 Residual Impact

12.6.1 Construction/Operation Phase

The implementation of screening/planting strategies are envisaged at the early stages of the proposed development. Planting regimes can take several years to develop and successfully establish and any visual impacts will be most pronounced during the construction and initial operation stages, after which mitigation measures will be increasingly effective in integrating the development within the landscape and historic environment and in reducing visual impacts.

During the construction phase, a mechanism for recording, protecting and where necessary resolving any newly revealed sites as a result of the geophysical survey and test excavation works within the planning application area will have to be agreed with the National Monuments Service of the DCHG.

If features are to be left in-situ, detailed plans will be required as to the layout and extent of these features/sites as well as a geographical location. Before and after photographs will be required as well as a full report on the preservation of the site and how this was achieved, by the National Monuments Service.

Planting regimes can take several years to successfully establish and a monitoring programme will be implemented to ensure that any failures are detected and replaced.

12.6.2 Restoration Phase

It is anticipated that after mitigation measures have been applied there will be no significant residual archaeological, architecture and/or cultural heritage impacts.

12.7 Monitoring

As the DCHG have recommended and depending on the findings of the geophysical survey and required test trenching, archaeological monitoring may be required. The DCHG will advise the Applicant/Developer on these matters.

12.8 References

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13 LANDSCAPE AND VISUAL

This chapter documents the landscape and visual effects of the proposed sand and gravel facility at Racefield, Ballyshannon, Kilcullen, Co. Kildare. The purpose of this chapter is to identify and determine the effects on landscape character, landscape features, visual receptors and visual amenity as a result of the works described in Chapter 3.

13.1 Assessment Methodology

The following guidelines and documents have been used to determine the most appropriate methodology, terminology and approach to the assessment which has been adopted within this chapter:

- Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3);
- Advice Note 01/11 Photography and photomontage in landscape and visual impact assessment (The Landscape Institute, 2011); and
- Advice Note 02/17 Visual representation of development proposals (The Landscape Institute, 2017).

The landscape has been appraised to allow it to be described and classified into landscape character areas that in turn enable the classification of landscape quality. The capacity of the landscape to accept change of the type proposed is assessed by determining the sensitivity of each landscape character area. Overall key landscape components are normally landform, vegetation and historical and cultural components.

Landform relates to topography, drainage characteristics and geology. Historical and cultural components include historic landscapes, listed buildings, conservation areas and historic designed landscapes. Vegetation plays an important role in how the landscape and visual resources of an area are viewed and is an integral component of a landscape character.

The assessment has been undertaken through analysis of:

- Up to date digital copies of Ordnance Survey Ireland maps;
- Aerial photography;
- Kildare County Council Development Plan 2017 – 2023;
- The National Inventory of Architectural Heritage (NIAH) of the Department of Arts; and
- Detailed description and drawings of the proposed development.

Site visits were undertaken in July 2019 in order to assess the existing environment, to establish the existing visual resource and to identify sensitive receptors, i.e. residential properties, scenic viewpoints. Site visits were also used to establish the perceived extent of landscape and visual impacts that may be associated with the proposed development. These site visits concentrated on publicly accessible locations such as the surrounding road network and residential areas.

13.1.1 Study Area

The study area for the proposed development measures 3km from the centre of the application site and has been derived through analysis of proposed elements of development, analysis of the receiving landscape resource and site visits. Field survey and assessment has established that a 3km study area was appropriate for this type of development as visibility of the proposed development and its associated elements are often screened or limited by topographical changes and intervening vegetation.

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13.1.2 Landscape Impact Assessment

The LVIA firstly assesses how the proposed development would impact directly on any landscape features and resources. This category of effect relates to specific landscape elements and features (e.g. woods, trees, walls, hedgerows, watercourses) within the site that are components of the landscape that may be physically affected by the proposed development. Physical effects are restricted to the area within the site boundary and are the direct effects on the fabric of the site, such as the removal or addition of trees and alteration to ground cover.

The LVIA then considers impacts on landscape character at two levels. Firstly, consideration is given to how the landscape character is affected by the removal or alteration of existing features and the introduction of new features. This is considered to be a direct impact on landscape character.

Secondly, the indirect impacts of the proposed development on the wider landscape are considered. The assessment of impacts on the wider landscape is discussed using the surrounding character areas identified in the relevant landscape character assessments. It is acknowledged there is an overlap between perception of change to landscape character and visual amenity, but it should be remembered that landscape character in its own right is generally derived from the combination and pattern of landscape elements within the view.

The significance of effects on landscape features and character is determined by cross referencing the sensitivity of the feature or landscape character with the magnitude of impact.

Consideration of the sensitivity of the landscape resource against the magnitude of impact caused by the proposed development is fundamental to landscape and visual assessment and these two criteria are defined in more detail in the following sections.

13.1.3 Landscape Sensitivity

The determination of the sensitivity of the landscape resource is based upon an evaluation of each key element or characteristic of the landscape likely to be affected. The evaluation reflects such factors as its quality, value, contribution to landscape character and the degree to which the particular element or characteristic can be replaced or substituted. For the purpose of this assessment, landscape quality is categorised as:

- **Very High:** Areas of especially high quality acknowledged through designation as either national or international importance or other landscape based sensitive areas. These are of landscape significance within the wider region or nationally;
- **High Quality:** Areas that have a very strong positive character with valued and consistent distinctive features that gives the landscape unity, richness and harmony. These are of landscape significance within the district;
- **Medium Quality:** Areas that exhibit positive character but which may have evidence of alteration/degradation or erosion of features resulting in a less distinctive landscape. These may be of some local landscape significance with some positive recognisable structure; and
- **Low Quality:** Areas that are generally negative in character, degraded and in poor condition. No distinctive positive characteristics and with little or no structure. Scope for positive enhancement.

As previously discussed, landscape sensitivity is influenced by a number of factors including value, condition and the type of change brought about by the proposed development. In order to assist with bringing these factors together the following five point scale has been used. Table 13.1 defines the criteria that have guided the judgement as to the Sensitivity of the Landscape Resource.

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Table 13.1: Landscape Sensitivity

Landscape Sensitivity	Description
Very High	Key characteristics of the landscape are highly vulnerable to the type of change proposed (have little or no tolerance to change). May be a landscape designated as being of international or national importance with features of international or national importance that has rarity and of very high scenic quality.
High	Key characteristics of the landscape are vulnerable to the type of change proposed (have limited or low tolerance to change). May be a landscape designated as being of national or regional importance with key features of national or regional importance which is uncommon and of high scenic quality.
Medium	Key characteristics and attributes of the landscape are reasonably resilient to the type of change proposed (have medium tolerance to change). May be a landscape designated as being of local importance with features of local importance and of medium scenic quality.
Low	Key characteristics and attributes of the landscape are resilient to the type of change proposed (are tolerant of change). Not usually designated but may have characteristics or elements of local value.
Negligible	Key characteristics and attributes are unlikely to be affected by the type of change proposed. Not designated and little or no characteristics or elements of value.

13.1.4 Magnitude of Landscape Impact

Direct resource changes on the landscape character in the study area are brought about by the introduction of the proposed development and its impact on the key landscape characteristics. The categories and criteria used are presented in Table 13.2.

Table 13.2: Magnitude of Landscape Impact

Magnitude	Description
Large	Total loss or extensive alteration to key elements/features/characteristics of the landscape resulting in a large change to the baseline conditions that is likely to be irreversible, long term or permanent.
Medium	Moderate partial loss or alteration to key elements/features/characteristics of the landscape resulting in a medium change to the baseline conditions that is likely to be, long term but may be partly reversible.
Small	Some loss or alteration to key elements/features/characteristics of the landscape resulting in a small change to the baseline conditions that is likely to be, short or medium term and at least partly reversible.
Negligible	Limited loss or alteration to key elements/features/characteristics of the landscape resulting in a negligible change to the baseline conditions that is likely to be, short or medium term and fully reversible.
No change	No change to the landscape baseline.

13.1.5 Visual Impact Assessment

The assessment of effects on views is an assessment of how the introduction of the proposed development will affect views throughout the study area. Assessment of visual effects therefore needs to consider:

- Direct impacts of the proposed development upon views of the landscape through intrusion or obstruction;
- The reaction of viewers who may be affected, e. g. residents, walkers, road users; and

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- The overall impact on visual amenity.

Viewpoints have been selected to meet the following criteria, with locations illustrated in **Appendix 13.1 of Volume III** which comprises a specific viewpoint location map.

- A balance of viewpoints from where main direction of view is towards the proposed development;
- A range of views of the proposed development covering the extent of the study area. Selected viewpoints have all been located within the study area associated with the proposed development;
- A proportion representing areas known to be available to the community where people may frequently congregate; and
- Locations of interest e.g. settlements.

13.1.6 Visual Sensitivity

Visual sensitivity is defined with reference to the landscape sensitivity of the viewpoint location and the view. Other factors effecting visual sensitivity include:

- The location and context of the viewpoint;
- The expectations and occupation or activity of the receptor; and
- The importance of the view.

Although the interpretation of viewers' experience can have preferential and subjective components, there is generally clear public agreement that the visual resources of certain landscapes have high visual quality.

Viewer sensitivity, as set out in **Table 13.3**, is a combination of the sensitivity of the human receptor (for example resident, commuter, tourist, walker, recreationist or worker, and the numbers of viewers affected) and viewpoint type or location (for example house, workplace, leisure venue, local beauty spot, scenic viewpoint, commuter route, tourist route or walkers' route).

