March 2024

Environmental Impact Assessment Report (EIAR) Volume 2

Proposed Plasterboard Manufacturing Plant

On behalf of

GABM Limited

Gorteens, Co. Kilkenny

MALONE O'REGAN ENVIRONMENTAL

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

Ground Floor – Unit 3
Bracken Business Park
Bracken Road, Sandyford
Dublin 18, D18 V32Y
Tel: +353- 1- 567 76 55
Email: enviro@mores.ie

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Prepared By: Gus Egan **Signed:** _____

Checked By: Kenneth Goodwin **Signed:** _____

Approved By: Kevin O'Regan **Signed:** _____

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Environmental Impact Assessment Report (EIAR) Volume 2

Proposed Plasterboard Manufacturing Plant

GABM Limited

Gorteens, Co. Kilkenny

Contents

FIGURES

TABLES

PLATES

1 GENERAL

1.1 Introduction

Malone O'Regan Environmental (MOR) has been commissioned by GABM Limited ('the Applicant') to prepare this Environmental Impact Assessment Report (EIAR).

This report has been prepared in support of a planning application for the development of a plasterboard manufacturing plant, a waste gypsum handling plant, a site access road, infrastructure, and associated works (the 'Proposed Development') on a greenfield site at Gorteens, Co. Kilkenny ('the Site').

Figure 1-1 below shows the location of the Proposed Development on lands circa (ca.) 0.9km from Belview Port and ca.5km northeast of Waterford City, Co. Waterford.

Figure 1-1: Site Location

This EIAR is structured as follows:

- Volume 1 – Non-Technical Summary;
- Volume 2 – Main Report; and,
- Volume 3 – Appendices with supporting technical reports and drawings.

1.2 Applicant

GABM Limited is a new company that hasn't traded previously. The brand name is being developed for a range of products that will include plasterboard and powdered products, including gypsum skim coats and bonding coats.

1.3 Site Context

The Site is on ca. 11.57 hectares (ha.) of agricultural lands, located ca. 0.9km northwest of Belview Port, and ca. 5km northeast of Waterford City, Co. Waterford (ITM 665240 614063). The general topography of the area slopes gradually to the south towards Belview Port and the N25. The Site is accessible via the industrial roads through the Belview Port industrial estate which connects to national road N29, which itself joins national road N25 ca. 2.1km to the northwest. The N25 links Wexford and Cork, and diverges in Slieverue, Co Waterford to the N29, which connects the N25 to Belview Port, Co. Kilkenny. To the west of the Site lies local road L3482.

Belview Port is a significant trade gateway for Ireland, providing a vital link to international markets. Belview Port is strategically located, providing easy access to major road networks, including the N25 and N29 to incoming freight.

The Site is zoned under the Ferrybank-Belview Local Area Plan (LAP) (2017) as mainly '*Port Facilities and Industry*'. This is to allow for the further development and expansion of port facilities and associated industries. There are also partial areas of the Site zoned as '*Passive Open Space'* in the LAP, in order to protect sensitive environmental features [1].

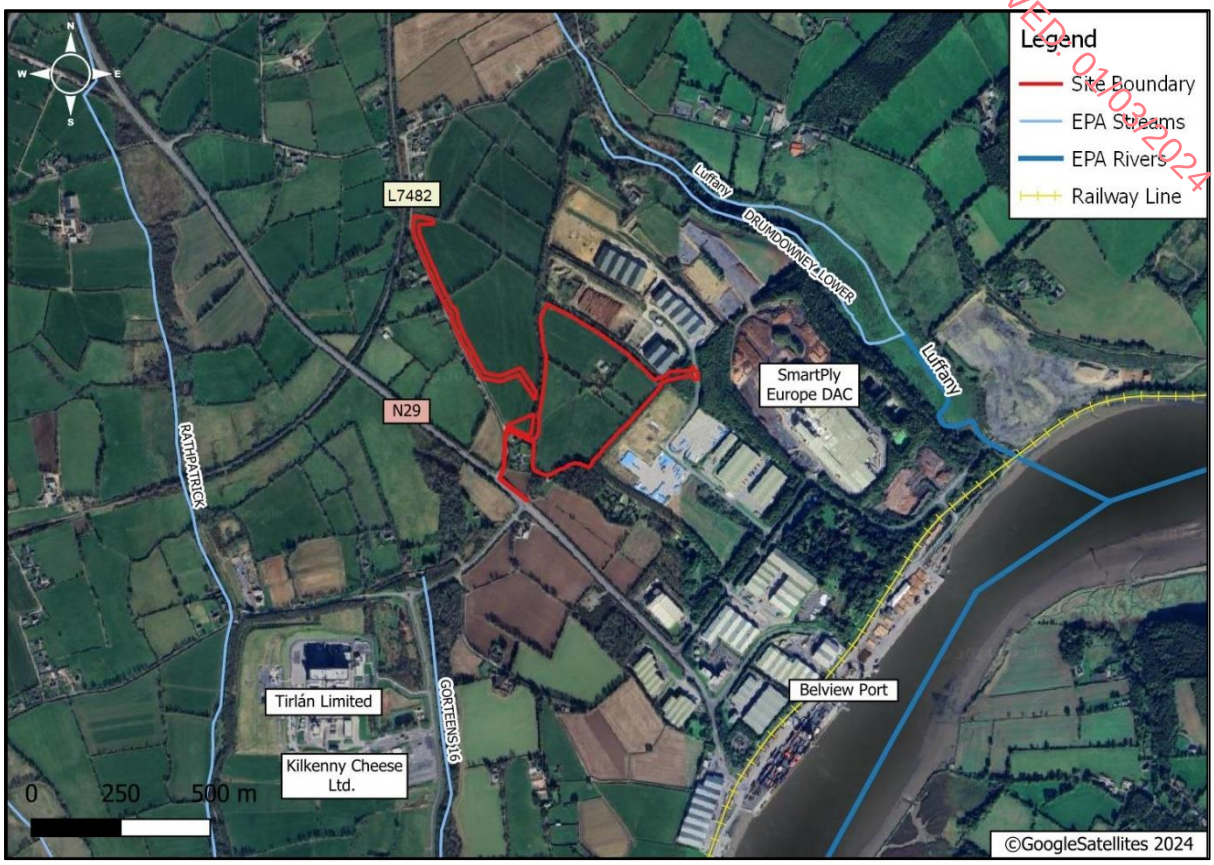
The Site is surrounded by agricultural land with treelines and hedgerows, residential properties typically located along the local roads, port related businesses and industrial facilities. Agricultural land borders the Site to the south, north and west, with a small number of residential properties interspersed within the vicinity. The Proposed Development is not located immediately adjacent to any residential areas. The nearest residential area is located ca. 15m from the southern boundary of the Site and ca. 230m from the facility.

The closest surface waterbodies are the Lower Drumdowney Stream and the Luffany River located to the east of the Site, both of which are hydrologically connected to the River Suir which is designated as a Special Area of Conservation (SAC), see Figure 1-2 below.

SmartPly Europe DAC - an industrial facility, several warehousing units, and other port-related industries lie to the north, northeast and southeast. A railway line runs along the bank of the River Suir ca. 870m east southeast of the Site.

Tirlán Limited is located to the southwest of the Site across the N29, with the new Kilkenny Cheese Limited facility under construction to the south of the existing Tirlán site.

Figure 1-2: Site Context



1.4 Overview of the Proposed Development

The Proposed Development will operate 24 hours a day, 7 days a week, for 333 days per year. Delivery and collection hours are likely to be 6am to 10pm, Monday to Friday, with campaigns broadly every 6 weeks. Each campaign will consist of the arrival of ca. 24,375 tonnes of gypsum rock to Belview Port, and the unloading of raw gypsum from the shipping vessel, which will be transported from Belview Port via HGVs to the Site over a 24 hour period.

Gypsum rock will be imported into Belview Port from either Southern Spain or Northern Africa, unloaded, and transported to the Site. Traffic will follow the internal Belview Port Road, to the junction, where it meets the internal site road leading to Bv 4 Warehouse, Store All. From there heavy goods vehicles (HGVs) will follow the road that leads to the Suir Shipping warehouses. Within the Site's boundary, an access road ca. 56m in length will be constructed to join the existing road at the north-western boundary.

The first stage of the process will involve crushing the gypsum rock and heating or calcining the rock to dehydrate the feedstock. This drying process will be carried out in the calciner. Next the calcined gypsum rock will be mixed with water and additives to form a slurry, which will be fed between two sheets of paper on a board machine conveyor. As the board moves along the boarding conveyor line, the calcium sulphate rehydrates, reverting to its original rock state. The paper will become bonded to the gypsum board. The board will then be cut into the required lengths and conveyed through dryers to remove any remaining moisture from the board. End tapes will be placed on boards which identify the manufacturer, date, location, and time of manufacture. The boards will be stacked, taped, and placed in a dedicated storage building.

Paper liner for the manufacturing of the plasterboards will be delivered daily, and the additives for the plasterboard slurry and chopped glass fibres will be delivered weekly to the Site.

The Proposed Development will also accept waste gypsum plasterboard from construction and demolition wastes for recycling, which will be in keeping with the requirements of the Circular Economy. European and Government policy is moving away from the linear economy and embracing the circular economy. The circular economy encourages re-use of a product as its primary goal and when re-use is no longer feasible, then recycling of the product is the next stage. Fundamentally the circular economy aims to reduce the extraction and use of natural resources, it seeks to identify where materials can be re-used, products repaired or upgraded, to extend the life of the products that we use.

It is currently estimated that in the future the Proposed Development will accept in the region of 25,000 tonnes per annum of waste gypsum plasterboard. The waste plasterboard will be delivered to the Site by NWCPO authorised waste contractors and placed in a dedicated building. The paper on the plasterboard will be stripped and recycled. The gypsum will be brought to the calcining plant, dried, milled and water and additives added to form a slurry mix. This material will be blended with the virgin calcined gypsum to make plasterboards as described above.

Depending on market requirements, the source of gypsum could vary between waste gypsum plasterboard and the imported raw gypsum rock, but the overall total levels of production per annum will not exceed the design capacity of the Proposed Development of 195,000 tonnes per annum.

HGVs will collect and distribute the finished goods to the market. The HGVs will use the entrance on the western side of the building to collect plasterboard. The HGVs will exit the Site and travel on the N29 to its destination. The markets for the products will be Ireland, Northern Ireland, the UK and Europe.

The facility will be powered by a combination of electricity and gas. The heat generated during the calcination process will be used to heat the building and administration offices.

The Proposed Development will create approximately 45 permanent jobs at the Site, and the products manufactured at the plant will create further employment opportunities in the construction sector. During construction it is estimated that up to 100 jobs will be created.

1.4.1 Licencing Requirements / Other Consents

1.4.2 EPA Licencing

The Proposed Development will not require an Industrial Emissions Licence (IEL) from the Environmental Protection Agency (EPA) as it will process a maximum of 195,000 tonnes per annum which is below the threshold of 200,000 tonnes per annum:

> *"1 Minerals and Other Materials*
>
> *1.3 The extraction and processing (including size reduction, grading and heating) of minerals within the meaning of the Minerals Development Acts 1940 to 1999, where an activity involves—*
>
> *(a) a metalliferous operation, or*
>
> *(b) any other operation where either the level of extracted or processed minerals is greater than 200,000 tonnes per annum or the total operational yield is greater than 1,000,000 tonnes, and storage of related mineral waste."*

1.4.2.1 Waste Permit

The Proposed Development will accept waste gypsum plasterboards from construction and demolition (C&D) wastes. In future, it is proposed that the Development will accept in the

region of 25,000 tonnes of gypsum waste per annum. Therefore, a waste facility permit from Kilkenny County Council will be sought under the Waste Management (Facility Permit and Registration) Regulations S.I No. 821 of 2007, and the Waste Management (Facility Permit and Registration) Amendment Regulations S.I No. 86 of 2008 (hereafter referred to as 'the Regulations').

1.4.2.2 Water Abstraction

Groundwater abstraction will form part of the Proposed Development's water supply on-site. However, it is currently estimated that the volume of groundwater abstracted on-site will be low at ca. 7.5m^3/hr or 180m^3 per day. Abstractions over 25m^3 (25,000 litres) a day currently require registration with the EPA, even if the relevant abstraction only occurs occasionally. The abstraction will therefore be registered with the EPA. The proposed on-site abstraction will also be regulated under planning controls. GABM Limited will also comply with any future water abstraction regime [2].

1.5 The Environmental Impact Assessment Report (EIAR)

This EIAR has been prepared in accordance with the requirements of the following legislation and guidance documents:

- The Planning and Development Acts 2000 to 2023 (Part X, Schedule 5) [3];
- Part II of the first Schedule of the European Communities (Environmental Impact Assessment (EIA) (Amendment) Regulations, 1999 (S.I. No. 93 of 1999) [4];
- The Local Government Planning and Development Regulations (S.I. No. 600 of 2001) as amended [5];
- European Union (EU) (Planning and Development) (Environmental Impact Assessment) Regulations 2018 [6];
- EU Guidance on EIA: EIS Review, 2001 [7];
- European Commission 'Guidance on the preparation of the Environmental Impact Assessment Report', 2017 [8];
- EPA 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports', 2022 [9];
- EPA 'Advice notes on current practice in the preparation of Environmental Impact Statements', 2003 [10];
- European Commission 'Interpretation of Definitions of Project categories of Annex I and II of the EIA Directive, 2015 [11];
- Department of Housing, Planning and Location Government 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment', 2018 [12]; and,
- European Commission, 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions', 1999 [13].

1.5.1 EIA Amending Directive (2014/52/EU)

On 14th April 2014, the EIA Directive (2014/52/EU) (the EIA Amendment Directive) was adopted by the Council of the European Union (EU) and amended Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. Article 2 of the EIA Amendment Directive required all Member States to bring the Directive into force by 16th May 2017.

The EIA Amendment Directive clarified aspects of the preceding Directive 2011/92/EU to bring it into line with intervening European Court of Justice (ECJ) judgments and introduced additional provisions and procedural options. Therefore, compliance with the EIA Amendment Directive (2014/52/EU) will automatically ensure compliance with Directive 2011/92/EU. In Ireland, the EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. 296 of 2018), came into effect on the 1st September 2018[1] and gave effect to Directive 2011/92/EU as amended by the EIA Amendment Directive.

Article 1 (2)(g) of the Amending EIA Directive provides that an EIA means a process consisting of;

1. The preparation of an environmental impact assessment report by the developer;
2. The carrying out of a consultation;
3. The examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer and any relevant information received through consultation;
4. The reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (c) and where appropriate, its own supplementary examination; and,
5. The integration of the competent authority's reasoned conclusion into its decision.

An EIAR document is produced as the key component of the environmental impact assessment (EIA) process. It provides a description of:

6. The baseline environment;
7. Identification of the potential effects (if any - both positive and negative) that are predicted to be incurred as a result of the Proposed Development;
8. A description of any control and mitigation measures required to avoid, reduce or eliminate such potential effects; and,
9. A description of the reasonable alternatives studied by the persons who prepared the EIAR, which are relevant to the Proposed Development and its specific characteristics.

1.5.2 Assessment under Schedule 5 (Mandatory EIA)

The relevant classes of developments that require EIA are set out in Schedule 5 of the Planning and Development Regulations 2001 (as amended) [5]. Schedule 5 transposes Annex I and Annex II of the EU EIA Directive (85/337/ECC as amended) into Irish law under Parts 1 and 2 of the Schedule.

The Proposed Development does not meet the thresholds of any classes in Part 1 of Schedule 5, but does fall under the following Part 2 classes:

> *"10 Infrastructure Projects*
>
> *(b) (iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere"*

and

> *"11. Other Projects*
>
> *(b) Installations for the disposal of waste with an annual intake greater than 25,000 tonnes not included in Part 1 of this Schedule."*

The area of the Proposed Development will exceed 10 hectares and the site would be located in an area classified as a built up area in Gorteens, surrounding Belview Port. Additionally, the Proposed Development will accept waste plasterboard from construction and demolition (C&D) wastes. It is proposed in the future to accept in the region of 25,000 tonnes per annum of plasterboard waste. There is the potential that in the future this threshold could be exceeded, therefore, taking a precautionary approach, this mandatory class of activity has also been screened in as a mandatory EIAR requirement.

1.6 Scope of the EIAR

In accordance with the most recent EPA Guidelines [9] , the following attributes of the receiving environment and their interactions are described within the EIAR:

- Population and Human Health;
- Biodiversity;
- Water (Hydrology and Hydrogeology);
- Land & Soils;
- Air Quality;
- Climate;
- Noise and Vibration;
- Landscape and Visual;
- Cultural Heritage;
- Material Assets – Traffic and Transport;
- Material Assets – Waste and Use of Natural Resources and Energy; and,
- Material Assets – Water Supply and Wastewater Treatment.

Note: Other Material Assets such as property ownership was screened out as the Site is within lands owned by the Applicant.

1.7 Structure of the EIAR

Table 1-1 below provides a description of the EIAR structure.

Table 1-1: Structure and Description of the EIAR

Title	Description
Volume 1: Non-Technical Summary (NTS)	
NTS	The NTS contains an overview of the Proposed Development and the principal findings of the EIAR main text in non-technical language.
Volume 2: Main EIAR Report	
Chapter 1-4	Chapters 1-4 provide an introduction to the Proposed Development, describe the Proposed Development, the need for the Proposed Development and the alternatives considered.

Title	Description
Chapters 5-16	Chapters 5-16 comprise the assessment of environmental effects, together with an evaluation of their significance and a description of any mitigation measures proposed to minimise potential effects. It also takes into account the interactions between the various attributes. Chapters 5-16 will generally be structured as follows: *A brief introduction to the chapter;* *An outline of the methodology employed;* *A description of the receiving existing environment relevant to the environmental topic under consideration;* *A description of the characteristics and predicted impacts of the Proposed Development on the receiving environment;* *A description of the reductive or mitigation measures and/or the factors that will reduce or eliminate any significant environmental impacts identified;* *A description of the cumulative and indirect impacts;* *A description of the interactions with other environmental attributes;* *A description of the residual impact of the Proposed Development. Residual impacts are the remaining impacts that will occur after the proposed mitigation measures have been taken into consideration;* *Details of any monitoring required during Site preparation and operations;* *Details of any rehabilitation required; and,* *Difficulties encountered in undertaking the assessment.*
Chapter 17	Chapter 17 summarises the major interactions between environmental impacts on the various factors.
Chapter 18	Chapter 18 outlines the overall Schedule of Commitments agreed by the applicant in the event the planning application is authorised.
Volume 3: Appendices	
Appendices	Relevant A3 drawings and topic-specific supporting documentation are contained within Volume 3 – Appendices.

1.8 Methodology

1.8.1 Assessment of Effects – Evaluation Criteria

The assessment of effects has been undertaken in accordance with best practice, legislation and guidance notes. The evaluation of significance considers the magnitude of the change and the sensitivity of the resource or receptor. Unless otherwise stated, this approach has been adopted throughout the EIAR.

The criteria for determining the significance of impacts, and the effects, are set out in Figure 1-3 below, taken from the EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' [9]. Definitions of effects as outlined by the EPA guidance are included below. Certain chapters may use additional or alternative terms due to the specific methodology or guidance required within those chapters. Such alternative use will be stated within the chapter.

Figure 1-3: Description of Impacts

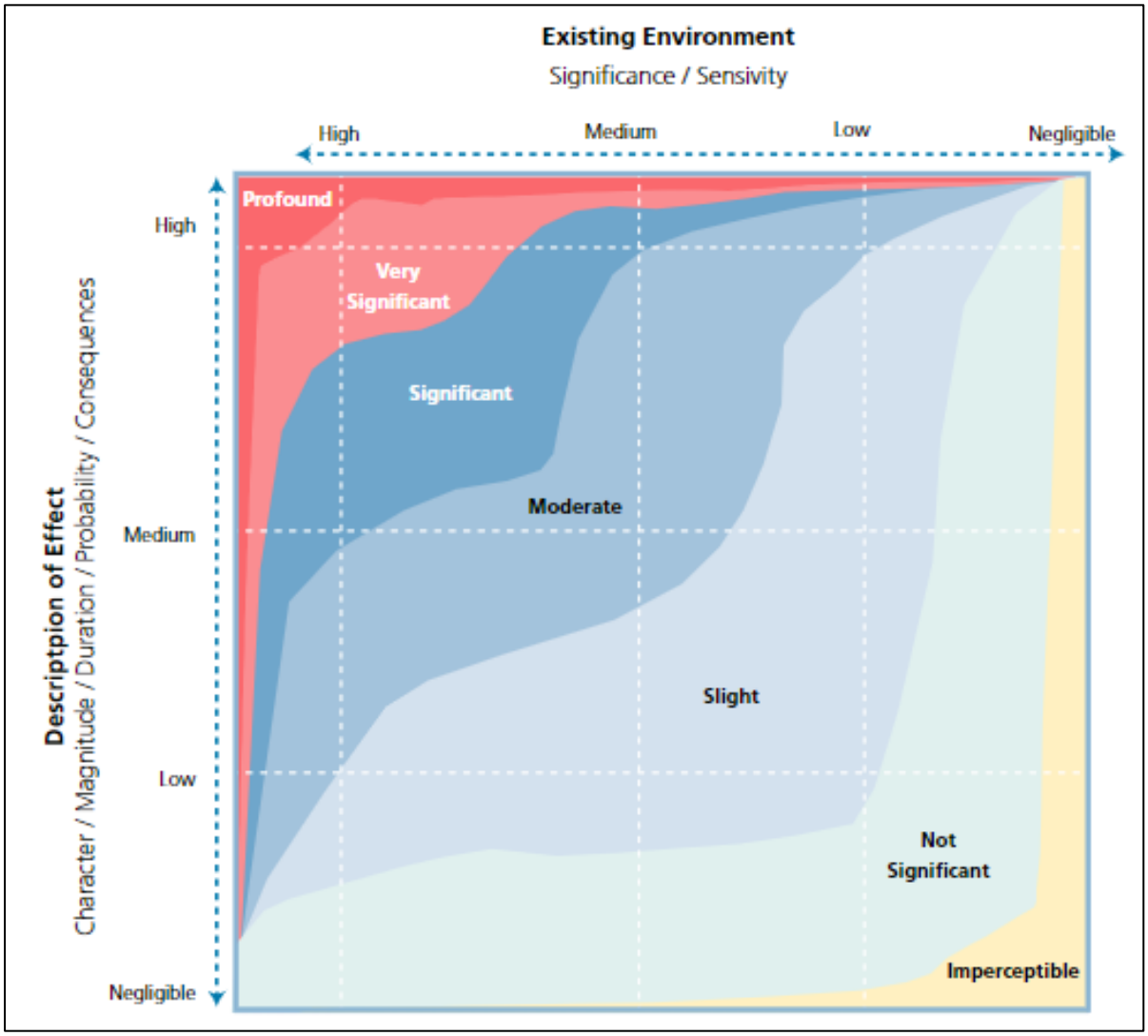


Table 1-2 defines the quality of effect of a Proposed Development on the environment, ranging from positive to negative.

Table 1-2: Quality of Effects

Quality of Effect	Description
Positive Effects	A change which improves the quality of the environment.
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative/Adverse Effects	A change which reduces the quality of the environment.

Table 1-3 outlines the definitions of significance of effects, which ranges from imperceptible to profound effects.

Table 1-3: Definitions of Significance of Effects

Classification	Description
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.

Table 1-4 describes the terminology used to discuss the extent and context of the effects of a Proposed Development on the environment.

Table 1-4: Describing the Extent and Context of Effects

Magnitude	Description
Extent	Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
Context	Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?).

Table 1-5 shows how likely an impact is to occur.

Table 1-5: Describing Probability of Effects

Magnitude	Description
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Table 1-6 describes the duration of effects. Momentary effects lasting from seconds to minutes will often be less concerning than long-term and permanent effects, depending on their severity.

Table 1-6: Describing Duration of Effects

Magnitude	Description
Momentary	Effects lasting from seconds to minutes.
Brief	Effects lasting less than a day.
Temporary	Effects lasting less than a year.
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years.
Reversible	Effects that can be undone, for example through remediation or restoration.
Frequency of Effects	Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

Table 1-7 defines the types of effects that can potentially occur as a result of a Proposed Development.

Table 1-7: Describing Types of Effects

Magnitude	Description
Cumulative Effects	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant, effects.
'Do-Nothing Effects'	The environment as it would be in the future should the subject project not be carried out.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effects are of greater significance than the sum of its constituents.

Magnitude	Description
Indirect Effects (aka secondary or Off-site effects)	Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
'Worst Case' Effects	The effects arising from a project in the case where mitigation measures substantially fail.

1.9 Assessment of Cumulative Impacts

Annex IV(5) subsection (e) of the EIA Directive, as amended, states that an EIAR should contain:

> *"A description of the likely significant effects of the project on the environment resulting from, inter alia:*
>
> *e) the cumulation of 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 natural resources."*

Annex IV(5) also states:

> *"The description of the likely significant effects on the [environmental] factors 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."*

The EC Guidelines on indirect and cumulative impacts [13] include the following definition of cumulative effects:

> *'The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.'*

1.10 Assessment of the Risk of Accidents and Unplanned Events

In accordance with EPA guidance [9] the risk of accidents and unplanned events which may be either caused by or have impact on the Proposed Development have been assessed in all relevant specialist chapters of this EIAR. A risk-based approach was employed for these assessments.

1.11 Consultation and Scoping

In accordance with best practice guidelines, extensive non-statutory consultation was undertaken in the preparation of this EIAR. Table 1-8 below lists the consultees notified about the Proposed Development, whether a response was received, and the topics of interest raised by the consultee where relevant. A copy of the EIAR Consultation document, issued between 8th and 11th August 2023, and copies of all the responses received by the relevant date of 29th September 2023, are included in Appendix 1-1.

Table 1-8: Consultees and Consultation Responses

Consultee	Response Date	Response Method	Topics Raised
Housing, Local Government & Heritage	13/09/2023 and 21/09/2023	Email & letter	Archaeology impact assessment be carried out by a competent and professionally accredited archaeologist. Archaeological Impact Assessment to include: • Site inspection • Archaeological Impact Assessment (to include Archaeological Geophysical Survey and / or Archaeological Testing).
Transport	06/09/2023	Email	No observations to make on the proposed development at this time.
Development Applications Unit - National Parks and Wildlife Service (NPWS)	No response	n/a	n/a
Kilkenny County Council	06/09/2023 & 29/09/2023	Email & letter	Undertake 'screening for an Appropriate Assessment of the nearby river which is within the Lower River Suir and River Nore/Barrlow Natura 2000 sites.' Provide details of how process water is treated. To confirm with Uisce Éireann that public water is available at this location for port related activities
Electricity Supply Board (ESB)	No Response	n/a	n/a
Geological Survey of Ireland (GSI)	No Response	n/a	n/a
Inland Fisheries Ireland (IFI)	No Response	n/a	n/a
Uisce Éireann / Irish Water (IW)	06/09/2023	Email & letter	List of water services aspects to be considered in the scope of an EIA.
Gas Networks Ireland	No Response	N/A	N/A

Consultee	Response Date	Response Method	Topics Raised
Southern Regional Waste Management Office	No Response	n/a	n/a
Transport Infrastructure Ireland (TII)	18/08/2023	Email	• A Traffic and Transport Assessment should be completed; • Consultation should be had with relevant bodies re existing and future road schemes, public transport schemes and sustainable mobility schemes; and, • Noise.
Port of Waterford	No response	n/a	n/a

1.12 Project Team

The in-house Malone O'Regan project team included the following competent professionals.

Table 1-9: MOR In-House Project Team

Name and Qualification	Project Role	Completed Assessments in Chapter(s)	Relevant Experience
Kevin O'Regan, BAgrSci, MSc	Project Director	All Chapters of the EIAR	25+ years' experience in Planning Applications and Environmental Impact Assessment
Gus Egan BSc (Hons), MSc, PgD Acoustics, Associate Member IOA and AACI.	Project Manager	All Chapters of the EIAR	5+ years' experience in environmental consultancy, with expertise in Planning Applications and Environmental Impact Assessment.
Klara Kovacic, MEng, MSc, DIB, Full member IEMA, Chartered Environmentalist	Senior Associate Director, Air, Climate & Sustainability	Chapter 9: Air Quality Chapter 10: Climate Chapter 15: Material Resources – Natural Resources, Waste and Energy Chapter 17: Interactions	15+ years' experience in Air Dispersion Modelling and Air Quality Assessments, 10+ years' experience related to GHG emissions assessments and accounting, 10+ years' experience specific to Environmental Impact Assessments
Kenneth Goodwin, BSc, PgD Acoustics, Full Member IOA, Full member AACI, IEMA Practitioner	Associate Director, Acoustics	Chapter 11: Acoustics (Noise and Vibration)	15+ years' experience in environmental acoustic assessment, monitoring and modelling, working on EIAR, and specialist noise impact assessment in Ireland and the UK.
Dyfrig Hubble, BSc, MSc, CIEEM Full Member	Associate Director, Ecology	Chapter 6: Biodiversity	Dyfrig is an Ecological consultant with 15+ year experience in undertaking Ecological Impact Assessments.
Nuria Manzanas, BSc, MSc, PGeo (IGI), Member IAH	Senior Geologist	Chapter 7: Soils and Geology	5+ years' experience in contaminated land and hydrogeological assessments.
Simon Firth, BSc, MSc, FGS, CGeol, ASoBRA,	Principal Hydrogeologist	Chapter 8: Water	20+ years' experience in hydrogeological assessment and hydrogeological modelling.

In addition to the MOR project team, the team included the following consultants.

Table 1-10: External Consultants and Contributors on Project Team

Name and Qualifications	Competent Person for:	Relevant Experience
Dr Maurice Hurley, M.A. and Ph.D. degrees in Archaeology and a professional diploma in EIA and Strategic Environmental Assessment (SEA) Management.	Chapter 13: Cultural Heritage	Dr. Hurley has over 40 years of relevant experience. He specialises in Environmental Impact Studies and Site Assessments which have included pioneering work on large-scale infrastructural projects, large-scale excavations, publications and urban infrastructure. Maurice has been involved in many EIS projects, compiling the Archaeological and Cultural Heritage sections for the planning process along with Archaeological testing.
John Morris, PGDip in Arboriculture & urban Forestry, CIHCM, MArborA	Competent person for Arboriculture section within Chapter 6: Biodiversity	First class BSc in housing and a post graduate diploma in Arboriculture & Urban Forestry. Professional Member of the Arboricultural Association, Associate member of Institute of Chartered Foresters and has worked in the arboricultural sector for over 8 years.
Richard Barker, BSc, H. Dip Env Eng, MSc,	Chapter 12: Landscape and Visual Assessment	Chartered Landscape Architect with 23 years of professional experience including 5 years as a Town Planner and the past 18 years as a landscape designer and landscape and visual assessment specialist.
Richard Frisby, BE & MEngSc, Chartered Engineer	Chapter 14: Materials Assets - Traffic	15+ years' experience Roadplan

1.13 Abbreviations and Definitions

The following abbreviations and definitions may be used throughout this document.