Table 13.3: Visual Receptor Sensitivity

Visual receptor Sensitivity	Description
Visual Receptor Sensitivity	Description
Very High	People with proprietary interest in their surroundings or whose attention is likely to be focused on enjoyment of the view. Views are usually of value as recognised by international or national designation or promoted nationally or internationally for their scenic quality. Examples include residents positioned to take advantage of scenic views and recreational visitors at nationally promoted viewpoints.
High	People with proprietary interest in their surroundings or whose attention is likely to be focused on enjoyment of the view. Views are usually of value as reflected in local designations and promoted at local level, for example, in local guidebooks and maps. Examples include residents of dwellings positioned to view and enjoy the wider countryside, viewers on long distance walking routes or cycle tracks and viewers at locally promoted viewpoints.
Medium	People with passing interest in their surroundings for example those travelling in vehicles on scenic routes. Views attained may be locally valued.
Low	People with limited interest in their surroundings such as commuters travelling on major road and rail routes. Views attained are not necessarily of any particular scenic quality or value.
Negligible	People who are not focused on their surroundings, for example, those at work or engaged in active recreation where the setting is of little relevance to their activity. Views, where available, are not of any particular scenic quality or value and may feature detracting elements.

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13.1.7 Magnitude of Visual Impact

The magnitude of impact on the visual resource results from the scale of change in the view, with respect to the loss or addition of features in the view, and changes in the view composition. Important factors to be considered include: proportion of the view occupied by the proposed development, distance and duration of the view. Other vertical features in the landscape and the backdrop to the proposed development will all influence resource change. Magnitude of visual impact is defined in Table 13.4.

Table 13.4: Magnitude of Visual Impact

Magnitude	Description
Magnitude	Description
Large	Total loss or extensive alteration to key elements/features/characteristics of the view experienced by a particular viewer type resulting in a large change to the baseline conditions that is likely to be irreversible, long term or permanent
Medium	Moderate partial loss or alteration to key elements/features/characteristics of the view experienced by a particular viewer type resulting in a medium change to the baseline conditions that is likely to be, long term but may be partly reversible.
Small	Some loss or alteration to key elements/features/characteristics of the view experienced by a particular viewer type resulting in a medium change to the baseline conditions that is likely to be, short or medium term and at least partly reversible
Negligible	Limited loss or alteration to key elements/features/characteristics of the view experienced by a particular viewer type resulting in a small change to the baseline conditions that is likely to be, short or medium term and fully reversible
No change	No change to the existing view

13.1.8 Significance of Effect

The purpose of this LVIA is to determine, in a transparent way, the likely significant landscape and visual effects of the proposed development. It is accepted that, due to the nature and scale of development, the proposed development could potentially give rise to some notable landscape and visual effects.

GLVIA3 identifies that 'The regulations require that a final judgement is made about whether or not each effect is likely to be significant. There are no hard and fast rules about what effects should be deemed significant but LVIA's should always distinguish clearly between what are considered to be significant and non-significant effects.'

Significance can only be defined in relation to each particular development and its specific location. The relationship between receptors and effects is not typically a linear one. It is for each LVIA to determine how judgements about receptors and effects should be combined to derive significance and to explain how this conclusion has been arrived at.

The changes caused to landscape and visual receptors as a result of the proposed development are evaluated in terms of their size or scale, geographical extent and duration and reversibility. Duration is defined as short term lasting 0-5 years, medium term lasting 5-10 years, long term lasting 10-20 years and permanent lasting more than 20 years.

As a general guide it is considered that the following are likely to be considered effects of the greatest significance:

- Major loss or irreversible negative effects, over and extensive area, on elements and/or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes, or
- Irreversible negative effects on people who are particularly sensitive to changes in view, on recognised and important viewpoints or scenic routes, large-scale change which introduces non-characteristic, discordant or intrusive elements into the view.

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The identification of significant effects would not necessarily mean that the effect is unacceptable in planning terms. What is important is that the likely effects on the landscape and visibility are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making the planning decision.

The significance of effects on landscape, views and visual amenity are evaluated according to a five-point scale: Large, Medium, Small, Negligible or No Change.

For the purposes of this assessment those effects indicated as being of Substantial or Major to Substantial are considered significant as per Table 13.5. Effects of 'Moderate' and lesser significance have been identified in the assessment but are not considered significant upon the character and quality of the landscape and on views although they remain worthy of consideration throughout the decision making process.

For those effects indicated as being Moderate to Major the assessor will exercise professional judgement in determining if the effect is considered significant.

Table 13.5: Significance of Effects

		Sensitivity				
Magnitude of Impact		Negligible	Low	Medium	High	Very High
	No change	None	None	None	None	None
	Negligible	Negligible	Negligible to Minor	Negligible to Minor	Minor	Minor
	Small	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate	Moderate to Major
	Medium	Negligible to Minor	Minor	Moderate	Moderate to Major	Major to Substantial
	Large	Minor	Minor to Moderate	Moderate to Major	Major to Substantial	Substantial

13.1.9 Landscape & Visual Assessment Definitions

The following provides a list of landscape and visual definitions for the terms used within this assessment:

- **Landscape Capacity:** the capacity of a particular type of landscape to absorb change without unacceptable adverse effects on its character;
- **Landscape Character Area:** distinct types of landscape which are generic in character in that they may occur in different parts of the country, but wherever they are they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern. Landscape character area (LCA) names are generic, for example 'Upland Hills', 'river valley' and 'urban landscape';
- **Landscape Fabric:** is the physical pattern of elements and features such as vegetation, landform and land use that combine to create landscape character. The effects of a development on landscape fabric are those that alter the physical pattern of elements. These effects are restricted to the landscape within which the proposed development is located as it is within this area that the physical pattern will alter, for instance through loss of vegetation, re-contouring or changes to land use;
- **Landscape Quality (or condition):** is based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place;

- **Landscape Resource:** the combination of elements that contribute to landscape context, character and value;
- **Landscape Value:** the importance attached to a landscape (often as a basis for designation or recognition) that expresses national or local consensus, because of its quality, cultural associations, scenic or aesthetic characteristics;
- **Sensitivity:** vulnerability of a sensitive receptor to change;
- **Sensitive receptor:** physical or natural resource, special interest or viewer group that will experience an impact;
- **Magnitude:** size, extent and duration of an impact;
- **Visual Amenity:** the value of a particular area or view in terms of what is seen;
- **Visual Character:** when a viewer experiences the visual environment, it is not observed as one aspect at a time, but rather as an integrated whole. The viewer's visual understanding of an area is based on the visual character of visible features and aspects and the relationships between them. The visual character is descriptive and not evaluative;
- **Visual Effect:** is a change to an existing view as a result of development or the loss of particular landscape elements or features already present in the view;
- **Visual Resources:** The visual resources of the landscape are the stimuli upon which actual visual experience is based. They are a combination of visual character and visual quality; and
- **Visual Quality:** Although the interpretation of viewers' experience can have preferential and subjective components, there is generally clear public agreement that the visual resources of certain landscapes have high visual quality. The visual quality of a landscape will reflect the physical state of individual features or elements. Due to the subjective value of the evaluation there is no comprehensive official process for identifying visual quality. The visual quality of this evaluation has been carried out by one Chartered Landscape Architect and verified by another.

The methodology for Cumulative Landscape and Visual Impacts (CLVIA) has been derived from Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3).

Cumulative effects consist of direct effects on the physical landscape and the character of the site containing the development, and indirect, perceived effects on the landscape character of areas within the study area from which the developments would be visible. GLVIA3 identifies effects as follows:

- **Cumulative effects** as 'the additional changes caused by a Proposed Development in conjunction with other similar developments or as the combined effect of a set of developments, taken together' (SNH, 2012:4).
- **Cumulative landscape effects** as effects that 'can impact on either the physical fabric or character of the landscape, or any special value attached to it' (SNH, 2012:10).
- **Cumulative visual effects** as effects that can be caused by combined visibility, which 'occurs when the observer is able to see two or more developments from one viewpoint' and/or sequential effects which occur when the observer has to move to another viewpoint to see different developments' (SNH, 2012:11).

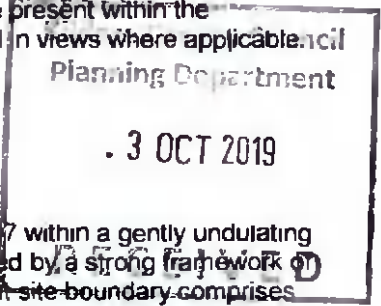
The significance of any identified cumulative landscape and visual effect has been assessed as per the main LVIA. These categories have been based on the same combination of receptor sensitivity and predicted magnitude of impact in order to identify the residual significance of effects.

13.1.11 Cumulative Baseline

The LVIA also considers the additional landscape and visual effects arising from the proposed development in combination with other consented and proposed developments, which may give rise to potential or significant cumulative landscape and visual effects.

A search was conducted of planning applications (projects) within the vicinity of the proposed development, using the Kildare County Council planning portal map viewer and the Department of Housing, Planning and Local Government EIA portal map viewer. The search was limited to the five year period preceding the date of issue of this report and excluded retention applications (i.e. typically local-scale residential or commercial developments where an impact has already occurred), withdrawn and refused applications. The search returned mostly one-off housing development applications (with associated waste water treatment facilities) and application for agricultural storage sheds (for both produce and machinery).

A search of the An Bord Pleanála website^[1] was also completed to identify any relevant applications, including Strategic Infrastructure Development (SID) and Strategic Housing Development (SHD) in the past three years, or in close proximity to the proposed development. Table 3.2 lists those proposals identified from planning searches.

Where existing overhead lines, telecommunication masts and other built form are present within the landscape they have been considered as part of the LVIA baseline and are noted in views where applicable. 

13.2 Receiving Environment

13.2.1 General Overview

The proposed development site is located immediately south of the L-8006/L-8007 within a gently undulating agricultural landscape, which is predominantly pastoral in nature with fields defined by a strong framework of well-maintained hedgerows and trees. The land contained within the development site boundary comprises eight fields bounded by hedgerows, with mature trees forming a component of hedgerows along the southern boundary.