Table 1-11: List of Abbreviations and Definitions

Abbreviation	Explanation
AADT	Annual Average Daily Traffic
AQS	Air Quality Standard (S.I. No. 244 of 1987)
BAT	Best Available Technique
BC	Before Christ
BER	Building Energy Rating
BRE	Building Research Establishment
BS	British Standard
Ca.	Circa
CAFÉ	Clean Air for Europe (European Directive 2008/50/EC)
CDP	County Development Plan
C&D	Construction and Demolition
CFB	Central Fisheries Board
CH_4	Methane
CIRIA	Construction Industry Research and Information Association
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CSO	Central Statistics Office
dB(A)	A-weighted decibels
DAFM	Department of Agriculture, Food and the Marine
DAHG(I)	Department of Arts, Heritage, Gaeltacht (and the Islands)

Abbreviation	Explanation
DECLG	Department of the Environment, Community and Local Government
DED	District Electoral Division
DHHLG	Department of Health, Housing and Local Government
DRA	Dust Risk Assessment
EC	European Community
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EOP	Environmental Operating Plan
Etc.	Et cetera
EU	European Union
FRA	Flood Risk Assessment
GHG	Greenhouse Gas
GNI	Gas Networks Ireland
GSI	Geological Survey of Ireland
hl	Hectolitre
hr	Hour
H_2S	Hydrogen Sulphide
ha	Hectare
HGV	Heavy Goods Vehicle
IDA	Industrial Development Agency
IE	Industrial Emissions
KCCDP	Kilkenny City & County Development Plan
kg	Kilogram
km	Kilometre
kph	Kilometre per hour
l	Litre
L_{Aeq}	A-weighted equivalent continuous level
L_{A90}	The A- weighted 90th percentile statistical result from a sound measurement.
LAP	Local Area Plan
LEA	Local Electoral Area
LVIA	Landscape and Visual Impact Assessment
m	Metre
m^2	Square metre
m^3	Cubic metre
mOD	Metres above Ordnance Datum (Malin Head)
M&E	Mechanical and Electrical
mg	Milligram
min	Minute
mm	Millimetre
MPCPC	Maximum Permitted Carbon Performance Coefficient
NIAH	National Inventory of Architectural Heritage
NM	Noise Monitoring
No.	Number
NO_x	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NPWS	National Parks & Wildlife Service
NRA	National Roads Authority
NSS	National Spatial Strategy
NSL	Noise Sensitive Location
NSR	Noise Sensitive Receptor
OD	Ordnance Datum
OPW	Office of Public Works
OS	Ordnance Survey
PC	Predicted Concentrations
PCU	Passenger Car Units
PEC	Predicted Environmental Concentrations
p.e.	Population Equivalent
pNHA	proposed Natural Heritage Area
PM	Particulate matter
RBMP	River Basin Management Plan
RHP	Renewable Heat Plant

Abbreviation	Explanation
RMP	Record of Monuments and Places
RWMP	Resource and Waste Management Plan
s	Second
SAC	Special Area of Conservation
SAPS	Small Area Population Statistics
S.I.	Statutory Instrument
SMR	Sites and Monuments Record
SO_2	Sulphur dioxide
SPA	Special Protection Area
SUDS	Sustainable Urban Drainage Systems
t	Tonne
tpa	Tonne per annum
TFI	Transport For Ireland
TII	Transport Infrastructure Ireland
µg	Microgram
UWWTP	Urban Wastewater Treatment Plant
WFD	Water Framework Directive
WRP	Water Recycling Plant
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
yr	Year

2 PLANNING CONTEXT AND NEED FOR THE PROPOSED DEVELOPMENT

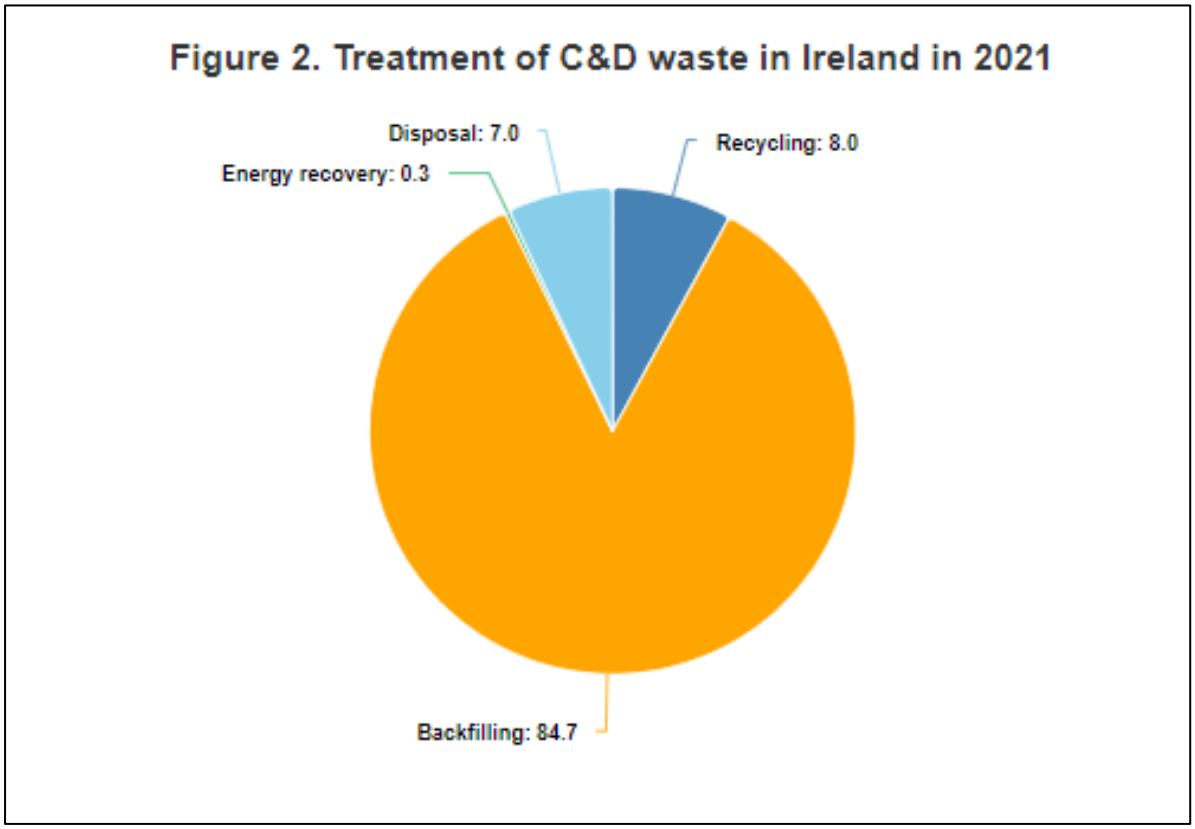
2.1 Introduction

This chapter of the EIAR sets out the need for the Proposed Development, and also provides a summary of the planning history of the Site and adjoining lands. It considers relevant planning policies at a national, regional and local levels. A conclusion on compatibility with planning policy, zoning and the pattern of adjacent development is provided at the end of the chapter.

2.2 Need for the Proposed Development

In 2017, ca. 5million tonnes of C&D waste was collected by authorised waste collectors, this represents a large cost and loss of value to the construction industry, in addition to the volumes of avoidable waste. Project Ireland 2040 sets out the State's vision for development over the next ca.16 years, which includes large scale construction projects. At present in Ireland, there is only one (1No.) manufacturer of plaster and plasterboard. It is vital that the demand from the construction industry is met, and that new development aids in the recovery/reuse of waste materials from the construction industry. Currently the percentage of C&D waste being recycled is 8% [14], refer to Plate 2-1 below.

Plate 2-1: Treatment of C&D Waste in Ireland in 2021



The proposed industrial production process involves importation of gypsum raw material and processing in the gypsum plant to produce gypsum plasterboard drywall products in standard construction sizes. The end product, gypsum plasterboard/drywall, is extensively used in the construction industry as a lightweight, sustainable material with good structural, sound insulation and fire-resistant qualities for use in residential, institutional and commercial structures. Gypsum plasterboard is a fundamental product used in all aspects of construction.

In addition to the use of raw gypsum, the Proposed Development will be another operator within the C&D circular economy, through its design to accommodate in the region of 25,000 tonnes per annum of waste gypsum plasterboard for recycling back into new plasterboard.

Hence, the need for the Proposed Development is being driven by increased demand for housing and general construction. Plasterboard and related products are a key material used in construction. The Proposed Development will aid construction by processing and recycling gypsum into a much-needed sustainable construction material.

2.3 Planning History

The following comprises a summary of planning history pertaining to the Site and adjacent lands. This planning history is based on a review of the Kilkenny County Council (KCC) online planning search system [15].

The Site is part of an Inland Development Area associated with the Port of Waterford at Belview, Co. Kilkenny, where there are extensive industrial and logistics-based operations associated with the Port, located on both sides of the N29 national road, and served by both the Port and mainline freight rail with a stop at the portside. There are long established stevedore operations related to fertiliser imports and other materials, activities of South East Port Services, Target and other operators locally.

There is an expanding IDA Science and Technology Park located on the west side of the N29, with significant food ingredients plants, existing and under development. On the east side of the N29 there are several port related import/export operations, mainly in fertilisers, agri-feedstuffs etc. Port of Waterford (POW), the semi-state commercial company responsible for development and operation of the port acquired approximately 24ha (60 acres), now mostly zoned for 'port related/industrial development' in the Ferrybank/Belview Local Area Plan.

Although the Site is non-developed, see section 2.3.1 below, there is a pattern of significant industrial development and employment generation in the vicinity of the Site, refer to sections 2.3.2 to 2.3.7 below.

2.3.1 Subject Site

There are no previous planning applications for the Site.

2.3.2 Adjacent Lands - Electricity Supply Board

Reg. Ref.: 03/1206

Permission was granted on 22nd October 2003 *"to build two new 110kV lines from an existing 110kV line in Murtaghstown, Co. Kilkenny to a new station to be located in Gorteens, Co. Kilkenny. The proposed new lines will be built over the townlands of Murtaghstown, Drumdowney Upper & Gorteens, Co. Kilkenny. The lines will run in parallel with a length of 2,090m for west line and 2,150m for east line. The proposed lines will comprise of eighteen wood pole sets of maximum height 20m and ten lattice steel masts of maximum height 18m. The average distance between the proposed structures will be 150m. The lines will consist of three conductors 4.5m apart along with two earth wires 5m apart."* This permission has not been put into effect and a wayleave in respect of same is preserved across lands in the vicinity of the Site.

Reg. Ref.: 03/1218

Permission was granted on 22nd October 2003 *"to erect a 110kV outdoor type transformer substation with fenced compound to include one 17Mt. high 110kV and mast, one 110/38 kV transformer, one 110kV/MV transformer and associated 110/38kV structures and equipment, control room building. MV Switchgear building and associated works, bio-unit waste water treatment system, internal roadway and splayed entrance off the public road."*

This permission has not been put into effect.

2.3.3 Adjacent Lands – Suir Shipping Ltd.

Reg. Ref.: 18/317

Permission was granted on 27th August 2018 "*for bulk stores and associated site works. The stores will be used to store port related products such as bulk break, bulk and unitized products. The site works will include two weighbridges, weighbridge office, entrance gates and fencing, concrete paving, water services including a borewell and a water storage tank, drainage and wastewater treatment".* This permission has been put into effect.

Reg. Ref.: 20/552

Permission was granted on 16th January 2021 "*for a 7 year planning permission for bulk stores, an uncovered storage yard and associated offices, personnel facilities and site works including earthworks, road works, entrance, gates, and fencing, concrete paving, water services, borewell, drainage works, site lighting and landscaping. The stores will be used to store Port related products such as bulk goods, break bulk and unitised products. The yard will be used to store Port related break bulk products. Entry and exit will be via a new entrance and also via the adjacent site (Planning Ref. No. PD18/317) for trucks to be weighed."* This permission has been put into effect.

Reg. Ref.: 20/515

Permission was granted on 1st October 2020 *"for amendments to permitted development PD 18/317. The amendments comprise: - offices and personnel facilities, relocation of car parking, relocation of water storage tank and borewell, relocation of polishing filter bed and associated site works, The application also seeks Retention Permission for a security fence and a containment wall".* This permission has been put into effect.

Reg. Ref.: 23/60426

Permission is sought for *'a 7-year planning permission for 3 No Bulk Stores, a marshalling yard and site works including earthworks, road works, entrance, gates and fencing, concrete paving, water services, drainage works, site lighting and landscaping. The stores will be used to store Port related products such as bulk goods, break bulk and unitised products. Entry and exit will be via a new entrance and also via the adjacent sites (Planning Ref No PD18/317 & PD20/552) for trucks to be weighed."* This application is at request of further information stage.

2.3.4 Adjacent Lands – Seed Technology Ltd

Reg. Ref.: 15/397

Permission was granted on 1st December 2015 *"for a seed processing and storage building (4,836m^2), fertilizer bagging and storage building (6,094m^2), 2No. external dust extraction silos, single storey office building and car parking (156m^2), weighbridge, external fertilizer pallet storage yard, 4No. external fire-water storage tanks, storm water attenuation pond, on site borewell and associated pump house, wastewater treatment system and percolation area, extension of existing site access road, infilling of low lying portion of site with excavated material from the development, signage, boundary fencing and landscaping together with all associated site development works".* This permission has been put into effect.

Reg. Ref.: 16/209

Permission was granted on 29th August 2016 *"for an ESB Sub Station together with alterations to site the boundary as permitted under P.D. Ref: 15/397 and all associated site development works".* This permission has been put into effect.

Reg Ref: 23/60315

Permission was granted on 14th November 2023 for "*(1) Retention Permission for storage of felled trees, to maximum height of 6m to part of the site; 2) Planning Permission for a 3-year*

duration for additional storage area to the site for felled trees, to maximum height of 6m, together with all associated site development works."

2.3.5 Adjacent Lands – Port of Waterford

Reg. Ref.: 06/2014

Permission was granted on 1st April 2007 "*for a car and truck compound and all associated site works including outfall to an existing drain pipe. The application also includes for the retention of an existing 600mm drain and outfall to the River Suir. The compound will be used to store cars and truck trailers shipped to or from Belview Port".* This permission has been put into effect.

2.3.6 Adjacent Lands –Smartply Europe DAC

Reg. Ref.:20/700

Permission was granted on the 8th March 2021 *"to develop a log yard and associated works. The log yard will extend the area available for stockpiling and handling of logs for use in SmartPly's oriented strand board mill which adjoins the site."* This permission has been put into effect.

2.3.7 Adjacent Lands – Target Fertilisers Ltd

Reg. Ref.: 06/1190

Planning was granted on 7th February 2007 *"to construct a new road, including public lighting, fencing and associated services and signing, to access lands zoned for port development port-related development and strategic and ancillary development".* This permission has been put into effect.

Reg. Ref.: 15/251

Permission was granted on 29th October 2015 *"for the proposed erection of a Storage Compound for the storage of palletised bagged fertilizer together with site entrance and all associated site works and ancillary services on site".* This permission has been put into effect.

Reg. Ref.: 17/79

Permission was granted on 10th April 2017 *"for (a) the proposed change of ground levels on site, (b) the erection of a retaining wall and (c) the erection of a boundary fence, together with all associated site works on site".* This permission has been put into effect.

Reg. Ref.: 20/920

Permission was granted on 25th February 2021 *"for (1) Permission for Retention of the following, (a) the erection of a concrete kerbing on site, (b) the revision of fencing layout from that previous granted under Planning reg No's P15/251 and P17/79 consisting of the removal of the palisade Fencing from the kerbing on top of the sloped sections of ground and the replacing of the Stout Timber fencing with a Palisade Security fence to provide the necessary Security on site and (c) Retention and Completion of the creation of a concrete covered compound (a part of the site which was granted Permission under Planning Reg No. 17/79) for the storage of palletised bagged fertiliser on site, and also for (2) Permission for the proposed installation of Surface Water drainage and Attenuation to cater for the new compound area on site".* This permission has been put into effect.

Reg. Ref.: 23/60046

Permission was granted 6th February 2024 *"for the proposed erection of a Security Cabin on site comprised of Security Office, Canteen and WC together with Treatment Plant and associated Polishing Filter and all associated site works and ancillary services on site"*.

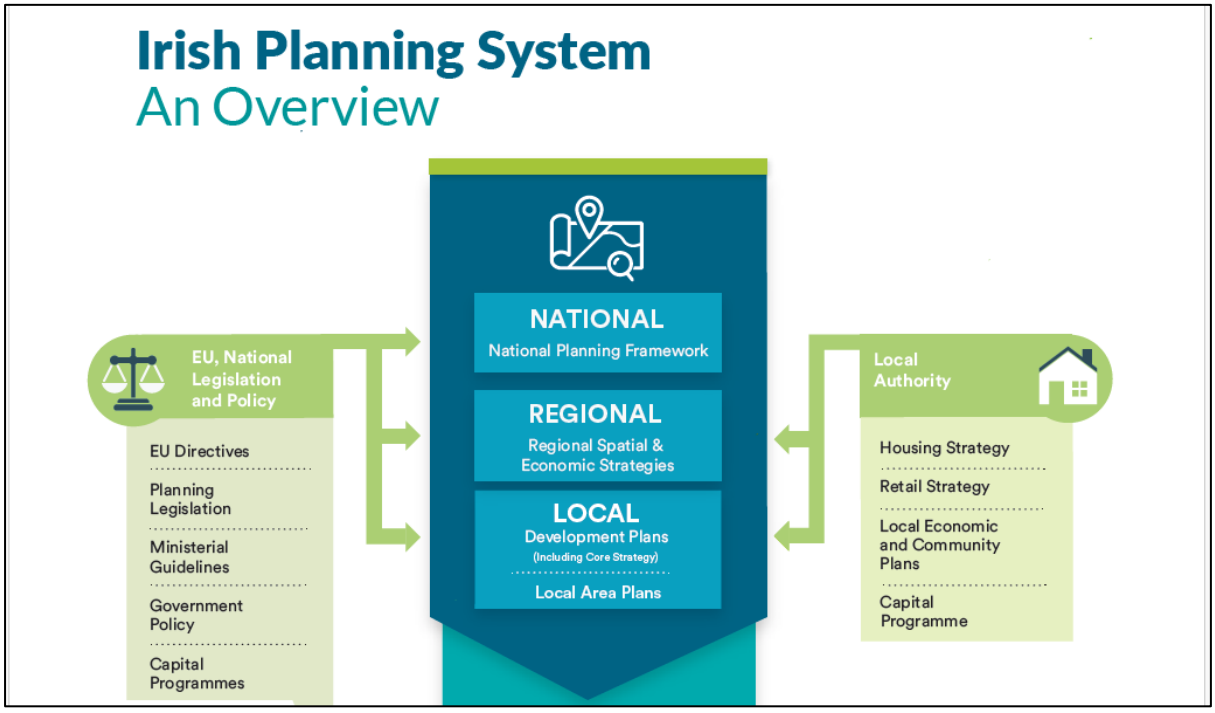
2.4 Planning Policy Context

2.4.1 Overview of the Irish Planning System

Ireland now has a fully integrated planning system. Based on a long-term vision set out in the National Planning Framework (NPF), plans within a hierarchy translate national policy to regional and local effect with an overview provided by the Office of the Planning Regulator (OPR). The Implementation Roadmap for the National Planning Framework (2018) highlights the Government's focus on achieving alignment between national, regional and local planning policy and practice.

A visual of the hierarchy of plans, drawn from the NPF document, is exhibited below in Plate 2-2.

Plate 2-2: National Planning Framework Overview



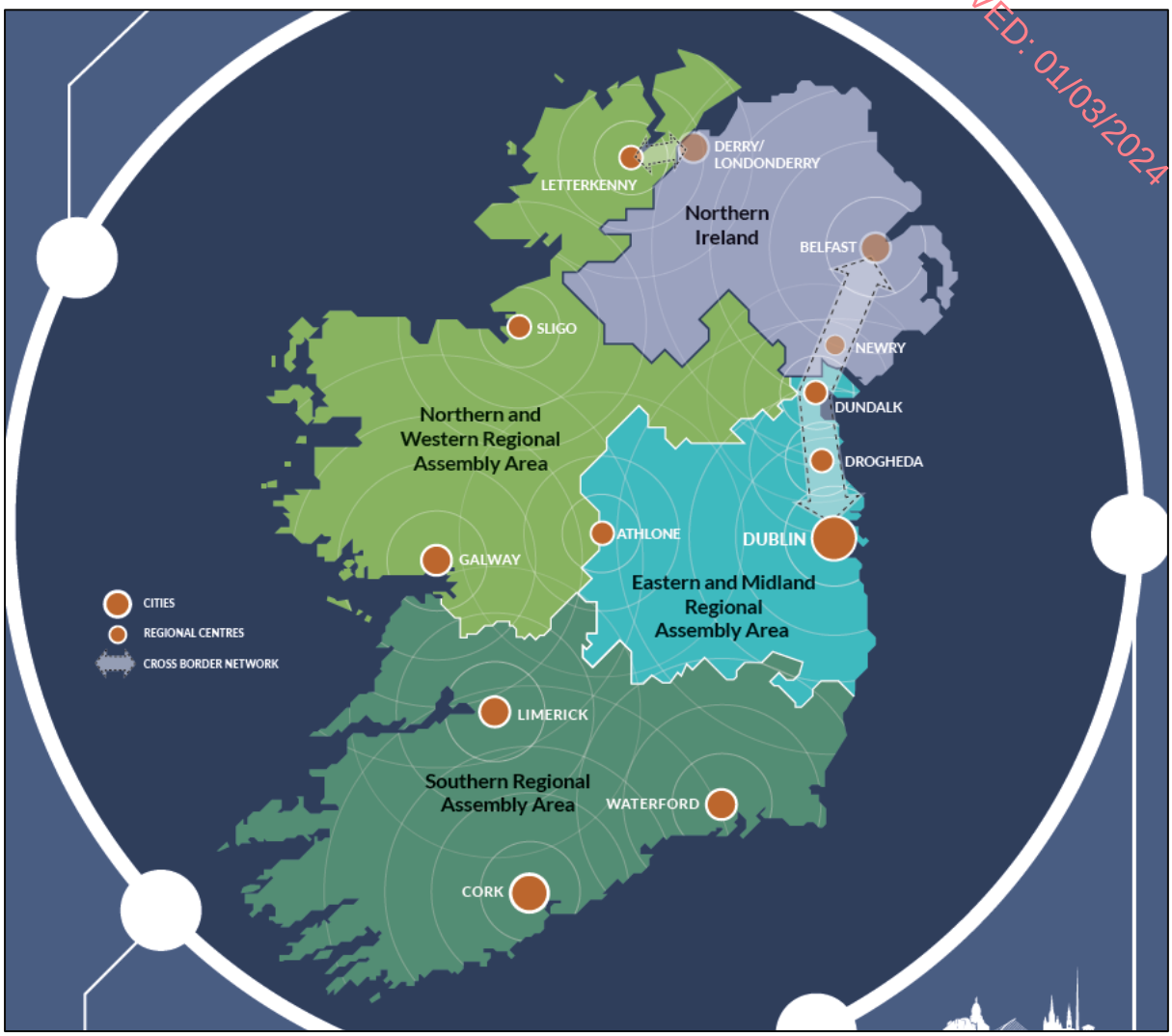
At Regional level, the geographical area has been subdivided into 3 Regional Assemblies. The Regional Assemblies have prepared Regional Spatial and Economic Strategies (RSESs) to guide development within the regions and to provide context for the preparation of the next order of statutory development plans – City (where a county contains a city) and County Development Plans (CCPs), and Local Area Plans (LAPs) to guide more focussed development in particular towns and localities. Joint LAPS can be prepared where urban development areas extend across county boundaries.

2.4.2 National Planning Framework (NPF)

The NPF sets out a high-level plan shaping future growth and development of Ireland out to 2040, to accommodate 1,000,000 extra inhabitants in the country requiring infrastructural development on all fronts. There is a projected requirement to accommodate 550,000 additional households to 2040 in new build and regeneration developments.

The five main cities Dublin, Cork, Limerick, Galway and Waterford will share 50% of overall national growth between them, refer to Plate 2-3 below.

Plate 2-3: NPF Map showing Regional Assemblies and Cities



The NPF is supported by a national investment plan, the National Development Plan (NDP), to provide state funding for nationally and regionally important infrastructure to support the NPF vision. Evidence of this investment is already apparent in Waterford City centre, where the Ferrybank regeneration development is underway, with a new bridge and other infrastructure funded from the NDP strategic infrastructure funds.

There will be an emphasis on growing the regions and cities other than Dublin. There are three cities located in the Southern Regional Assembly (SRA) area with a target to add 340,000-380,000 persons in the region i.e. a target population of almost 2 million in the southern region by 2040.

Waterford City is located in the southeast of the region. The key challenge for Waterford is to build scale through employment-led growth.

The NPF will be subject to regular monitoring and review, for example to reflect the outcome of census returns, and the emerging refugee and international protected persons responsibilities and the effects of these upon targets, distribution etc. The NPF explains that in setting targets for future growth, it is a pattern of development that the NPF targets rather than precise numbers i.e. location, relative scale and proportionality of growth.

Phasing of population growth targets will be adjusted, but the targeted pattern of 1/2 of population growth allocated to the five cities will continue to apply. Phasing is not specified for

the cities - their growth will be addressed as part of the Metropolitan Area Strategic Plans (MASPs), which by now have been developed for each city by the regional assemblies in their respective RSESs.

Where lower-order plans and strategies are subject to review, they must continue to be consistent with the NPF and any relevant environmental requirements, and be subject to SEA. This includes CCPs and LAPs, subject to monitoring by the office of the planning regulator (OPR).

2.4.3 Southern Regional Assembly (SRA), Regional Spatial and Economic Strategy (RSES)

The Strategic Vision for the Southern Regional Assembly is set out in Section 2.1 which states as follows:

> *"The RSES vision for the Southern Region is led by the need for transformative change. By 2040, the population of the Region will most likely grow by 380,000 people to reach almost two million. This growth will require new homes and new jobs. It also raises questions as to where our future population will live and work, what kind of quality of life will we enjoy and how we can adapt to the challenges we face such as climate change, regional disparity and global uncertainty. An unchecked "business as usual" scenario will diminish our quality of life, our environment, erode our competitiveness and compound regional disparity. There is a need for a different approach to planning for the future."*

In addition, the RSES states that the vision is to:

- *Nurture all our places to realise their full potential;*
- *Protect and enhance our environment;*
- *Successfully combat climate change;*
- *Achieve economic prosperity and improved quality of life for all our citizens;*
- *Accommodate expanded growth and development in suitable locations; and*
- *Make the Southern Region one of Europe's most creative, innovative, greenest and liveable regions.*

Section 8.2 of the RSES highlights the objectives for the development of the Port of Waterford (Belview) as a major international gateway. Objective 15 states that:

> *"Local Authorities and Public Bodies shall support the development of the necessary port infrastructure and associated road and rail connectivity required to support the development of the Port of Waterford Belview and to support the role of the Port as an Economic Driver for the South-East, subject to the outcome of appropriate appraisal, environmental assessments and the planning process."*

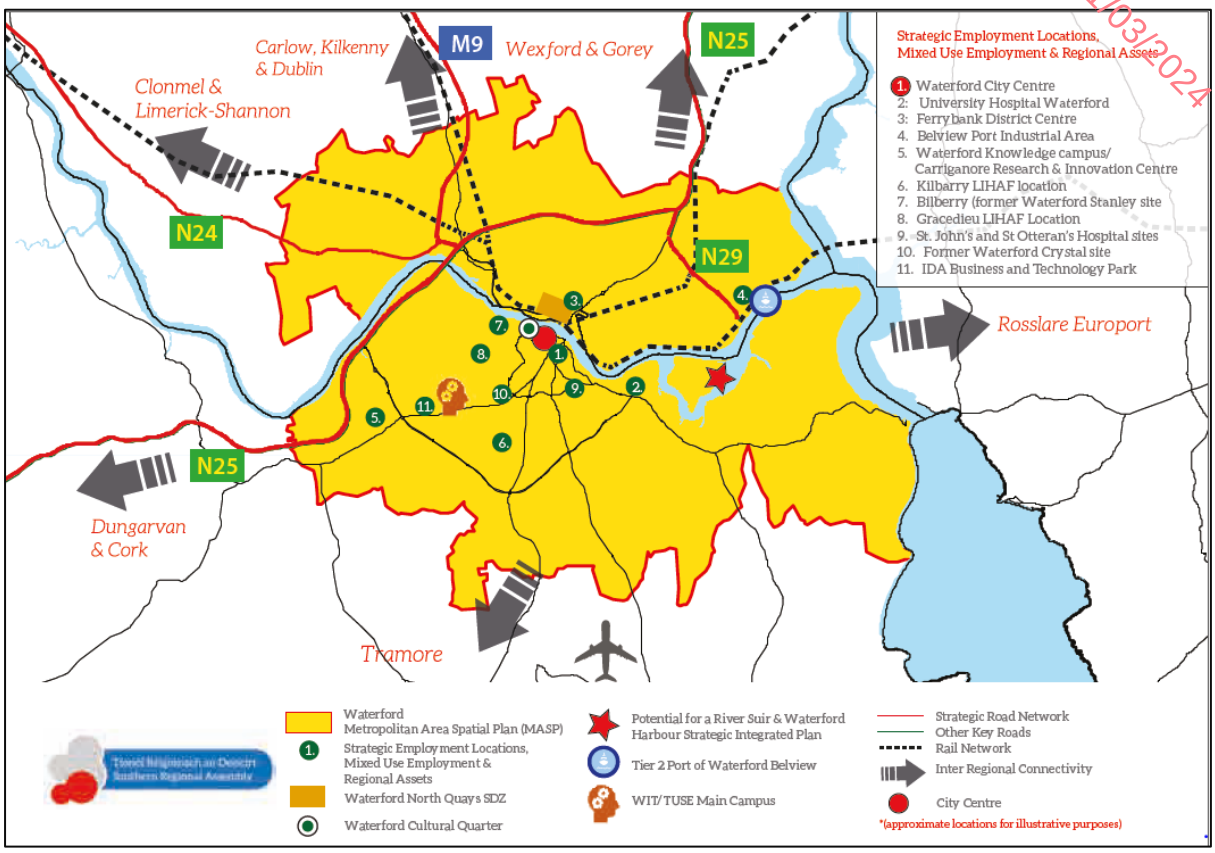
The plan highlights the necessity to improve accessibility to the port, including road and rail services.

The SRA RSES makes provision for the implementation strategy for the NPF for the southern region. It envisages a population growth of 380,000 to a total regional population of almost 2 million by 2040, an increase of 225,000 persons in jobs, with 888,000 in employment in total in the region.

A MASP has been prepared for Waterford City and Environs. It should be noted that the environs extend across the Waterford County boundary into Co. Kilkenny, described as the Ferrybank Belview Area. The county boundary falls along the centreline of the River Suir.

Belview Port and the subject site are located within the Waterford City and Environs MASP area, identified as location 4 in the Plate 2-4 below, Belview Port Industrial Area.

Plate 2-4: Belview Port Industrial Area



The RSES sets out the Vision Statement for the Waterford Metropolitan Area: - *Waterford aims to be a dynamic, concentric, modern European city of scale and significance, a UNESCO Learning City, driving national and regional growth, prosperity, innovation and creativity which is supported by focused investment in transformational rejuvenation across the Metropolitan Area, a vibrant and diverse University City with a high quality of life for all through a high standard of physical and community infrastructure and housing options, education, amenities and opportunities for employment.*

Port of Waterford at Belview and the associated industrial land bank is identified as a significant economic growth driver for the southern region in MASP policy objectives 2 and 15 and as a strategic employment location in the Waterford metropolitan area strategic plan (MASP), in section 8.6 of the RSES.

2.4.4 Kilkenny City and County Development Plan Policy 2021-2027

The Kilkenny City and County Development Plan 2021 - 2027 [16] (KCCDP) came into effect on 15th October 2021.

The Belview Port area is located approximately 8km (5m) downstream of Waterford City in the River Suir Estuary. The port is a strategic national, regional and county asset with good road and rail links. The port is one of five ports of national significance in terms of the national ports policy 2013, and is classified as a comprehensive port on the EU Ten-T Network (logistics network). The port is active in bulk handling, breakbulk/project cargoes and container handling (Lo-Lo). The bulk side of the business is predominantly import and focused on Agri inputs. The container operations supports a wide range of imports and regional exporters from the food, pharmaceutical and other sectors.