Land use within the study area associated with the proposed development is generally comprised of small to medium scale agricultural fields, primarily used for arable agricultural, with field boundaries well defined by hedgerows and hedgerows with trees. Mixed species woodland blocks are scattered throughout and are mainly associated with farm buildings which form a distinct element within the surrounding landscape. Commercial coniferous woodland, Clonmoyle Forest, to the immediate south of the proposed development site provides a strong sense of enclosure, particularly from the surrounding local road network, whilst providing variety and interest within available views.

The 400kV Moneypoint – Dunstown overhead transmission line traverses the north-western corner of the proposed development site and forms a distinct visual element, clearly visible in many views from within the surrounding study area.

13.2.2 Landscape Character Assessment Kildare County Development Plan 2017 – 2023

The proposed development site and associated study area are located within the Kildare County Council area, covered by the Kildare County Development Plan 2017 – 2023 (CDP). As part of the CDP, Kildare Council has carried out a Landscape Character Assessment, which identified sixteen Landscape Character Areas (LCA) within County Kildare.

A review of the Landscape Character Assessment accompanying the CDP has identified that the proposed development site is primarily located within the Central Undulating Lands LCA, with a small portion of the

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proposed development, associated with the south-western corner, located within the Southern Lowlands

13.2.2.1 Central Undulating Lands LCA

The Central Undulating Lands LCA is identified as the Central Undulating Lowlands in the original landscape character assessment contained in the 2005-2011 County Development Plan. It is described by the CDP as follows:

This lowland landscape character unit is characterised by undulating topography and located in the centre of the County. The terrain gently rises to a maximum elevation of 147m O.D. at the east of the Curragh lands. The Curragh racing course and its natural grasslands represent a significant landscape feature in the area (see Chapter 10, Volume 1).

The generally medium sized open lands are bordered by well-maintained hedgerows that contain scattered trees along some sections of the field boundaries. Although hedgerows are generally low, the undulating lands provide the potential to screen adjacent low-lying areas. The skyline to the east is defined by the Eastern Kildare Uplands (see Section 18.3.1) and the Chair of Kildare (Section 18.3.4) defines the extent of visibility to the west. Soils in the area are dominated by Grey Brown Podzolics combined with mineral soils. As a result, the area is suitable to moderately suitable for tillage, pasture, meadow and forestry.

The unit is generally perceived as being important and special in landscape terms (see Appendix 4), particularly due to the Curragh which is perceived as the most important landscape feature in the County (see also Section 18.7.1). The road that runs through the Curragh is considered to have scenic value and the area is perceived as having significant tourism potential however, it is not considered suitable for other type of developments - except for telecommunication antennae.

In respect of landuse, the landscape character description states The Curragh natural grassland represents the larger and most considerable landuse in this unit. Agricultural lands, including tillage and complex cultivation patterns, are dispersed both to the north and south of the Curragh, with a dispersed pattern of large areas of coniferous and mixed forestry. Patches of peat bog also occur to the south of this character unit. Established large population centres such as Kildare and Newbridge, combined with other smaller settlements such as Milltown and a dispersed, relatively high density of rural housing on the outskirts of the major urban areas, are indicative of a high population density.

It is noted that this LCA contains similar development (sand and gravel extraction) to the south of the L-6080, adjacent to the southern boundary of The Curragh.

Critical landscape factors are described by the CDP as follows:

Undulating topography - *The gently undulating topography that characterises this character unit provides physical shielding. The dynamic and complex nature of undulating lands have the potential to locally enclose vistas and thus, help to provide a realistic scale and visual containment where development does not break the skyline.*

Elevated Vistas - *The roads that run through the upper elevation areas of this undulating terrain allow long distance vistas to the Curragh open lands, as well as to the Northern and Southern Kildare Lowlands (see Sections 18.4.1 & 18.4.2). These views however are interrupted along some sections by unmaintained and thus, tall hedgerows.*

Low Vegetation - *The grassland, tillage fields and generally low hedgerows of this area provide similar characteristics to smooth terrain in landscape terms, and the two are often interrelated due to soil attributes. Grassland vegetation and tillage crops are usually uniform in appearance, failing to break up vistas and allowing for long distance visibility.*

Shelter Vegetation - *Shelter vegetation is represented at some stretches of this unit by the presence of coniferous and mixed forests. In a similar manner to undulating topography, shelter vegetation has screening and absorbing quality in landscape terms. It can provide a natural visual barrier and also add to the complexity of a vista, breaking it up to provide scale and containment for built forms'*

Localised River Views - The River Liffey runs through this character unit, which is easily accessible by existing roads. Due to the undulating nature of this area, many views of the river valley are available from vantage points along the river valley. River valleys are generally visually enclosed and have very distinctive characters with a high degree of visual consistency.

13.2.2.2 Southern Lowlands LCA

The CDP describes the Southern Lowlands as follows:

This landscape character unit comprises an extensive lowland area to the south-west of the County, the River Barrow and the Grand Canal running along its western quarter. This area is characterised by generally flat terrain and open lands with regularly shaped large field patterns. Hedgerows are well maintained and low, with scattered trees along the field boundaries that partially screen the lowest lying areas.

Nevertheless, the generally flat topography and the low lying vegetation allow long-distance and extensive visibility. Distant views include the skylines of the Eastern Kildare Uplands, the Newtown and Hughstown Hills and the Wicklow Mountains to the east, the Chair of Kildare hilltops to the north-east and the neighbouring hills of County Laois to the south-west.

The predominant landuse in this area is tillage, combined with other agricultural crops and relatively large areas of pastureland. A number of coniferous and mixed forestry plantations also occur, as well as small patches of deciduous woodlands and naturally occurring vegetation.

Critical landscape factors described by the CDP are as follows:

Smooth Terrain - Smooth terrain and the generally flat topography and landform that characterised this landscape character unit, allows extensive vistas over long distances without disruption, as the planar surface does not break up fore and middle ground. Consequently, development can have a disproportionate visual impact due to an inherent inability to be visually absorbed by the flat terrain.

Low Vegetation - The grassland, large tillage fields and generally low well maintained hedgerows of this area provide similar characteristics to smooth terrain in landscape terms, and the two are often interrelated due to soil attributes. Grassland vegetation and tillage crops are usually uniform in appearance, failing to break up vistas, and allowing long distance visibility. Although existing low hedgerows partially screen the lowest land parcels, the generally low vegetation proves unable to visually absorb new development.

Shelter Vegetation - Shelter vegetation is represented at some stretches of this unit by coniferous plantations, deciduous woodlands and the presence of trees that grow on field hedgerows. Tall vegetation has a shielding and absorbing quality in landscape terms as it can provide a natural visual barrier and also adds to the complexity of a vista, breaking it up to provide scale and containment for built forms.

Localised Water Corridor Views - River valleys and water corridors are generally visually enclosed and highly localised areas of very distinctive character and high degree of visual consistency. This character unit includes sections of the River Barrow and the Grand Canal. Due to the low lying nature of this area, many views of the river valley and the canal corridor are available from the local roads and from the viewing points located on bridges.

Both of these LCAs are categorised, by the CDP Landscape Character Assessment, as being Class 1 Low Sensitivity, which is described as Areas with the capacity to generally accommodate a wide range of uses without significant adverse effects on the appearance or character of the area.

Table 14.3 of the CDP presents an assessment of the likely compatibility between a range of land uses, including sand and gravel extraction, and the LCAs. Both the Southern Lowlands LCA and The Central Undulating Lands LCA are not included in this assessment.

13.2.3 Landscape Policies Kildare County Development Plan 2017 – 2023

Policies of relevance to landscape and visual amenity are documented in Chapter 14 of the CDP. General policies of relevance to this LVIA are set out as follows:

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Policy LA 1: *Ensure that consideration of landscape sensitivity is an important factor in determining development uses. In areas of high landscape sensitivity, the design, type and the choice of location of proposed development in the landscape will also be critical considerations.*

- **Policy LA 2:** *Protect and enhance the county's landscape, by ensuring that development retains, protects and, where necessary, enhances the appearance and character of the existing local landscape.*
- **Policy LA 3:** *Require a Landscape/Visual Impact Assessment to accompany significant proposals that are likely to significantly affect:*

Landscape Sensitivity Factors;

A Class 4 or 5 Sensitivity Landscape (i.e. within 500m of the boundary); and

A route or view identified in maps 14.2 and 14.3 (i.e. within 500m of the boundary).

- **Policy LA 4:** *Seek to ensure that local landscape features, including historic features and buildings, hedgerows, shelter belts and stone walls, are retained, protected and enhanced where appropriate, so as to preserve the local landscape and character of an area, whilst providing for future development.*
- **Policy LA 7:** *Be informed by consideration of the County Landscape Character Appraisal.*

Policies are also documented with the CDP for 'Lowland Plains and Boglands'. This is interpreted to include the Southern Lowlands and the Central Undulating Lands as referenced in the previous CDP 2011-2017. The policies of relevance to this assessment states:

- **Policy LL1:** *Recognise that the lowlands are made up of a variety of working landscapes, which are critical resources for sustaining the economic and social wellbeing of the county.*
- **Policy LL2:** *Continue to permit development that can utilise existing structures, settlement areas and infrastructure, whilst taking account of the visual absorption opportunities provided by existing topography and vegetation.*
- **Policy LL3:** *Recognise that this lowland landscape character area includes areas of significant landscape and ecological value, which are worthy of protection.*

Policy in respect of Scenic Routes in the County Development Plan is outlined below,