The port is a significant economic facilitator with an important role to play in the economic development of the southeast and further afield. To fulfil its role the port needs to be positioned to deliver the infrastructure and capacity required of it in a timely manner. POWC is the commercial state company responsible for the operation and development of the port and has prepared a masterplan setting out a strategic vision to position the port as the preferred cargo gateway for the southeast region.

The port has a significant industrial hinterland including the IDA's 55ha. strategic industrial land bank, and the port has identified the need for further additional land and facilities to support port activity in the Master plan. One of the main priorities for expansion in the Belview area is the attraction of FDI.

It is Kilkenny County Council policy to: -

- *Support the development of the necessary port infrastructure and associated road and rail connectivity required for the development of the port, to enhance the role of the port as an economic driver for the southeast subject to the outcome of appropriate appraisal, environmental assessments and the planning process.*
- *Work with Irish water to ensure an adequate wastewater treatment plant and distribution network to service the employment lands at Belview.*
- *Support development of freight rail services and facilities at Belview for the port to function effectively for the state and support modal shift to freight rail as part of the wider climate action programmes.*
- *Support the port of Waterford in the development of port facilities as set out in its strategic master plan.*

Substantial investment has been taking place at Belview as a result of the infrastructural improvements, including the construction and extension of a new milk processing plant by Glanbia. As a result of that investment, a new natural gas supply has also been delivered. Further investment is planned at Belview for the construction of cheese production facility recently granted permission. (P 27)

Chapter 4 of the KCCDP sets out a Core Strategy, as required by planning legislation, including the following extracts: -

Strategic Aim: To implement the provisions of the National Planning Framework (NPF) and the Regional Spatial and Economic Strategy (RSES) and to promote the compact growth of Kilkenny City, Ferrybank/Belview (as part of WMASP), the District Towns, the other settlements in the hierarchy and to strengthen rural economies and communities through growth and development of rural areas.

4.3.2 Waterford MASP (Ferrybank/Belview) Waterford is the largest urban centre in the South-East and the State's fifth largest city and is unique in having a network of large and strong urban centres in close proximity. It has a diverse industrial and commercial base and has the fifth largest employment base in the State. The metropolitan area extends beyond the physical built up area into a defined metropolitan area extending to County Kilkenny and County Waterford. The vision for the Waterford MASP area is to develop a concentric city both north and south of the River Suir (which will include areas within County Kilkenny) with services appropriate to its status as one of the five national cities and recognising the people of the area as the heart of its potential. Notwithstanding Belview as a strategic location for employment, the wider Waterford Metropolitan Area within County Kilkenny has potential as a strategic employment location. This will be addressed as part of the review of the Ferrybank Belview LAP under objective 4I.

4.3.2.1 *Kilkenny County Council will work proactively with the Southern Regional Assembly and Waterford City and County Council to establish a MASP area steering committee for the implementation phase of the Waterford MASP. Ferrybank and Belview Port (Port of Waterford) is included in the Waterford Metropolitan Area Strategic Plan (MASP) area and although located in Kilkenny, will be developed as part of an agreed Waterford Metropolitan Strategy.*

The Council has ensured in the short term, through a Local Area Plan for the environs of Waterford within County Kilkenny (Ferrybank/Belview LAP 2017), that there is sufficient development capacity for the various land uses required to support the international Gateway.

Kilkenny County Council is committed to developing Ferrybank/Belview as part of a concentric city as envisaged in the Waterford MASP and remains conscious of maintaining the area's social, cultural, sporting and political identity into the future.

For the Waterford MASP area, the Council will support the growth of Waterford city as the principal urban centre of the South-East and the Waterford MASP with the objective for the City to become an important driver of national growth and a 'Regional City of Scale' within a defined Metropolitan Area. The Council will assist in the implementation of the Waterford MASP by reviewing the Ferrybank/Belview Local Area Plan to be consistent with the RSES MASP in a timely manner and incorporating it into the Kilkenny City and County Development Plan by means of variation. The Council will also adopt and give effect to the guiding principles of the Waterford MASP as set out on page 320 of the RSES and stated in text above.

2.4.4.1 Economic Development

The strategic aim of the Economic Development section within the KCCDP is:

> **"***To provide a framework for the implementation of the Council's economic strategy by fostering competitiveness and innovation in all sectors within a high-quality physical environment while having due regard to the protection of the environment and heritage, in order to position the county for sustainable economic growth."*

The economic development section of the KCCDP details objectives for the manufacturing sector. which includes the Belview Port area. The KCCDP highlights the need to have sufficient lands zoned for large scale industries. It also states that *"Belview has all the necessary infrastructure for high volume production and is supported by significant water, wastewater and gas capabilities".* The objective within this section is as follows:

> *5B "To ensure there is sufficient quantity of zoned land available and serviced at suitable locations within the City and County to maximise the potential for employment and Foreign Direct Investment in the County."*

2.4.5 Ferrybank Belview Local Area Plan 2017 – 2023 (FBLAP)

The FBLAP identifies a significant landside area as an industrial area. In respect of this industrial area, the FBLAP recognises that there is a need to capitalise on the significance of the port as a critical piece of infrastructure rivalling the more traditional ports of Dublin and Cork. The ready availability of water services, energy and good infrastructural links are the key elements which make these lands ideal for industry.

2.4.5.1 Zoning

The site is zoned 'PFI - development of port facilities and industry in the FBLAP. Land Use developments permitted in principle include general industrial use.

The subject lands are zoned PFI – Port Facilities & Industry in the LAP [1] with the objective;

> *"To allow for the further development and expansion of portal facilities and associated industries, to assist in the economic development of the wider area, whilst not encouraging leakage of uses which would be more appropriately located in the existing urban centres of Waterford City and Ferrybank."*

The permissible uses of these lands include:

> *"Car/Truck Park, industry (General Industrial use), Industry (Light), Port related office, open space, park and ride facility, silos and storage areas, storage tanks including bulk liquid storage and general warehousing, wholesale/warehousing".*

2.4.5.2 Economic Policy

The Economic Development and Retailing of the area is outlined in Section 4 of the LAP. This section states that "*The Belview Port area and its associated industries have provided an economic stimulus to the South-East region. The area will become an increasingly important economic nucleus as the port expands and develops*".

Section 5 elaborates further the importance of the Belview Industrial area, including Belview Port, and states, *"This LAP will seek to implement and underpin the sustainable development of Belview Port and the Belview area, as a key strategic asset for Kilkenny and the South East Waterford City region. The continued growth of portal activities will increase employment opportunities in the wider area."*

It is policy to prepare a review of the FBLAP taking into account the hierarchy of superior plans. KCC has tendered the preparation of the FBLAP by notice published on 7th December 2023, with a return date of 22nd January 2024.

2.4.6 Port of Waterford Masterplan 2020-2045.

The Port of Waterford Masterplan is a non-statutory plan developed to position the Port as an important economic enabler, to direct growth, expansion and function of the port as a primary hub in the southeast of Ireland to align with the NPF. The Port area is described as follows: -

> *"The Port comprises a total of some 265 Hectares of land currently zoned for port related development. This area includes the berths, port operational area, open and covered warehousing and storage areas behind the port and undeveloped farmland zoned for future port related developments including storage, processing and packaging. The main quays at Belview were constructed over the period 1993 to 2008."*

The Site is located within the Port hinterland area identified for storage, processing and packaging.

2.4.7 Regional Enterprise Plan to 2024 – South East

The Regional Enterprise Plan to 2024 is set out to create resilience in the regional economy in the southeast, by addressing identified gaps and maximising opportunities while focussing on developing a sustainable future. The plan identifies five strategic pillars which include:

1. *Start and Grow: Encouraging entrepreneurship and enhancing the regions start up ecosystem.*
2. *Green Growth: Ensuring that the green economy becomes an engine for future job creation and economic growth in the region.*
3. *Smart Specialisation and Clustering: The principles of smart specialisation and clustering are critical to the region to create a resilient, inclusive, sustainable and competitive economy.*
4. *Innovate: Building on our existing RD&I capacity to place innovation at the heart of the South-East economy.*

5. *Place: Developing a region that is attractive to both domestic and international visitors and communicating the benefits of living and working in the South-East.*

2.4.8 Kilkenny Local Economic and Community Plan 2016 - 2021

The aim of the Local Economic and Community Plan 2016 – 2021 is to ensure that Kilkenny remains a great place to live, work and play, offering its citizens dignity, security and the capacity to participate to their maximum potential.

2.5 Conclusions of the Planning Assessment

The hierarchy of plans, and the planning history of development on lands in the vicinity, demonstrate that the lands are intended for industrial development to support long term national, regional and local development.

Port of Waterford at Belview, and the associated industrial land bank, is identified as a significant economic growth driver for the southern region in MASP.

The Port and its industrial hinterland is identified in the KCCDP as a significant economic facilitator with an important role to play in the economic development of the southeast and further afield.

The end product of the proposed industrial processing plant is an essential construction product used in the provision of housing, health, education, community facilities, offices, industry and general logistics infrastructure.

The Proposed Development will be located on suitably zoned lands for “Port Facilities & Industry”, and will provide employment opportunities in the area. With raw materials imported through the port and processed into gypsum plasterboard through a manufacturing process, the Proposed Development is a port related and general industrial use compatible with the zoning objective and vision for the area.

It is considered that the Proposed Development accords with all relevant planning policies and objectives at National, Regional and Local Planning levels.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Introduction

This section gives a detailed description of the Proposed Development, including layout and elements of the construction phase. It should be read in conjunction with the Site layout (Figure 3-1) and the detailed drawing provided in Appendix 3-1.

3.2 Description of the Proposed Development

The Proposed Development will consist of an integrated plasterboard manufacturing facility. The production facility will have a floor area of ca. 22,401m^2, with a height over finished ground level ranging from ca. 19 metres to 28 metres (stack height), incorporating roof mounted solar panels.

The Proposed Development will include:

- All site development works;
- Landscaping;
- Boundary treatments including:
    - earthworks;
    - road works;
    - vehicle entrance;
    - vehicle parking with charging (HGV, cars and bicycles/scooters);
    - gates;
    - fencing;
    - paving;
    - drainage; and,
    - lighting.

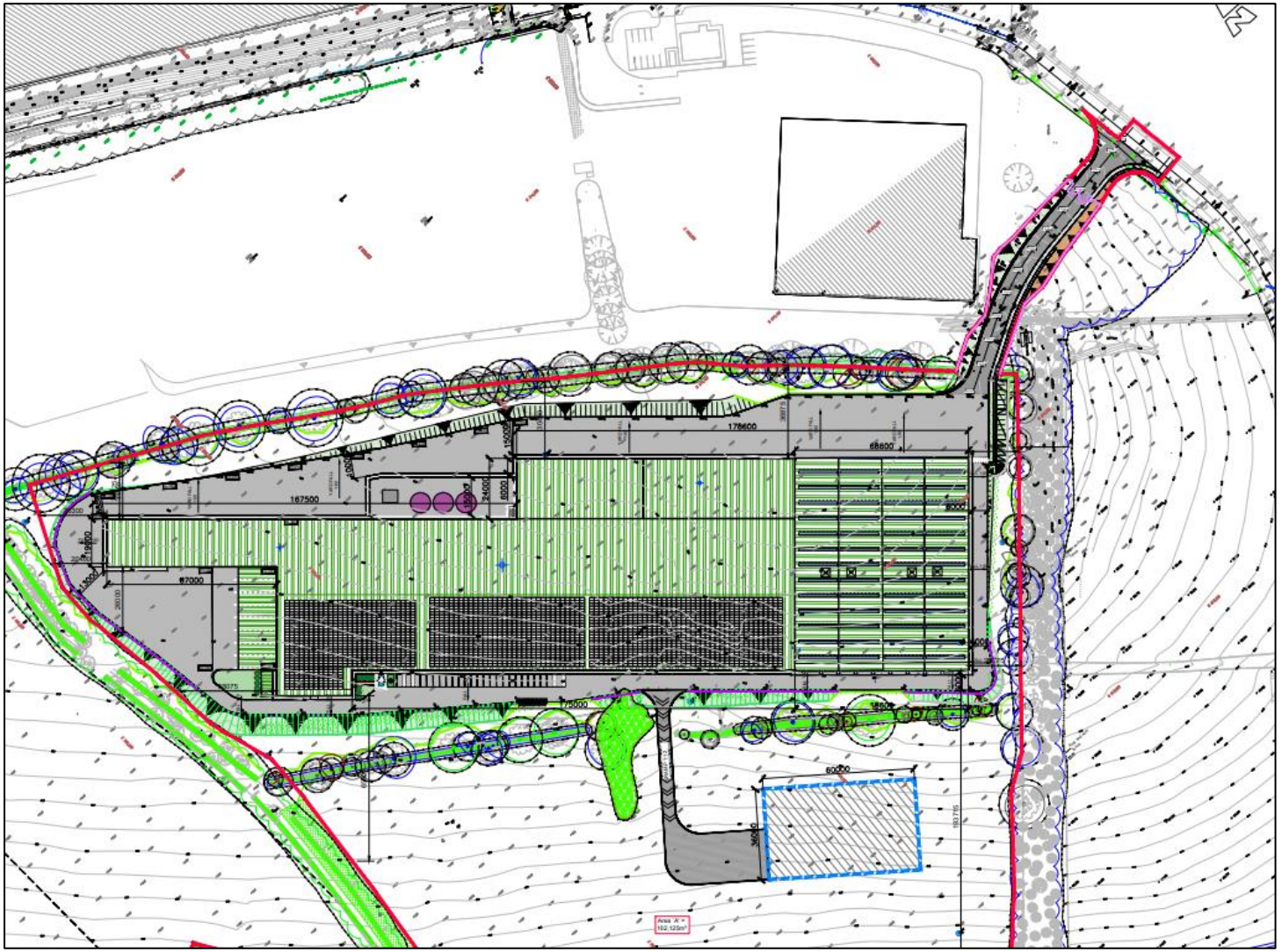
Planted berms both within and around the perimeters of the Site.

Servicing arrangements include the provision of:

- A constructed surface water attenuation area;
- Access to connect to an off-site wastewater treatment plant; and,
- Access to connect to mains water supply.

Further details on the above elements of the Proposed Development are provided below.

Figure 3-1: Main Site Layout



3.2.1 Process Overview

The Proposed Development will be a plasterboard manufacturing plant. Recycling of waste plasterboard will also be carried out at the Site. A specialist gypsum manufacturing plant equipment supplier will be retained by GABM Limited to construct the gypsum manufacturing plant inside the building. The equipment that will be installed will be state of the art pieces of plant that will be maximised for energy efficiency. The internal layout of the building as shown in Figure 3-4 is a standard manufacturing line, that is used worldwide for the manufacture of gypsum boards. The plant will contain air and noise control measures to minimise/eliminate dust and noise emissions.

3.2.1.1 Raw Materials Warehouse

When delivered to the Site, the gypsum rock will be stored in two (2No.) raw material warehouses. A front-end loading shovel will be used to stockpile the gypsum rock in the raw material store. The daily throughput of the plant will be ca. 585 tonnes of gypsum. The storage capacity of the two (2No.) raw material warehouses will be ca. 48,000 tonnes which will provide about 80 days of supply of raw material.

The warehouses will have an air extraction system to remove dust generated during the stockpiling and loading process. The air handling system will consist of multiple bag filters with pressure drop sensors to control the bag cleaning cycle. The filter units will be mounted vertically on the roof at the rear of the raw material store.

Plasterboard and powdered gypsum will be final products. The gypsum rock will undergo several steps to manufacture plasterboard. These steps are described below:

- Milling, Calcining and Stucco Manufacturing;
- Conveying and Plasterboard Formation;
- Drying; and
- Warehousing of the finished product.

The process will be fully automated and will be controlled by computer software specifically designed for the gypsum plasterboard manufacturing industry. The system will be equipped with both local and global manual stop mechanisms.

3.2.1.2 Milling, Calciner Building and Stucco Area

Milling will occur within the Calciner Building which will contain a gypsum rock silo, a milling plant, a calciner, a heat exchanger, and several storage containers for additives used during the stucco makeup, and stucco silos.

The gypsum rock will be moved internally from the raw materials warehouse to the milling plant using loading shovels. From here all processing and transferring of gypsum rock through the milling plant, the calcining plant and onwards to the Stucco production and Stucco storage silos, will be in enclosed equipment. This will prevent the generation of fugitive air emissions and assist in mitigating noise generated during this stage of the process. The bag filter on the air emission point from the calciner equipment will have a bag burst detection system which prompts automatic shutdown of the process.

The first step in the process will involve loading gypsum rock onto a vertical bucket elevator that discharges into the gypsum rock silo. Discharge of the rock into the milling plant will be controlled by an automatic chute at the silo/mill interface. The gypsum rock will be milled in a fully enclosed mill to a size suitable for the manufacture of plasterboard (See Figure 3-2).

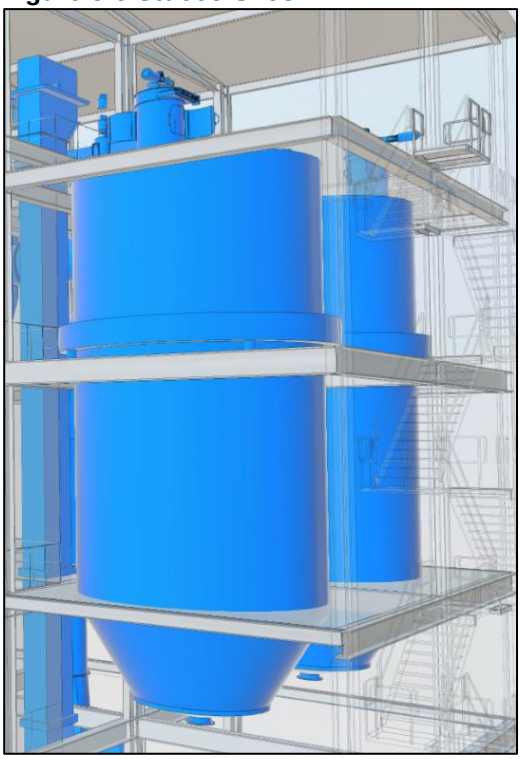
After milling, the crushed rock will be conveyed in an enclosed conveyor to the calcining plant where gas will be used to heat the gypsum to 500 degrees Centigrade(ºC) to remove water.

A heat exchanger will be used to recover some of the heat, and this will be used to heat open spaces and the finished products warehouse. Moisture sensors in the calciner will record the moisture levels in the milled gypsum rock before forwarding the dried material to the Stucco silo (see Figure 3-3). The slurry mix will be manufactured 24 hours in advance of production and will be stored in the Stucco silos until ready for production. In a dedicated Mixer, warm water (20oC) and additives, such as chopped glass fibres, will be added to the Stucco to create a slurry from which the boards are formed. The slurry mix will be pumped to two discharge pipes that will be positioned over a conveyor.

Figure 3-2: Calcining Mill

Provided by GAMB Limited

Figure 3-3 Stucco Silos



Provided by GAMB Limited

3.2.1.3 Conveyor and Formation of the Plasterboard

The slurry mix will be deposited onto a continuous roll of paper on the conveyor belt below. This single conveyor will be ca. 140m long and will extend the length of the building, refer to Figure 3-4 below. The Stucco will harden during the conveying process and the paper will chemically bond to the gypsum during this process. A blade positioned across the conveyor will be automatically positioned to define the thickness of the plasterboards. After running along the conveyor for ca. 120m, an automatic blade will slice the plasterboard to the desired length. After cutting, the board will be flipped and brought along a second shorter conveyor to the Dryer.

Figure 3-4 Plasterboard Conveyor

Provided by GAMB Limited

3.2.1.4 Dryer

At the inlet to the dryer, multiple trays will allow the sheets of plasterboard to be stacked one on top of the other. When the trays are full, the conveyor will slowly move through the gas fired dryer, refer to Figure 3-5 below. This will remove the remaining excess moisture in the plasterboards. Plasterboards will be dried to about 7% residual moisture content.

The latest high efficiency dryer will be used in the plant. Increased residence time for the boards will be achieved by having multiple stacked decks inside the dryer, which will reduce the energy consumption. Innovative technological advances in the area of heat recovery will be employed to redirect the hot gases from the high temperature zone to the low temperature zones, further reducing gas use. Compared to older dryer technology, the latest technology dryers are expected to deliver a 30% reduction in CO_2 emissions and recover up to 30% of the water used in the slurry.

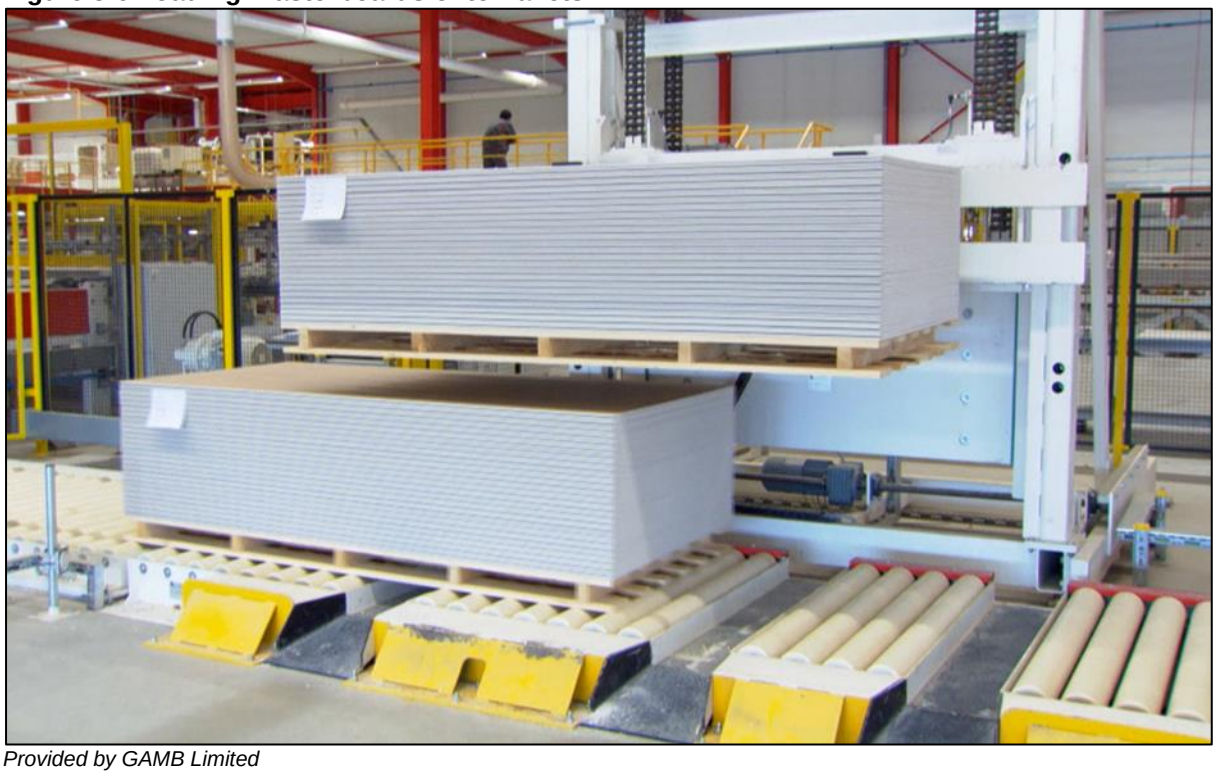
Figure 3-5: Plasterboard Entering a Dryer

Provided by GAMB Limited

3.2.1.5 Board Warehouse & Board Line

The plasterboards will be stacked in groups of ca. 72 on a pallet, see Figure 3-6 below. The pallets will be covered in a plastic stretch hood. The stacked pallets will be transported using a forklift to the warehouse. The warehouse will have capacity for ca. 600,000 plasterboards. The warehouse will be temperature controlled using the recovered heat from the heat exchanger on the calciner or the dryer. The plasterboard will be loaded onto HGVs for distribution nationwide and abroad.

Figure 3-6 Loading Plasterboards onto Pallets



Provided by GAMB Limited

3.2.1.6 Recycling Plant for Recovered Plasterboard for Recycling.

The recovered plasterboard will arrive on-site in skips. GABM Limited will have strict criteria for waste acceptance and only plasterboard will be accepted at the Site. The waste plasterboard will be stored in a cornered off section in the Raw Materials Warehouse. GABM Limited will use specialised equipment to separate the paper from the plasterboard. This recycling plant will be fitted with screens so that only gypsum powder will be sent forward for processing. The removed paper will be baled on-site. Small quantities of paper bales will be stored inside the raw materials building in a dedicated cornered off area.

3.2.2 Operational Hours

It is intended that the Proposed Development will operate 24 hours per day, 7 days a week for 333 days per annum. The plant will operate on a 3-shift cycle. The facility will employ a total of 45 staff, with 10-15 staff per shift and three shift changeovers per day.

Delivery and collection hours are likely to be 6am to 10pm Mondays to Fridays, excluding the port unloading campaigns, ca. 8No. campaigns (24hour events) per annum.

3.3 Environmental and Energy Controls during Manufacture

GABM Limited is fully committed to implementing innovative design solutions to minimise energy and water usage at the Site. The building will therefore have several energy control measures to reduce energy usage and to help lower the carbon footprint of the manufacturing process. All the manufacturing stages will be linked to an automated PLC control system[1]. Temperature sensors in the calciner and the dryer will control the operating temperatures to ensure that heating will be maximised and surplus heat avoided. This will have a knock-on effect in reducing the volume of gas required in these devices and consequently reduce the level of greenhouse gas emissions from the Site. Moisture sensors in the stucco silos will control the volumes of water required to form the stucco, with a consequential saving in the water demand. Furthermore, the process water supply will be supplemented by use of rainwater stored in the rainwater harvesting tanks.

3.3.1 Natural Resources

The natural resources used by the Proposed Development will be:

- Gypsum rock; and,
- Water.

Gypsum rock will be imported into Belview Port from either Southern Spain or Northern Africa. The source of the gypsum will be from currently operating quarries in these countries. This will be supplemented through the use of recycled plasterboard.

Water will be supplied from a combination of mains water supply and/or abstracted groundwater (see Chapter 16 for further details). No on-site water treatment will be necessary for the process.

3.3.2 Energy

The installed electrical power will be 2,075kW.

Photovoltaic solar panel arrays on the roof of the Proposed Development will generate up to ca. 1,105kW.

GABM Limited will purchase some of its energy from external energy companies and this will be supplied via the mains grid.

[1] A Programmable Logic Controller (PLC) is an industrial computer control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices.

Energy reduction is a key design objective for the Proposed Development. This will be achieved by a combination of the following measures:

6. A heat recovery system on the calciner that will be used as space heating in the finished goods warehouse;
7. A heat recovery system on the final plasterboard dryer where heat will be re-circulated into the dryer; and,

- Roof mounted photovoltaic (PV) panel arrays.

See Chapter 10 and Chapter 15 for further details.

An electrical substation will be present to the east of the fenced off equipment area, within the electrical area, refer to Section 3.3.5 below.

3.3.3 Gas Supply

The annual gas demand will be in the region of 12,480,000 m^3. Max hourly gas load will be 1,930 m^3/hr. Peak daily gas requirements will be 37,440 m^3/d.

A gas skid will be located within the fenced off equipment area, north of the board warehouse.

3.3.4 Water Supply

The Proposed Development will require 363m^3/day of water for the manufacturing process and will use a combination of:

- Mains water;
- Abstracted groundwater (ca. 7.5m^3/hour); and,
- Rainwater harvesting/capture.

3No. silos will be used to harvest roof rainwater. These silos will hold a total volume of 900m^3 of water, with an overflow to a soakaway, refer to section 3.3.10.

The Proposed Development has been designed to ensure that ca. 30% of the water used in the manufacturing process will be recycled to reduce the overall process water demand.

Uisce Éireann has provided a 'Confirmation of Feasibility' that confirms that ca.363m^3 per day mains water will be available for the Proposed Development. This is shown in Appendix 3-2.

Robust hydrogeological testing has confirmed that ca. 7.5 m^3 per hour of groundwater can be abstracted from the underlying aquifer in a sustainable manner. Refer to Chapter 8 and Chapter 16 for further details.

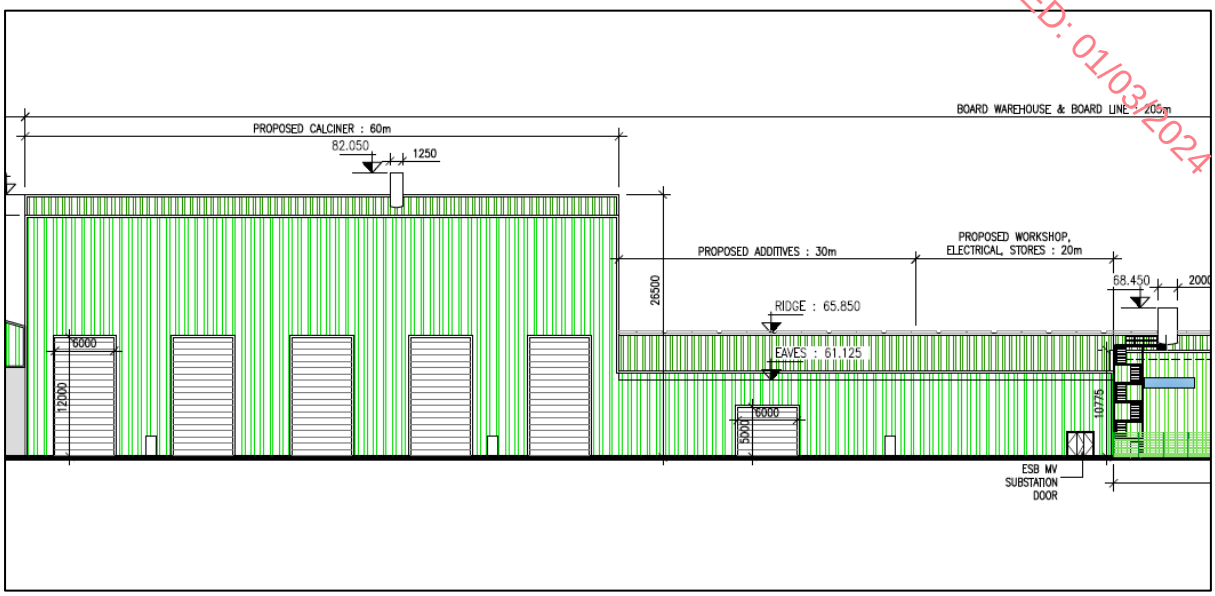
3.3.5 Additives, Workshop, Electrical and Stores

These areas will be located within the middle of the building, east of the proposed rainwater harvesting tanks. They will include:

- Electrical Substation and distribution;
- Transformers/Inverters;
- Fire hydrants; and,
- Additives storage area for Board Line.

Figure 3-7 below shows the cross-section of the Proposed Development, illustrating the locations of the Additives, Workshop, Electrical and Stores.

Figure 3-7: Locations of Additives, Workshop, Electrical and Stores of the Proposed Development



3.3.6 Offices

There will be ca.10 office staff. This area will be located on the southwestern corner of the Proposed Development, adjacent to the finished product, covered canopy area. Parking will be provided nearby. The offices will include the following:

- Welfare area;
- Offices; and
- Quality Control Lab.

3.3.7 Fire-fighting Facilities

Fire prevention, detection and fire-fighting facilities will be present at the Site, including:

- Fire alarm as per BS 5839 / IS 3218;
- A Fire Hydrant system;
- Double header hydrants will be provided no more than 46m apart and 6m away from the building.;
- Fire Hose reels; and,
- Fire sprinklers.