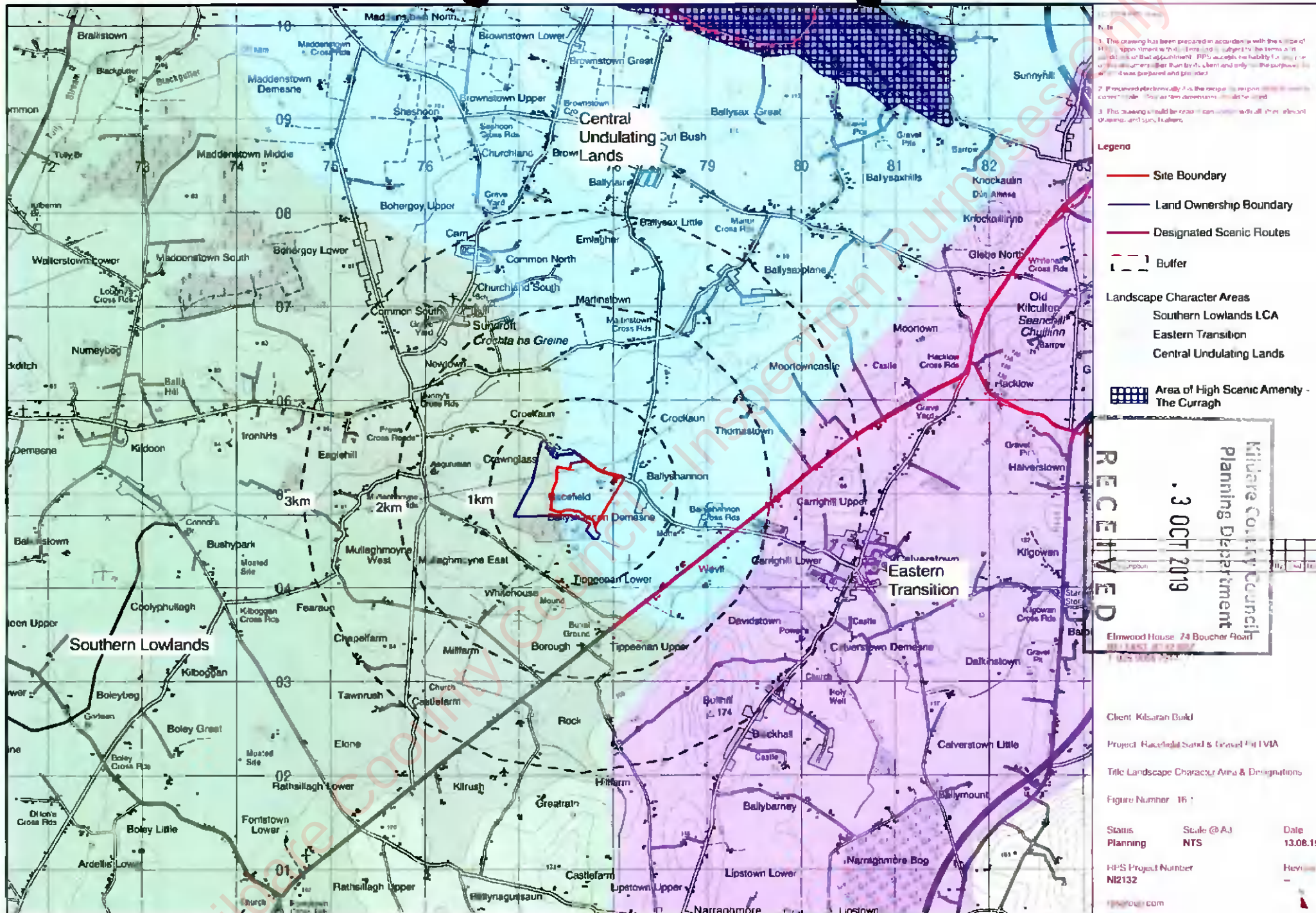
- **Policy SR 1** *Protect views from designated scenic routes by avoiding any development that could disrupt the vistas or disproportionately impact on the landscape character of the area, thereby affecting the scenic and amenity value of the views.*

13.2.4 Landscape Designations Kildare County Development Plan 2017 – 2023

The proposed development site lies within the Kildare County Council area covered by the CDP. A review has taken place of the CDP and other relevant statutory documents to establish if there are any relevant landscape related designations that may influence the assessment within the study area.

13.2.4.1 Areas of High Amenity

A review of the CDP has identified that there are no Areas of High Amenity (AHA) within the Study Area as shown in Figure 16.1. The closest AHA, The Curragh and Environs, is located approximately 4.9km north of the proposed development site and is considered to experience no significant effect as a consequence of the proposed development due to screening provided by intervening topographical changes and vegetation cover.



13.2.4.2 Scenic Routes and Protected Views

A review of the CDP has identified that there are two Scenic Routes within the Study Area associated with the proposed development identified as follows:

- Scenic Route No. 25 is located approximately 1.3km south east of the application area and comprising views to the north-west of Kildare Plains from the R418 south of Moortown House to Tippeen Lower. The elevated nature of the road, which runs through the plains, and the generally low lying hedgerows provide for long distance views over the agricultural plains. The proposed development will lie within the viewpoint of this scenic route and the impact is assessed within this EIAR.
- Scenic Route No. 35 is located approximately 4.5km north of the application area and comprising views of Dun Ailinne from the R418 from Moortowncastle to Knockbounce. While the proposed development lies outside the viewpoint of this scenic route, the potential for visual impact from Dun Ailinne is considered.

13.2.5 Historic Gardens and Designed Landscapes

The National Inventory of Architectural Heritage (NIAH) under the remit of the Department of Arts, Heritage and the Gaeltacht (DoAGH) has prepared a survey of Historic Gardens and Designed Landscapes. A review of the NIAH has identified that the following Historic Garden and Designed Landscape's (HGDL) are located within the study area associated with the proposed development;

- Ballyshannon House; located approximately 1km south-east of the eastern boundary of the proposed development site is described by the NIAH as having virtually no recognisable features remaining;
- Calverstown House; located approximately 2.9km south-east of the eastern boundary of the proposed development site is described by the NIAH as having main features substantially present, though peripheral features unrecognisable;
- Eaglehill House; located approximately 2.1km west of the western boundary of the proposed development site is described by the NIAH as having main features unrecognisable though peripheral features visible;
- Martinstown House; located approximately 1.9km north-east of the northern boundary of the proposed development site is described by the NIAH as having main features substantially present though peripheral features unrecognisable.
- Normanby Lodge; located approximately 2.8km north of the northern boundary of the proposed development site is described by the NIAH as having virtually no recognisable features.

13.3 Potential Impacts

Chapter 3 of the EIAR describes the proposed combined construction/operational phase of the proposed development in detail, including timing and phasing of the proposed works. As the proposed development is for the extraction of materials (sand and gravel), the construction phase and operational phase of the proposed development have been considered as a single phase in order to avoid repetition.

13.3.1 Construction/ Operational Phase Impacts

During this phase the potential LVIA impacts include;

- Site preparation/enabling works;
- Site infrastructure and access for construction traffic;
- Implementation of new features within the landscape (berms / storage heaps);
- Vehicular and plant movements associated with sand and gravel extraction activities; and
- Lorry / haulage traffic on local roads

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13.3.2 Construction / Operational Phase Landscape Character Impacts**13.3.2.1 Central Undulating Lands LCA**

The proposed development is primarily located within the Central Undulating Lands LCA. Direct impacts on the LCA predicted to occur during the construction / operational phase arise from the physical construction of the new access road, removal of existing internal field boundary hedgerows located within the area identified as the Limit of Excavation Area, formation of earth berms along northern and eastern boundaries of the site and the spreading of overburden and spoil within fields adjacent to the southern and western boundaries. Proposed activities will not directly affect existing established boundary vegetation which will screen activities within the proposed development site.

The construction of the new access and vegetation removal will require construction equipment and activities that will be locally conspicuous while in operation. It is considered that such construction activities will be localised in their effect as the surrounding well vegetated nature of the landscape will quickly absorb such features. Activities associated with the formation of the earth berms, spreading of spoil and material extraction will also require construction equipment, which will be locally conspicuous, though easily absorbed by existing, established boundary vegetation.

Localised portions of the LCA adjacent to, but beyond the site boundary of the proposed development are predicted to experience indirect effects as a consequence of the formation of new features associated with the proposed development, though predicted impacts are reduced by retained vegetation and localised changes in topography.

The Central Undulating Lands LCA is considered, by the CDP, to have a low sensitivity to change.

The predicted magnitude of impact associated with the proposed development during the construction/ operational phase is considered to be localised, medium with direct impacts restricted to land within the site boundary.

Remaining portions of the Central Undulating Lands LCA beyond the site boundary are predicted to experience localised negligible, temporary indirect impacts during the construction phase.

Localised Minor, direct, adverse effects are predicted to be experienced during the construction/ operational phase of the proposed development. Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects during the construction/ operational phase.

13.3.2.2 Southern Lowlands LCA

A minor portion of the proposed development is located within the Southern Lowlands LCA. Direct impacts on the LCA predicted to occur during the construction/ operational phase arise from the removal of existing internal field boundary hedgerows located within area to receive overburden and the spreading of overburden / spoil within identified areas. It is predicted that there will be no direct effect on existing vegetation forming external boundaries to the immediate west or south as the proposed development has been carefully located to in order to eliminate the need to remove such vegetation.

The vegetation removal and spreading of overburden / spoil will require construction equipment and activities that will be locally conspicuous while in operation. It is considered that such construction activities will be localised in their effect as the surrounding well vegetated nature of the landscape will quickly absorb such features.

Localised portions of the LCA adjacent to, but beyond the site boundary of the proposed development are predicted to experience indirect effects as a consequence of the formation of new features associated with the proposed development, though predicted impacts are reduced by retained vegetation and localised changes in topography.

The Southern Lowlands LCA is considered, by the CDP, to have a low sensitivity to change.

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The predicted magnitude of impact associated with the proposed development during the construction/ operational phase is considered to be localised, small with direct impacts restricted to land within the site boundary.

Remaining portions of the Southern Lowlands LCA beyond the site boundary are predicted to experience localised negligible, temporary indirect impacts during the construction/ operational phase.

Localised negligible to minor, direct, adverse effects are predicted to be experienced during the construction/ operational phase of the proposed development. Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects during the construction phase.

13.3.3 Construction/ Operational Phase Landscape Designation Impacts

Construction/ operational phase impacts on relevant landscape designations contained within the CDP are discussed in the following sections.