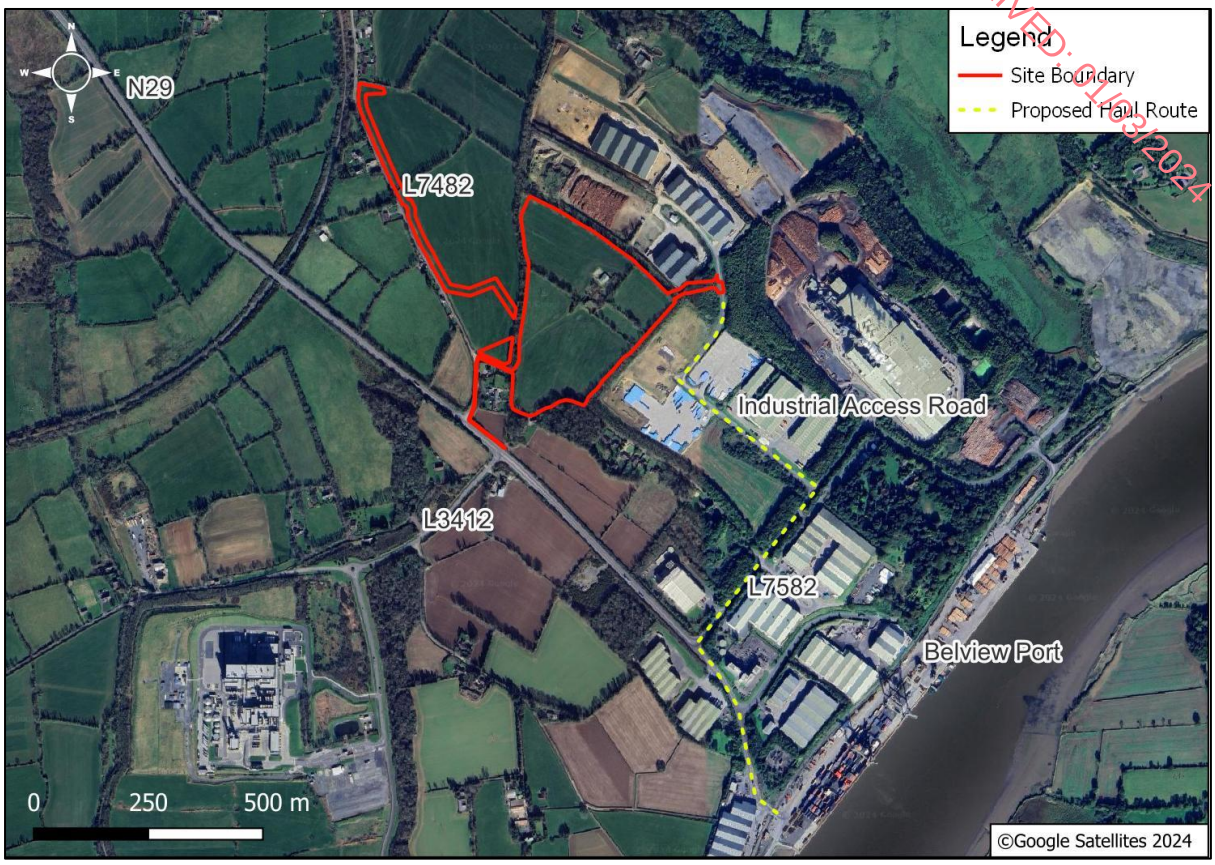
In addition to these water systems the facility will have the following:

- Hand-held fire extinguishers at key locations.

3.3.8 Site Access

A new entrance and internal access road will be developed for the Site. The entrance will provide access to the Proposed Development via the existing public road that currently provides access to Seedtech and the existing Suir Shipping storage buildings to the north of the Site, refer to Figure 3-8 below. This internal access road will be constructed to meet the design criteria for heavy goods vehicles.

Figure 3-8: Access Road and Proposed Haulage Route



HGVs delivering raw materials will enter the Site and enter the raw material stores to the southeast of the Site, where they will unload internally before exiting the Site via the new internal access road. To the northwest of the main building there will be a canopy covering where the final product will be dispatched. The HGVs will be loaded with finished product (gypsum board) They will then leave the Site the same route (along the northern yard and the new access road). The covered canopy area will have parking spaces for four (4No.) HGVs.

Access for all vehicles to the Site will be via a new access road to the northeast – see Figure 3-1 above and Appendix 3-1: Site layout.

3.3.9 Parking

There will be a total of twenty-five (25No.) car-parking spaces in the staff/visitor's carpark in the southern portion of the Site to accommodate shift-changes. In addition, there will be (1No.) disabled space and one (1No.) electric vehicle charging point. There will also be a covered bicycle parking and storage facility to the side of the main carpark. This will have space for ca. five (5No.) bicycles.

3.3.10 Drainage

3.3.10.1 Process Wastewater

There will be no process water discharges from the Site. Water that is used in the process will be evaporated off during the curing and drying process. The evaporate created will be harvested and re-used within the system again, with small volumes, encapsulated within the finished product.

3.3.10.2 Foul Water

The foul water drainage system has been designed in accordance with the Irish Water Technical Standard for Wastewater Gravity Sewers and the Irish Water Code of Practice for Wastewater Infrastructure. Under agreement with Irish Water, foul water equating to approximately 45l/day/person will be discharged into the public foul sewer system (located to the southwest of the Site). The connection point will be via a manhole located within the Site along the southwestern boundary. See section 16.4.2.2 and the separate Drainage Infrastructure Design Report submitted as part of the planning application for further details.

3.3.10.3 Storm Water

The roof area (ca. 22,265m^2), yard area (ca. 11,846m^2), and new access road (ca. 1,012m^2) will be impermeable, and run-off from these areas will drain via a surface water drainage system. The storm water run-off from the roof and yard areas will be collected by a series of drains and gullies, independent of each other, that will flow through a settlement tank to trap solids and a fuel / oil bypass separator (Klargester NSBE025 bypass separator – Class 1) to remove oils and hydrocarbons. A monitoring chamber to sample surface water will also be provided. Storm water will discharge to a proposed soakaway pit to the south of the building. The location of the soakaway was determined following on-site testing to determine a suitable area with the necessary infiltration rates.

Storm water run-off from the access road will be collected via a new drainage system comprising of a drainage pipe ranging from 300mm – 375mm in diameter, road gullies, manholes and service drains. Prior to discharge to an existing 300mm diameter storm water drain located at the proposed entrance, the storm water will flow through a fuel / oil bypass separator (Klargestor NSBE030 Class 1 separator) to remove oils and hydrocarbons. Discharge to the existing storm water drain will be limited by a hydrobrake that will limit flow to 26 l/s.

3.3.11 Security Fencing

The Site will be fenced with a paladin fence and secure gate at the new entrance.

3.3.12 Lighting

The Proposed Development will operate 24/7 so on-site lighting will be required. Lighting on-site will be provided by high efficiency long life building and column mounted LED luminaires. Average Lux levels will be ca. 1.48 lux average across the Site.

Luminaires have been selected on the merit of their efficiency and minimal glare, back light and up light spill characteristics to ensure minimal light pollution to surrounding areas, including the treelines and hedge-lines on-site and surrounding the Site.

The lighting strategy which has been designed as part of the Proposed Development involves avoiding excessive lighting.

Lighting control shall be implemented to allow light levels to be reduced during off-peak periods.

3.3.13 Landscaping and Berms

Screening in the form of planted berms is proposed along the southwestern and southern boundaries of the Site. The berms are proposed to be ca. 3m in height hosting a mix of native woodland trees above wild grass seeding. This effectively will help to screen the Site from the south and west.

From the entrance and following the vehicle route retaining walls will be present to the north where existing woodland trees will be above proposed grassland and bolstered with a screening/low canopy mix of native whip planting.

Enhancement and bolstering of the existing hedgerow to the western and southwestern boundaries of the Site has also been proposed.

3.4 Construction Procedures

The construction works are currently planned to begin in mid to late 2024 and will take approximately 14 months to complete.

3.4.1 Construction Programme

The construction works will be undertaken in seven (7No.) distinct phases of work, although there will be some overlap between these different phases. Summary details for the different phases are outlined below. The construction phases will be:

1. Site set-up;
2. Groundworks – cut and fill;
3. Groundworks – foundation;
4. Structural framing;
5. Building envelope;
6. Process fit out; and,
7. Commissioning.

3.4.1.1 Site Set Up

This will involve creating access into the Site to construct a new temporary construction entrance. A temporary construction compound will be constructed by excavating and stock-piling topsoil, followed by the import of stone to form the compound. The compound will have space to facilitate the following:

- ca.60 parking spaces;
- ca.4 double-stack office/meeting cabins;
- ca. 2 welfare cabins;
- ca.10 secure storage containers; and,
- 1 security hut.

Not all of the listed items will be required during the initial phases of the project, with just a limited number of site cabins brought in at this stage.

The Site will be fenced by the contractor. An exclusion zone utilising perimeter fencing will be erected around the proposed ecological corridor and existing hedgerows on-site. Safety goalposts will be erected near any overhead wires. A wheel wash will be constructed at the main construction access.

Site clearance will involve removal of some on-site hedgerows, topsoil and subsoil. All vegetation will be mulched on-site for reuse as part of the landscaping proposals.

The equipment involved in the Site clearance works will be excavators, dump trucks, trucks importing stone and rollers. Initial employee numbers will be relatively low at less than 10 contractors working at the Site. The estimated duration of this phase will be approximately 1 month.

3.4.1.2 Groundworks Cut and Fill

This will involve the ongoing stripping of topsoil and will also include excavation of weak subsoil. These materials will be stockpiled and re-used for landscaping works. As the material

will be excavated, the filling element will commence. This will include a combination of excavated sub-soil and imported stone.

The imported stone fill will also be compacted in layers to the required level to provide working platforms and formation levels for yards / roads etc. Imported stone will be delivered in trucks, with estimated peak-period deliveries will be up to 100 trucks per day.

The topsoil, and subsoil will be reused in the formation of the landscape berms at the Site. Table 3-1 below summarises the estimated volumes of material used.

Table 3-1: Summary of Cut and Fill Volumes

Topsoil	
Est Total Volume Excavated	8,630m^3
Est Total Volume Re-Used for Berms	8,630m^3
Subsoil	
Est Total Volume Excavated	28,500m^3
Est Total Volume Re-Used for Berms	28,500m^3
Imported Stone for Fill (Clause 804)	
Est Total Volume Imported to Site	78,000m^3

The landscaping to the south and southwest will be undertaken during this initial phase of the project albeit the planting of trees will be dependent on the time of year.

The internal roads will also be constructed during this phase along with some areas of hardstanding.

The main equipment that will be used during this phase will be earth moving equipment and excavators. Construction numbers will increase during this phase to approximately 30 personnel. The estimated duration of this phase of the works will be approximately 1 month.

3.4.1.3 Foundations

On completion of the working platform under the buildings, tanks and structures. To construct the foundations and floor slabs, reinforcing steel will be delivered to Site with some of the reinforcing cages being prefabricated offsite, delivered and craned into position. There will be large concrete pours for various elements of the structure; including pile caps, ground beams and the ground floor slabs / yard slabs which will be poured in sections to an agreed phasing plan for the works.

The main equipment that will be used during this phase will be, excavators, dump trucks, bulldozers, cement spreaders, self-propelled stabilisation machines and heavy-duty vibrating rollers. Construction staff numbers will be approximately 50 persons during this phase of works. The estimated duration of this phase of the works will be approximately 2 months.

3.4.1.4 Structural Framing

This phase of the works will include the following elements:

- Ground floor slabs;
- Steel Frame;
- Intermediate floor levels;
- Internal & External Stairs; and,
- Pipe bridges.

The main equipment that will be used during this phase will be concrete mixers, concrete pumps, mobile cranes and telescopic handlers. Construction staff numbers will increase during this phase to ca. 80 persons, with an estimated duration of approximately 2 months.

3.4.1.5 Building Envelope

This phase of the works will include the following elements:

- Cladding;
- Glazing;
- Roofing; and,
- External doors.

The main equipment that will be used during this phase will be mobile cranes and telescopic handlers. Construction numbers will increase during this phase to approx. 100, with an estimated duration of approximately 3 months.

3.4.1.6 Process and Fit Out

This phase of works will primarily compromise of the installation of all the mechanical and electrical elements required for the Proposed Development, including the following:

- Internal walls, doors, ceiling and floor finishes;
- Furniture and Fittings, Sanitaryware;
- Photovoltaic Panels;
- Substation Fit out;
- Electrical, Lighting and Data Installations;
- Dryer and Conveyors;
- Raw Material Handling and Calcining; and,
- Mechanical and Fire Water.

The main equipment that will be used during this phase will be mobile cranes and telescopic handlers. Construction numbers during this phase will be ca. 100 persons. The estimated duration of this phase of the works will be approximately 3 months.

3.4.1.7 Commissioning and Completion

Once the construction works have been completed there will be a commissioning phase required before the facility will become operational. It is anticipated that this phase of works will include the following phases:

- Power connections;
- Water connections;
- Telecoms connection;
- Electrical, Lighting and Data Commissioning;
- Mechanical and Fire Water Mechanical Commissioning;
- Drainage Commissioning;
- Process Installation Commissioning; and,
- Renewable Heating Plant Commissioning.

Construction numbers during this phase will be approximately 100 persons. It is estimated that this phase will take 1-2 months to complete.

3.4.2 Construction Management

3.4.2.1 Construction Access

The primary access during the construction period will be the new entrance and internal access road identified on within Figure 3-1 above. To form this entrance and internal access road the existing scrubland will be removed. Any existing underground services in this area will be exposed and protected as required by the relevant utility company with a porous asphalt surface provided to tie in with the existing road surface. Drop kerbs will be provided locally to facilitate pedestrian and bicycle access. A flagman will be provided at the entrance to control traffic and ensure the safety of any pedestrians or cyclists in the vicinity of the construction entrance.

3.4.2.2 Construction Employment

It is anticipated that the number of construction workers will range between 20 and 100 during the different phases of construction over an estimated 14-month period.

3.4.2.3 Hours of Work

The hours of construction work are intended to be:

- Mon – Fri: 7am – 6pm; and,
- Saturday: 8am – 2pm.

As per any construction works programme, there will be the occasional requirement when emergency works will be required outside these hours. At all times the Planning Authority will be notified of works that need to occur outside the agreed hours.

3.4.2.4 Construction Management

During the construction phase, the methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the works. The impacts will be reduced as far as practicable through compliance with the mitigation measures stated in this EIAR, and current construction industry guidelines as outlined in relevant chapters of this EIAR.

As part of the pre-construction preparation, a preliminary Construction Environmental & Waste Management Plan (CE&WMP) has been developed and will accompany this application. To ensure the CE&WMP is relevant to the project and the current environment at the time of construction it will be prepared by the appointed Contractor in advance of the commencement of construction works.

The CE&WMP will outline in a single document the procedures for monitoring the effectiveness of the environmental protection measures. The CE&WMP will as a minimum include the following:

- Incorporate all Environmental Commitments and Mitigation Measures in the contract documents which will include all mitigation and prevention measures identified in Chapters 5 to 15 of this EIAR and the NIS submitted as part of this planning application, and any conditions of any permission as may be granted and any further requirements of Statutory Bodies;
- Provide a method of documenting compliance with these Environmental Commitments and Mitigation Measures;
- List all relevant environmental legislative requirements;

- State methods by which construction work will be managed to avoid, reduce or remedy potential adverse impacts on the environment;
- The contractor shall ensure that all personnel working on-site will be trained and made aware of the measures detailed within the CE&WMP; and,
- A detailed Resource and Waste Management Plan will be prepared in accordance with best practice guidelines and will form part of the CE&WMP.

The CE&WMP will be required to take account of best practice guidance such as:

- CIRIA C741 – Environmental Good Practice on Site (4th edition) [17];
- CIRIA C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [18];
- CIRIA C753 – The SuDS Manual [19].