13.3.3.1 Areas of High Amenity

The proposed development site is not located on land identified as an AHA and predicted impacts are considered to be indirect only. For the purposes of this assessment land designated as AHA is considered to be of a high sensitivity to the type of development proposed.

The southern boundary of The Curragh and Environs lies approximately 4.9km north of the proposed development site, the northern boundary of which is defined by the L-8006. The construction/ operational phase activities associated with the proposed development will not directly impact the AHA and indirect effects are reduced by existing intervening field boundary vegetation.

The predicted magnitude of impact associated with the construction/ operational phase of the proposed development is considered to be no change as the proposed development does not directly affect land identified as an AHA.

The predicted significance of effect for the Curragh and Environs AHA is none.

13.3.3.2 Scenic Routes and Protected Views

For the purposes of this assessment Scenic Routes and Protected Views are considered to be of a high sensitivity to the type of development proposed. The proposed development site lies approximately 1.3km north west of Scenic Route 25 comprising views to the north-west of Kildare Plains from the R418 south of Moortown House to Tippeenah Lower. Peripheral, western views from the R418, towards the proposed development site are restricted by existing roadside hedgerows, built form and intervening field boundary vegetation, such that the proposed development site is not discernible in western views from the R418.

It is therefore considered that the predicted magnitude of impact associated with the construction/ operational phase of the proposed development is considered to be no change as the proposed development will not directly affect protected views from Scenic Route 25.

In addition, the site is located approximately 4.5km south of Scenic Route No. 35 which has been designated to protect views of Dún Ailinne to the north from the R418. The proposed development will have no impact on this scenic route and further, the proposed development site is not discernible in southern views from Dún Ailinne.

The predicted significance of effect on the identified protected Scenic Routes is none.

13.3.3.3 Historic Gardens and Designed Landscapes

The proposed development site is not located on land identified as a Historic Gardens and Designated Landscape within the NIAH and as such there are predicted to be no direct effects upon this designation.

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13.3.3.4 Summary of Construction/Operation Phase Landscape Impact

Table 13.6 provides a summary of the predicted Construction / Operational Phase landscape impacts.

Table 13.6: Summary of Construction/ Operational Phase Landscape Impacts

Landscape Character / Designation	Predicted Effect
Central Undulating Lands	Localised Minor, direct, adverse effects are predicted to be experienced during the construction/ operational phase of the proposed development. Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects during the construction phase.
Southern Lowlands	Localised negligible to minor, direct, adverse effects are predicted to be experienced during the construction/ operational phase of the proposed development. Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects during the construction phase.
Areas of High Amenity	None
Scenic Routes and Protected Views	None
Historic Gardens and Designed Landscape	None

13.3.4 Construction/ Operational Phase Visual Impact Assessment

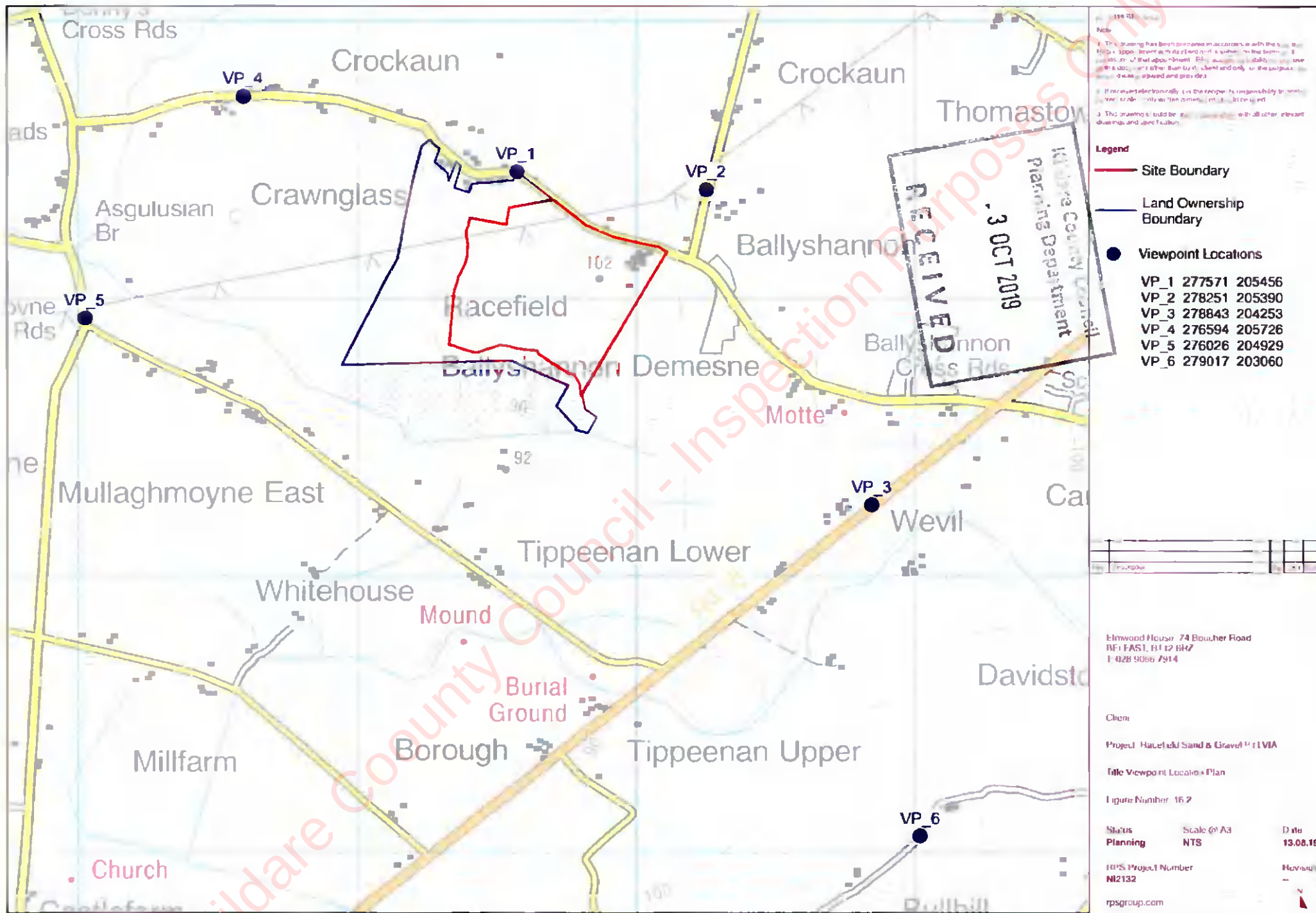
A series of six representative viewpoints have been selected to illustrate the existing visual context for the proposed development and as an aid to the visual impact assessment which should be read in conjunction with the following assessments. All of the viewpoints have been located on publicly accessible roads, footways and verges and available views and these are shown in Figure 16.2.

In order to avoid repetition, an assessment of construction phase impacts and predicted operational phase impacts are included within each viewpoint assessment.

The existing views, indicating the current view available from each of the viewpoint locations are identified as 'Baseline'. The predicted view, indicating the proposed development in the context of the existing view is identified as 'Photomontage'. Where the proposed development is not visible in the predicted view, a red line profile of the proposed development has been provided which indicates its position within the view and is identified as 'Red Line'.

All imagery of 'Baseline' and 'Photomontage' for each viewpoint are shown in Appendix 13.1 in Volume III of this EIAR.

A summary of the following viewpoint assessments in the absence of mitigation is presented in Table 13.7.



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Viewpoint 1: View South-east from Crockaun Road (L-8006)

Viewpoint Description and Sensitivity

This viewpoint is located on Crockaun Road (L-8006) approximately 0.1km north-west of the western boundary of the proposed development site. The view is considered to be representative of views experienced by road users traveling east on the local road, at a point where the proposed development site first becomes visible and residential properties within the vicinity.

The viewer sensitivity is considered to be high due to the proximity of residential properties.

Existing View

The existing view available from this location is generally open in nature, though existing roadside vegetation and tall hedgerow to the right of the view restrict views of surrounding built form and adjacent agricultural land. Existing built form associated with Racefield House, Ballyshannon Demesne, scattered residential properties and farm buildings are not apparent in the view due to screening effects by intervening vegetation. Distant horizons are formed by existing vegetation associated with the southern boundary of the proposed development site and Clonmoyle Forest, immediately south whilst more elevated land at Bullhill is visible at distance within the central portion of the view. High voltage power lines and single pylon form the main visual draw within the view, whilst timber poles carrying overhead lines are glimpsed amongst roadside vegetation to the left of the view.

Visual Effects during Construction:

Construction phase activities associated with the proposed development will be visible across the central portion of the view, primarily visible at middle distance, below and against a well vegetated background. Construction phase activities associated with formation of mounding will form a localised, short-term, point of interest within the overall available view though it is considered that such activities will not significantly impact on the view.

Predicted Effects during Operation:

The proposed storage mound within the north-western corner of the development site will be visible across the central portion of the view, visible at close distance. The proposed topsoil storage mound will obscure views of distant horizons formed by vegetated boundaries and woodland at Clonmoyle Forest, though will screen activities associated with the operational stage of the proposed development. This mound will be perceived locally as a new addition to the overall view within the medium term.

Magnitude of Impact:

The magnitude of visual impact during the construction phase of the proposed development is considered to be localised and medium. The magnitude of visual impact during the operational phase is considered to be localised and medium.

Significance of Effect:

Moderate to major, temporary, adverse effect during the construction phase of the proposed development. Moderate to major, locally adverse and not significant effect during the operational phase of the proposed development.

Viewpoint 2: View South-west from Ballyshannon Road

Viewpoint Description and Sensitivity

This viewpoint is located at a gated field access adjacent to the Ballyshannon Road, approximately 0.3km north-east of the proposed development site. The view is considered to be representative of oblique views experienced by road users traveling south on the local road and residential receptors in close proximity.

The viewer sensitivity is considered to be high due to the proximity of residential properties.

Existing View 3 OCT 2019

The existing view available from this location is partially restricted in nature by intervening vegetation, associated with field boundaries and vegetation adjacent to the Crockaun Road (L-8006). Existing ground levels of the proposed development site are not visible in the view due to screening effects of intervening vegetation. Large-scale pylons is visible within the central portion of the view, with overhead cables perceived as an elevated horizon above existing landform and vegetation. Scattered farm buildings are visible in the view, though partially screened by existing vegetation.

Visual Effects during Construction:

Construction phase activities associated with the proposed development will not be visible in the view due to screening by intervening field boundary and roadside vegetation.

Predicted Effects during Operation:

New features associated with the proposed development such as topsoil storage mounds will not be visible within the view, during summer months, due to screening by intervening field boundary and roadside vegetation. Such new features may form a minor addition to the overall view within central portions of the view during winter months, though it is considered that such new features will be difficult to perceive due to intervening vegetation and built form.

Magnitude of Impact:

The magnitude of visual impact during the construction phase of the proposed development is considered to be no change. The magnitude of visual impact during the operational phase is considered to be no change during the summer months, rising to localised and negligible during winter months.

Significance of Effect:

The predicted significance of effect during the construction phase of the proposed development is none. The predicted significance of effect during the operational phase of the proposed development is none during the summer months rising to minor, adverse and not significant effect during winter months only.

Viewpoint 3: View North-west from R418 (Tippeen Road)

Viewpoint Description and Sensitivity

This viewpoint is located on the grassed verge adjacent to the R418 (Tippeen Road), approximately 1.1km east of the eastern boundary of the proposed development site. The view is considered to be representative of oblique views experienced by residential receptors in close proximity, road users traveling north on the local road and representative of north-western views available from Scenic Route 25. The viewer sensitivity is considered to be high due to the proximity of residential properties and portion of the route designated as a Scenic Route.

Existing View

The existing view available from this location is generally panoramic in nature, characterised by arable pasture land with scattered mature tree copses throughout the available view. Distant horizons, formed by field boundary vegetation obscure views of land beyond, whilst farm buildings to the left of the view form a visual stop. High voltage powerlines are difficult to discern within the view, however upper portions of a single pylon are visible, at distance, above the existing vegetation cover.

Visual Effects during Construction:

Construction phase activities associated with the proposed development will not be visible in the view due to screening by intervening vegetation.

Predicted Effects during Operation:

New features associated with the proposed development such as topsoil storage mounds will not be visible within the view, during summer months, due to screening by intervening vegetation. Such new features may

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form an imperceptible addition to the overall view during winter months, though will not be readily discernible within the view due to intervening vegetation.

Magnitude of Impact:

The magnitude of visual impact during the construction phase of the proposed development is considered to be no change. The magnitude of visual impact during the operational phase is considered to be no change during the summer months, rising to localised and negligible during winter months.

Significance of Effect:

The predicted significance of effect during the construction phase of the proposed development is none. The predicted significance of effect during the operational phase of the proposed development is none during the summer months rising to minor, adverse and not significant effect during winter months only.

Viewpoint 4: View South-east from Crawnglass Road

Viewpoint Description and Sensitivity

This viewpoint is located at a gated field access adjacent to the Crawnglass Road, approximately 1km north-west of the western boundary of the proposed development site. The view is considered to be representative of glimpsed, peripheral views experienced by road users traveling east and oblique views experienced by residential receptors in close proximity. The viewer sensitivity is considered to be high due to the proximity of residential properties.

Existing View

The existing view available from this location is generally open in nature, though views of agricultural land at closer distance are restricted in by existing field boundary vegetation to the left of the representative view. Arable pastoral land forms the immediate foreground, set within a strong framework of field boundary vegetation, which screens visibility of arable land beyond. Mid distance views are restricted by field boundary vegetation and trees associated with Clonmoyle Forest to the middle right of the view. Distant horizons are formed by elevated land associated with the Wicklow Mountains and closer elevated land associated with Bullhill. Timber poles carrying overhead lines are visible to the left of the view, partially screened by roadside vegetation, whilst high voltage overhead lines and pylons are glimpsed above the existing vegetation cover at mid distance, across the central portion of the view.

Visual Effects during Construction:

Construction phase activities associated with the proposed development will not be visible in the view due to screening by intervening vegetation.

Predicted Effects during Operation:

New features associated with the proposed development such as topsoil storage mounds will not be visible within the view due to screening by intervening vegetation during summer months. It is also considered that new features will not be readily apparent during winter months as a consequence of intervening vegetation.

Magnitude of Impact:

The magnitude of visual impact during the construction phase of the proposed development is considered to be no change. The magnitude of visual impact during the operational phase is considered to be no change during summer and winter months.

Significance of Effect:

The predicted significance of effect during both the construction and operation phases of the proposed development is none.



Viewpoint 5: View East from Mollaghmoyne Road**Viewpoint Description and Sensitivity**

This viewpoint is located on the grassed verge adjacent to the junction of the Mollaghmoyne Road and local access road (L-8009), approximately 1.3km south-west of the western boundary of the proposed development site. The view is considered to be representative of oblique views experienced by road users traveling north on the Mollaghmoyne Road and scattered residential properties in the vicinity. The viewer sensitivity is considered to be high.

Existing View

The existing view available from this location is generally pastoral agricultural in nature, with pasture lands visible within the immediate foreground set within a strong, enclosing framework of field boundary hedgerows with mature trees. Intervening field boundary vegetation restricts views of agricultural land beyond, though glimpsed views are available where gaps in existing vegetation permit views beyond. Distant horizons, formed by the Wicklow Mountains, are visible to the right of the view, though are largely obscured by intervening vegetation. Built form is not readily visible within the view, with a single outbuilding roof partially visible to the right of the view. Timber poles carrying overhead lines are discernible in the view, though difficult to perceive against and below the existing vegetation cover. High voltage power lines and a single pylon form a strong visual draw within the central portion of the view, seen above the perceived horizon formed by vegetation cover at mid-distance.

Visual Effects during Construction:

Construction phase activities associated with the proposed development will not be visible in the view due to screening by intervening vegetation.

Predicted Effects during Operation:

New features associated with the proposed development such as topsoil storage mounds will not be visible within the view due to screening by intervening vegetation during summer months. It is also considered that new features will not be readily apparent during winter months as a consequence of intervening vegetation.

Magnitude of Impact:

The magnitude of visual impact during the construction phase of the proposed development is considered to be no change. The magnitude of visual impact during the operational phase is considered to be no change during summer and winter months.

Significance of Effect:

The predicted significance of effect during both the construction and operation phases of the proposed development is none.

Viewpoint 6: View North-west from Bull Lane**Viewpoint Description and Sensitivity**

This viewpoint is located at a gated field access adjacent to the local access road, Bulls Lane, located approximately 2.1km south-east of the eastern boundary of the proposed development site. The view is considered to be representative of views experienced by residential receptors in close proximity and glimpsed views experienced by road users on the local access road. The viewer sensitivity is considered to be high.

Existing View

The existing view available from this elevated location is generally panoramic and expansive in nature, though views of agricultural land beyond mid-distance are restricted by intervening field boundary vegetation across the central portion of the view. Distant horizons are generally formed by upper canopies of existing vegetation cover, however more elevated land to the west of Kildare, between Redhills and Grange common forms a distinct visual draw within the central portion of the view. Built form, including farm buildings,

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residential properties and road infrastructure are all difficult to discern within the view due, primarily to screening effects of extensive vegetation cover. High voltage powerlines and associated pylons are visible but form a minor element of the view and are often not discernible.

Visual Effects during Construction:

Construction phase activities associated with the proposed development will not be visible in the view due to screening by intervening vegetation.

Predicted Effects during Operation:

New features associated with the proposed development such as topsoil storage mounds will not be visible within the view due to screening by intervening vegetation during summer months. It is also considered that new features will not be readily apparent during winter months as a consequence of intervening vegetation.

Magnitude of Impact:

The magnitude of visual impact during the construction phase of the proposed development is considered to be no change. The magnitude of visual impact during the operational phase is considered to be no change during summer and winter months.

Significance of Effect:

The predicted significance of effect during both the construction and operation phases of the proposed development is none.

Table 13.7: Summary of Construction and Operational Phase Visual Impact Assessment

ID	Location	Predicted Construction Phase Visual Impacts	Predicted Operational Phase Visual Impacts
Vp 01	View south-east from Crockaun Road (L-8006)	Moderate to major, temporary, adverse effect during the construction phase of the proposed development	Moderate to major, locally adverse and not significant effect during the operational phase of the proposed development.
Vp 02	View South-west from Ballyshannon Road	None	None during summer months rising to minor, adverse and not significant during winter months only
Vp 03	View North-west from R418 (Tippeenán Road)	None	None during summer months rising to minor, adverse and not significant during winter months only
Vp 04	View South-east from Crawnglass Road	None	None
Vp 05	View East from Mollaghmoyné Road	None	None
Vp 06	View North-west from Bull Lane	None	None

13.3.5 Construction/ Operational Phase Visual Impacts on Residential Properties

An assessment has been undertaken within the study area to determine the magnitude of visual impact of the proposed development during the construction/operational phase on potential views from sensitive visual receptors including residential properties. The main visual receptors in proximity to the proposed development with the potential to be impacted will be;

- Cluster of residential properties immediately north-west of the proposed development site boundary adjacent to the L-8006;

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- Residential properties between proposed site access and Ballyshannon Crossroads (R418 / L-8007 Junction)
- Residential properties along local access road to the south of the proposed development; and
- Single residential property immediately south-east at Ballyshannon Demesne.

The residential visual receptors identified above all lie within 500m of the centre of the proposed development site. Other sensitive residential visual receptors within 1km to the south, west, east and north will not be impacted, due to the intervening vegetation that completely screen any views towards the proposed development site.

Residential Properties to the North-west adjacent to the L-8006:

As illustrated in Viewpoint 1 (refer **Appendix 13.1 in Volume III**) south-eastern views towards the proposed development site from this cluster of properties are well screened by existing vegetation associated with the western boundary of the proposed development site. Glimpsed views of the proposed development site and construction phase activities may be permitted where gaps in the existing hedgerow permit views to land beyond. The proposed construction/ operational phase operations will become locally apparent, but not prominent in the view. Additional traffic movements associated with the haulage route (refer **Chapter 10**) will not be visible in views from this cluster of residential properties. Overall the predicted magnitude of impact on these high sensitivity receptors is negligible, which in this instance would result in a localised, minor, adverse but not significant effect.

Residential Properties between Site Access and Ballyshannon Crossroads (R418 / L-8007 Junction)

There are scattered residential properties and farm dwellings on both sides of the L-8007 between its junction within the R418 and the proposed development site access. Views from the properties along this section of the L-8007, towards the proposed development site, are well screened by existing roadside vegetation, field boundary hedgerows and garden boundary vegetation. The proposed construction/ operational phase operations will not be apparent within south-western views, however due to the offsite transportation of material on the haulage route properties with direct views of the L-8007 will have direct views of traffic related to the proposals. Overall the predicted magnitude of impact on these high sensitivity receptors is localised and small, which in this instance would result in a localised, minor to moderate, adverse but not significant effect.

Residential properties along local access road (L-8009)

There are scattered residential properties and farm dwellings on both sides of the L-8009 between its junction within the R418, to the east and its junction within the L-4002, to the west. Views from the properties along this section of the L-8009, towards the proposed development site, are well screened by field boundary hedgerows and garden boundary treatments and the woodland at Clonmoyle Forest. The proposed construction/ operational phase operations and additional traffic movements associated with the proposed haulage route will not be visible in northern views from these properties. Overall the predicted magnitude of impact on these high sensitivity receptors is no change, which in this instance would result in no effect.

Single residential property immediately south-east at Ballyshannon Demesne:

This single residential property is located approximately 0.1km east of the eastern boundary of the proposed development site, with views to the north-west significantly screened by existing boundary vegetation and tree planting within the property boundary. It is considered proposed construction/ operational phase operations will not be apparent within north-western views due to screening provided by intervening vegetation. Overall the predicted magnitude of impact in these high sensitivity receptors is negligible, which in this instance would result in a localised, minor adverse but not significant effect.

13.3.6 Restoration Phase Landscape Character Impacts

Following cessation of operational phase activities, after 12 years, the proposed development site restoration will commence for a two year period. The proposed restoration of the extraction pit area will not involve any

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importation of additional, outside sourced material for infilling of the void space but the site will be restored as an ecological resource through the development of a mix of terrestrial and aquatic habitats to ensure a diverse ecosystem. As noted, the proposed development site is primarily located within the Central Undulating Lands LCA, with a small portion, associated with the south-western corner, located within the Southern Lowlands. The results of this analysis are summarised in Table 13.8.

13.3.6.1 Central Undulating Lands LCA

Proposed restoration phase operations will have a direct impact upon this LCA, limited to land contained within the site boundary. The proposed restoration of the site will result in a site that will consist of a locally altered topography. The site will be reseeded and revegetated with a suitable variety of locally appropriate native flora species; including scrub, shrub and tree species in order to provide a mix of terrestrial and aquatic habitats. Restoration phase activities will not be locally prominent, due to the strong enclosing framework of field boundary hedgerows and the proposed restoration of the disturbed landscape will blend with existing agricultural lands albeit as a locally modified landscape. This landscape due to its undulating nature and strongly vegetated character has the potential to quickly absorb such changes. It is therefore considered that this LCA will experience a localised beneficial impact, as the site is hard to discern from within the wider landscape.

The Central Undulating Lands LCA is considered, by the CDP, to have a low sensitivity to change.

The predicted magnitude of impact associated with the proposed development during the restoration phase is considered to be localised, medium with direct impacts restricted to land within the site boundary.

Localised Minor, direct, beneficial effects are predicted to be experienced during the restoration phase of the proposed development. Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects.

13.3.6.2 Southern Lowlands LCA

Restoration phase activities will not be locally prominent, due to the strong enclosing framework of field boundary hedgerows and the proposed restoration of the disturbed landscape will blend with existing agricultural lands albeit as a locally modified landscape. This LCA has the potential to quickly absorb localised changes and is considered that this LCA will experience a localised beneficial impact, as the site is hard to discern from within the wider landscape.

The Southern Lowlands LCA is considered, by the CDP, to have a low sensitivity to change.

The predicted magnitude of impact associated with the proposed development during the restoration phase is considered to be localised, negligible direct impact restricted to land within the site boundary.

Localised Negligible to minor, direct, beneficial effects are predicted to be experienced during the restoration phase of the proposed development. Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects.

13.3.7 Restoration Phase Landscape Designation Impacts

Restoration phase impacts on relevant landscape designations contained within the CDP are discussed below.

13.3.7.1 Areas of High Amenity

As previously identified, the proposed development site is not located on land identified as an AHA and predicted impacts are considered to be indirect only. The restoration phase activities associated with the proposed development will not impact upon The Curragh and Environs AHA. The predicted magnitude of impact associated with the restoration phase of the proposed development is considered to be no change as the proposed development does not directly or indirectly affect the identified AHA. The predicted significance of effect for the Curragh and Environs AHA is None.

13.3.7.2 Scenic Routes and Protected Views

As previously identified the proposed development site lies approximately 1.3km west of the southern end of Scenic Route 25 comprising views to the north-west of Kildare Plains from the R418 south of Moortown House to Tippeen Lower. Peripheral, western views from the R418, towards the proposed development site are restricted by existing roadside hedgerows, built form and intervening field boundary vegetation, such that the proposed development site is not discernible in western views from the R418.

It is therefore considered that the predicted magnitude of impact associated with the restoration phase of the proposed development is considered to be no change as the proposed development will not directly affect protected views. The predicted significance of effect on the identified protected Scenic Route is none.

13.3.7.3 Historic Gardens and Designed Landscapes

As previously identified, the proposed development site is not located on land identified as a Historic Gardens and Designated Landscape within the NIAH and as such there are predicted to be no direct effects upon this designation.

Table 13.8: Summary of Restoration Phase Landscape Impacts

Landscape Character / Designation	Predicted Effect
Central Undulating Lands	Localised Minor, direct, beneficial effects are predicted to be experienced during the restoration phase of the proposed development.
Southern Lowlands	Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects.
Areas of High Amenity	Localised Negligible to minor, direct, beneficial effects are predicted to be experienced during the restoration phase of the proposed development.
Scenic Routes and Protected Views	Remaining portions of the LCA, beyond the proposed development site boundary are predicted to experience localised negligible to minor, indirect effects.
	None
	None

13.3.8 Restoration Phase Visual Impact Assessment

The results of this analysis from each of the viewpoints assessed are summarised in Table 13.9.

Viewpoint 1: View South-east from Crockaun Road (L-8006)

Visual Effects during Restoration:

As part of the restoration phase, mounding along the northern boundary, and within the central portion of this view will be re-modelled as part of the oval re-grading of the site. Remaining portions of mounds will be seeded and planted with locally appropriate native tree and shrub planting. Whilst the remaining portions of mounds will be visible within the view, it is considered that the remediated site will largely blend with the surrounding landscape and locally improve the landscape.

Magnitude of Impact:

The magnitude of visual impact during the restoration phase of the proposed development is considered to be localised and small.

Significance of Effect:

Minor to moderate, beneficial effect during the restoration phase of the proposed development

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Viewpoint 2: View South-west from Ballyshannon Road

Predicted Effects during Restoration:

New features associated with the proposed development will not be possible to discern within the view due to screening by intervening vegetation and the fact that the remediated site will blend with its surroundings.

Magnitude of Impact:

The magnitude of visual impact during the restoration phase of the proposed development is considered to be no change.

Significance of Effect:

The predicted significance of effect during the restoration phase of the proposed development is none.

Viewpoint 3: View North-west from R418 (Tippeenán Road)

Predicted Effects during Restoration:

New features associated with the proposed development will not be possible to discern within the view due to screening by intervening vegetation and the fact that the remediated site will blend with its surroundings.

Magnitude of Impact:

The magnitude of visual impact during the restoration phase of the proposed development is considered to be no change.

Significance of Effect:

The predicted significance of effect during the construction phase of the proposed development is none.

Viewpoint 4: View South-east from Crawnglass Road

Predicted Effects during Restoration:

New features associated with the proposed development will not be possible to discern within the view due to screening by intervening vegetation and the fact that the remediated site will blend with its surroundings.

Magnitude of Impact:

The magnitude of visual impact during the restoration phase of the proposed development is considered to be no change.

Significance of Effect:

The predicted significance of effect during the restoration phase of the proposed development is none.

Viewpoint 5: View East from Mollaghmoyné Road

Predicted Effects during Restoration:

Features associated with the proposed development will not be possible to discern within the view due to screening by intervening vegetation and the fact that the remediated site will blend with its surroundings.

Magnitude of Impact:

The magnitude of visual impact during the restoration phase of the proposed development is considered to be no change.

Significance of Effect:

The predicted significance of effect during the restoration phase of the proposed development is none.

Viewpoint 6: View North-west from Bull Lane

Predicted Effects during Restoration:

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New features associated with the proposed development will not be possible to discern within the view due to screening by intervening vegetation and the fact that the remediated site will blend with its surroundings.

Magnitude of Impact:

The magnitude of visual impact during the restoration phase of the proposed development is considered to be no change.

Significance of Effect:

The predicted significance of effect during the restoration phase of the proposed development is none.

Table 13.9: Summary of Restoration Phase Visual Impact Assessment

ID	Location	Predicted Restoration Stage Visual Impacts
Vp 01	View south-east from Crockaun Road (L-8006)	Minor to moderate, beneficial effect during the restoration phase of the proposed development
Vp 02	View South-west from Ballyshannon Road	None
Vp 03	View North-west from R418 (Tippeen Road)	None
Vp 04	View South-east from Crawnglass Road	None
Vp 05	View East from Mollaghmoyn Road	None
Vp 06	View North-west from Bull Lane	None

13.9 Restoration Phase Visual Impacts on Residential Properties

Residential Properties to the north-west adjacent to the L-8006:

Boundary vegetation will have been retained and enhanced with uneven ground and stockpiles of material remodelled as part of the restoration works. Overall the predicted magnitude of impact on these high sensitivity receptors is negligible, which in this instance would result in a localised, minor, beneficial effect for those properties with potential views towards the proposed development site.

Residential Properties between Site Access and Ballyshannon Crossroads (R418 / L-8007 Junction)

Boundary vegetation forming the northern and eastern boundaries of the site will have been retained and enhanced. Stockpiles of materials along the northern boundary will have been remodelled as part of the restoration works and there will be a cessation of site traffic. Residential properties along this section of the L-8007 will not have a direct view of the restored development site due to intervening vegetation. Overall the predicted magnitude of impact on these high sensitivity receptors is negligible, which in this instance would result in a minor, beneficial effect for those properties with a potential view towards the proposed development site.

Residential properties along local access road (L-8009)

The restored site is not visible in northern views from residential properties along this portion of the L-8009. Overall the predicted magnitude of impact on these high sensitivity receptors is no change, which in this instance would result in no effect.

Single residential property immediately south-east at Ballyshannon Demesne:

Boundary vegetation forming the eastern boundary of the site will have been retained and enhanced. Stockpiles of materials along the eastern boundary will have been remodelled as part of the restoration

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works. Overall the predicted magnitude of impact on this high sensitivity receptors is negligible, which in this instance would result in a minor, beneficial effect for those properties with a potential view towards the proposed development site.

13.3.10 Cumulative Impacts

Other proposed developments within the vicinity of the proposed development site are generally domestic in nature, comprising alterations to existing residential properties or applications for construction of new dwellings. These proposed developments are located within both the Central Undulating Lands LCA and Southern Lowlands LCA, both of which have been identified by the CDP as being of low sensitivity.

It is considered that there will be a direct effect upon those portions of the Central Undulating Lands LCA and Southern Lowlands LCA affected by the proposed developments listed in Section 3.10.

Given the strong framework of field boundary vegetation within the landscape surrounding the proposed development site and the existing site boundary vegetation that is to be retained as part of the proposed development site, it is considered that there is limited potential for the proposed development to be read in combination with the other identified proposed developments.

It is therefore considered that the magnitude of cumulative impact associated with the proposed development in combination with other surrounding developments will be negligible, which in this case would give rise to a negligible to minor and not significant cumulative effect on both the Central Undulating Lands LCA and the Southern Lowlands LCA.

13.4 Mitigation Measures

Landscape mitigation measures are those measures that are taken to help reduce or remedy landscape and visual impacts or compensate for the loss of landscape value created by the development. The aims of the landscape mitigation are to:

- Screening or vegetation establishment to reduce the adverse visual impact of the proposal, particularly proposed spoil / storage heaps along the northern and western boundaries of the site; and
- Compensate for landscape impact where possible.

The design evolution associated with the proposed development has incorporated the following built-in design measures:

- Avoidance of impacts on skylines by spoil / storage heaps;
- Consideration of side slopes to extraction pit; and
- Preparation of an outline ecological restoration plan.

The following specific landscape proposals will be put into place, during the restoration phase in order to reduce any residual landscape and visual impacts arising from the proposed development:

- Reinstatement / terracing of excavated side slopes as new habitat;
- Re-vegetation of the site to maintain natural integrity with adjacent landscape; and
- Monitoring of reinstatement works and taking remedial actions if appropriate.

13.5 Predicted Residual Impacts

This section of the LVIA assesses the impact of the proposed development on the landscape character and visual receptors after the mitigation has been implemented. Within the wider landscape the proposal will continue to blend with the existing agricultural landscape around the site with a beneficial residual landscape character impact. With regards to visual impact on sensitive receptors the beneficial impact on existing views

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will continue post remediation and the site will remain as a new, feature from some viewpoints in very close proximity to the north and west but overall the visibility of the site will be limited through time and the proposals will continue to blend within the local context. In summary the broader landscape character and visual context around the landscape southeast of Kildare has the capacity to absorb a development of this scale in landscape and visual terms.

13.6 Monitoring

No monitoring is proposed for landscape and visual impact.

13.7 References

Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3).

Advice Note 01/11 Photography and photomontage in landscape and visual impact assessment (The Landscape Institute, 2011).

Advice Note 02/17 Visual representation of development proposals (The Landscape Institute, 2017)

Up to date digital copies of Ordnance Survey Ireland maps.

Kildare County Council Development Plan 2017 – 2023.

National Inventory of Architectural Heritage (NIAH) of the Department of Arts.





14 INTERACTIONS

14.1 Introduction

This chapter identifies the interrelationships of impacts as identified throughout the Environmental Impact Assessment Report (EIAR). An impact measure from one environmental topic may indirectly cause a secondary impact on another topic. While direct and indirect impacts have been assessed within the relevant chapters of this EIAR, the overall purpose of this chapter is to highlight the main areas of interrelated impacts identified for the proposed development.

14.2 Inter-relationship of Impacts

The Draft Advice notes for preparing Environmental Impact Statements (EPA, 2015) state that:

'All environmental factors are inter-related to some extent. This heading draws attention to significant interaction and interdependencies in the existing environment'

This advises of the importance of checking and cross referencing environmental effects and impacts against all environmental topics. To support this, the Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2017) advise that:

'It is general practice to include a matrix to show where interactions between effects on different factors have been addressed'

In this regard, a matrix has been provided in Table 14.1 which identifies the interactions as identified in the EIAR and illustrates that impacts resulting from one aspect of the environment can have a direct effect on other elements of the environment. These interactions are described in greater detail in the following sections.

14.2.1 Interaction between Population, Human Health, Traffic and Transportation, Material Assets, Cultural Heritage and Landscape and Visual Assessment

The population environmental topic relates to the human population and subsequently and the community. The extraction phase of the proposed development has potential for a negative cumulative impact on the immediate local environment, business and residents. The topics listed have the potential to impact the population and community.

The local community and their wellbeing may be negatively impacted by the increased vehicular traffic associated with the developments operation. The increased traffic has the potential to negatively impact material assets and cultural heritage sites by generating noise and dust and impacting transport infrastructure from HGVs. It is proposed to manage traffic impact through control of the frequency and timing of HGV movements and other demand management measures, therefore, significant disturbance is not expected to the local communities.

14.2.2 Interaction between Human Health, Soil, Geology and Hydrogeology and Water

Human health can be impacted by soil, geology and hydrogeology and water if mitigation measures are not in place. Water and soil, geology and hydrogeology have direct interactions as water is transferred to groundwater through the soil and underlying geology. Groundwater flow in the area is to the west and south so the proposed development is downstream of all sensitive receptors such as water abstraction wells employed by residents/farmers and hence no potential for health impact through this medium.

14.2.3 Interaction between Human Health, Air Quality and Climate, Noise and Vibration and Traffic and Transportation

Large scale developments have the potential to have an interaction between traffic and noise and vibration, as well as traffic and air quality and climate. This is the case for developments which give rise to HGV traffic which emit higher noise and emissions than standard vehicular traffic. This development is reliant on HGV movements to and from the site, over which have such noise and air quality potential implications. The transport of sand and gravel in particular in this case can impart dust and CO₂ emissions which impact air quality and climate. The increased HGV movement and interacting impacts may have negative implications on human health.

The proposed development however will manage and limit the traffic through traffic demand management measures and the use of all in house drivers which will limit the traffic and associated implications during the proposed 12 year extraction timeframe.

14.2.4 Interaction between Biodiversity, Soil, Geology and Hydrogeology, Water and Air Quality and Climate

Negative environmental impacts to soil, geology and hydrogeology, air quality and climate and water have the potential to result in adverse effects to the areas biodiversity. The varying quality of land, water and air quality may impact on the biodiversity present at the site.

Monitoring and mitigation measures are in place to minimum adverse land, water and air quality impacts and will subsequently support existing and future biodiversity. Future biodiversity will be enhanced through the ecological restoration of the pit void to a mix of wetland and terrestrial habitat.

14.2.5 Interaction between Biodiversity and Landscape and Visual Assessment

Changes to the landscape and subsequent changes to habitats have the potential to impact biodiversity. The proposed development has the potential to disturb existing biodiversity within the agricultural fields and hedgerows with potential for medium term negative impacts.

The proposed restoration of the void as an ecological habitat to blend the site with the natural environment will provide suitable habitats and a long term improved biodiversity through improving the existing landscape.

14.2.6 Interaction between Cultural Heritage and Landscape and Visual Assessment

The cultural heritage analysis noted the potential for a visual impact towards the hill of Dún Ailinne which is a designed National Monument. The potential for impact from this monument was specifically assessed in the LVIA and the analysis concluded that the predicted magnitude of impact associated with the proposed development would be no change and the proposed development will not directly affect protected views of Dún Ailinne.

14.3 References

Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA (2017).



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Table 14.1: Interaction of Impacts

	Population	Human Health	Biodiversity	Soil, Geology and Hydrogeology	Water	Air Quality and Climate	Noise and Vibration	Traffic and Transportation	Material Assets	Cultural Heritage	Landscape and Visual Assessment
Population		X						X	X	X	X
Human Health				X	X	X	X	X			
Biodiversity				X	X	X					X
Soil, Geology and Hydrogeology					X						
Water											
Air Quality and Climate								X			
Noise and Vibration								X			
Traffic and Transportation									X		
Material Assets											
Cultural Heritage											
Landscape and Visual Assessment											