All works will be undertaken in accordance with the following documents:

- Requirements for the Protection of Fisheries Habitat during Construction and Development [20];
- Guidance for the Treatment of Otters Prior to the Construction of National Road Schemes [21];
- Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes; [22] and,
- Guidance on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads [23].

3.5 Decommissioning

GABM Limited has no set lifetime planned for the Proposed Development. In the unlikely event of closure of all or part of the Site, a site audit would be conducted in order to:

- Identify and record all materials and equipment on-site;
- Identify and address any environmental issues prior to decommissioning; and,
- Identity an appropriate method of sale, treatment or disposal of all materials, equipment and plant.

4 ALTERNATIVES CONSIDERED

4.1 Introduction

The Planning and Development Regulations 2001 [5] as amended specifies the information to be contained within an EIAR. Schedule 6 1(d) specifies that an EIAR shall include *' A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment.'*

The EIA Directive 2014/52/EU [24] requires an EIAR to contain:

> *'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 EPA's 2022 Guidelines [9] further state:

> *'The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required.'*

Taking account of the above, the evaluation of alternatives for this project was a key component of this EIA process. Therefore, this chapter documents details on the alternatives to the Proposed Development that were considered, including alternative locations, alternative site layouts, alternative technologies to be employed, and the 'Do-Nothing' scenario.

4.2 Alternative Locations

Although the sourcing of mineral, ores and aggregates is constrained by the presence/location of the raw material, the processing will generally look to be positioned close to the markets or in proximity to the pathways to markets. Ireland was selected as the preferred location for the Proposed Development owing to its demographic, competent and highly educated work forces and access to an expanding construction market.

Within Ireland the Applicant sought proximity to a port to ensure an economic and environmental sound option to access the importation of bulk raw materials. Other ports reviewed include Dublin, Cork, and Rosslare, as the closest ports to the source of raw materials. Gypsum from Southern Spain and North Africa is currently being imported to Port of Waterford / Belview Port, Co. Kilkenny for use in the local cement industry.

In 2013, the National Ports Policy was introduced [25]. Its aim was to provide an overarching policy framework for the governance and future development of Ireland's state port network. It has resulted in promoting competition among ports and reducing barriers for shipping companies entering the Irish market. The National Ports Policy, categorised ports under three headings (Tier 1, Tier 2 and Tier 3). Alternative locations around each of these port types is presented below.

4.2.1 Locations Surrounding Tier 1 Ports

Although these Tier 1 ports are suitable in terms of vessel size and berthing depth requirements, they were discounted at an early design stage as this would involve the

additional shipping of gypsum to ports further afield from the existing import location. In addition, existing traffic and transport links to these ports are considered constrained.

4.2.2 Locations Surrounding Tier 2 Ports

The Port of Waterford and Rosslare Europort are classified as a Tier 2 ports. These ports are suitable in terms of the required vessel size and berthing depth requirements and are responsible for at least 2.5% of overall tonnage through Irish ports. In addition, these ports have the potential to manage higher volumes of unitised traffic and have existing transport links to serve a wider marketplace beyond their immediate region.

4.2.3 Locations Surrounding Tier 3 Ports

Tier 3 ports were discounted early in the process as they were considered not suitable due to the size of the incoming vessels and berthing requirements.

4.2.4 Locations at Belview Port

One of the initial alternative options for this project that was considered by the Applicant was the availability of suitably serviced sites within the Port of Waterford / Belview Port. This initial assessment was discounted at an early design stage based on the area of land that would be required for the Proposed Development and the infrastructure available.

4.2.5 Alternative Sites

The evaluation of different sites for the Proposed Development focused on lands in proximity to Belview Port / Port of Waterford and proximity to the source of the raw material (gypsum) and good infrastructure.

A number of separate land parcels within in the vicinity of the Site were discounted due to the following reasons:

- The presence of gas and electricity wayleaves which would have restricted the construction of the plant;
- The presence of established hedgerows and ecological receptors;
- The proximity of sensitive receptors on the western boundary.

The Site of the Proposed Development was selected for the following reasons:

1. Sufficient space on appropriately zoned lands;
2. Agricultural and greenfield lands in proximity to the Site that already had been subject to extensive due diligence for environmental compatibility;
3. Excellent road access;
4. Close proximity to the port;
5. Close proximity to existing raw material import location;
6. Availability of all services especially water, gas, and electricity; and,
7. Distance from sensitive receptors.

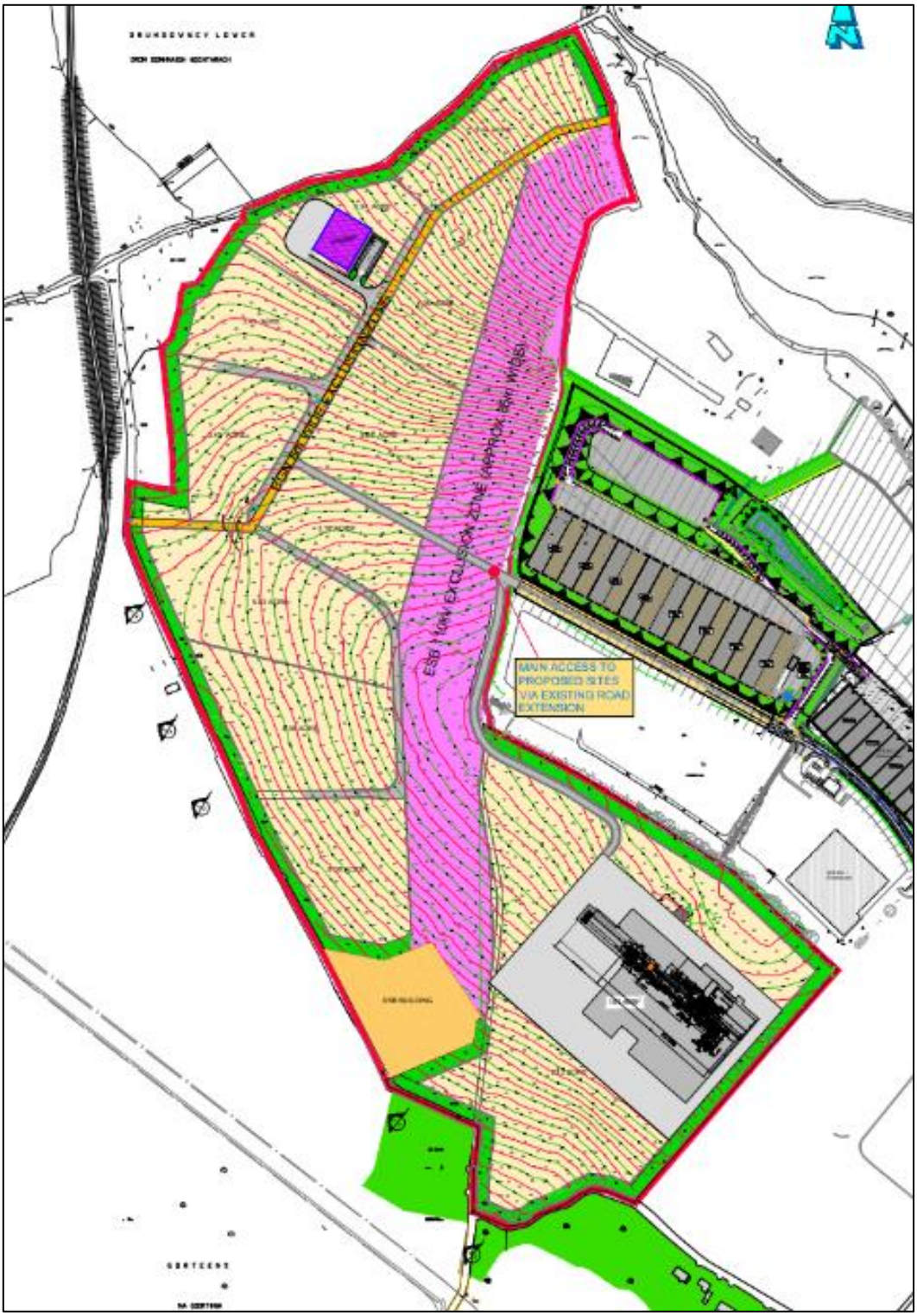
4.3 Alternative Design and Layout

This section sets out the alternative layouts which were considered. The overall design process was an iterative process between the design team and the EIA team, as findings from the baseline surveys were considered in the design process. This process was implemented to design out any potentially significant environmental impacts by avoidance in accordance with relevant EIAR guidance.

4.3.1 Site Layout A

Figure 4-1 below illustrates the Site layout 'A' which was considered unsuitable for a number of reasons, the main constraint being the requirement to severe the ecological corridor with the removal of trees and existing hedgerows along the proposed access route to the west into the Site.

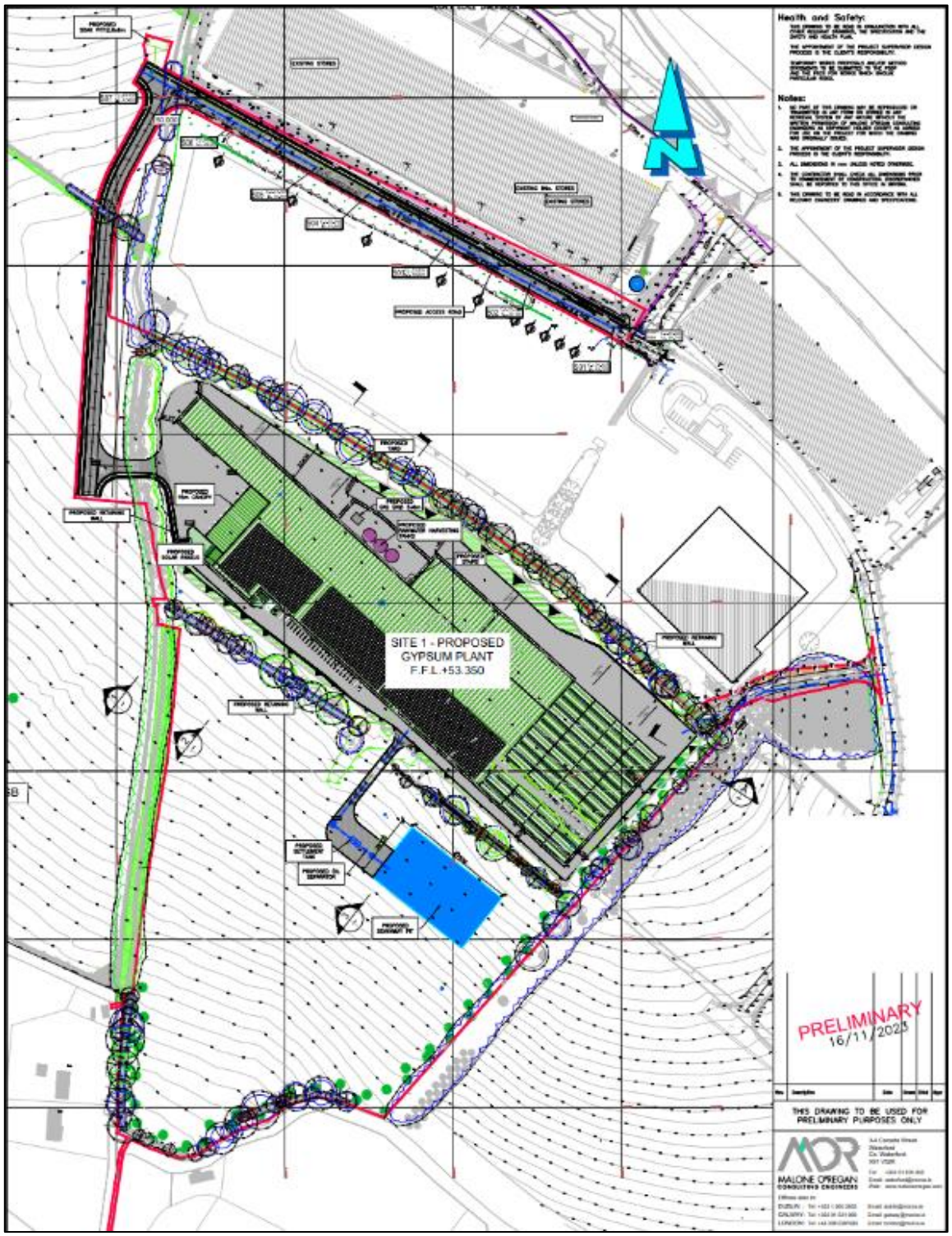
Figure 4-1: Site Layout 'A'



4.3.2 Site Layout 'B'

The following site layout ('B') was developed with a proposed access route to the west spanning behind the existing sheds and also a proposed access route to the east. However, similarly to Site Layout 'A' above, this was discounted due to the requirement to severe the ecological corridor with the removal of trees and hedgerow along the proposed access route to the west, Figure 4-2 below illustrates the Site layout 'B'.

Figure 4-2: Site Layout B



4.4 Selection of the Proposed Development

The Proposed Development is presented in Figure 4-3 below and shown in Appendix 3-1. The welfare was relocated to the main facility and there has been further design progression on the main facilities. This layout option includes the main site development areas avoiding the severing of the ecological corridor and removal of as many trees/hedgerows as possible. The entrance and internal access road is located in an area of scrub considered to be of low ecological value based on its small size, structure and surrounding land use.

In addition, an efficient road layout has been incorporated into the design and the internal road layout will facilitate truck loading finished product and exiting on the N29. The plasterboard plant is arranged as a long rectangular building to incorporate the manufacturing process, including a ca.140m long conveyor, with the internal layout of the building maximised to follow the plasterboard manufacturing process. The layout maximises energy efficiency in the building and will allow surplus heat generated from the calciner to be reused via a heat exchanger. In addition, the buildings orientation allows for the inclusion of solar PV panels.

Screen berms along the southern and western Site boundary will provide additional planting that in time will become a wildlife corridor for bird and mammals in the area. This will help maximise potential biodiversity enhancement measures.

Figure 4-3: Selected Overall Site Layout

4.5 Alternative Uses Including the "Do Nothing" Alternative

The Site is an agricultural/greenfield site zoned as 'Industrial and Port Related Operations' within the Ferrybank Belview Local Area Plan 2017. As the Site in on development zoned lands, it is unlikely that the Site would remain in agricultural uses.

In the event that this Site is not developed, an alternative site would be sought to ensure the future viability of business opportunities are achieved.

Therefore, a 'Do-Nothing' scenario will have limited environmental benefits, such as energy and natural resource use, waste generation, emissions to air or water, and traffic impacts would not occur. However, this scenario would adversely impact on the economic development of GABM Limited. The employment and associated social benefits for the local area would also not be realised. Refer to Chapter 2 for the need for the Proposed Development.

5 HUMAN HEALTH AND POPULATION

5.1 Introduction

This chapter was prepared by the MOR team. This chapter provides a description and assessment of the likely impacts of the Proposed Development in terms of population and human health.

The local or receiving population comprises a significant element of the overall environment. In carrying out developments, one of the principal concerns is that people should experience no diminution in their quality of life as a consequence of the construction and operational phases of a development.

5.2 Methodology

A desk-based study was carried out to characterise the environment in relation to human beings, including the receiving population, change over time in population, employment levels and human health indicators.

This chapter has been prepared taking cognisance of the guidance set out in Chapter 1 and the following specific guidance documents:

- IEMA (2022) Effective Scoping of Human Health in Environmental Impact Assessment [26];
- IEMA (2022) Determining Significance for Human Health in Environmental Impact Assessment [27];
- IEMA (2020) Health Impact Assessment in Planning, Impact Assessment Outlook Journal, Vol 8: Oct 2020 [28];
- IEMA (2017) Health in Environmental Impact Assessment, A Primer for a Proportionate Approach [29];
- Institute of Public Health of Ireland (IPHI) (2021) Health Impact Assessment Guidance [30]; and,
- IPHI guidance [31], sensitivity of the local population was determined following the methodology set out in Part 4 and as summarised in the Health Sensitivity: Conceptual Model presented in Figure 5-1.

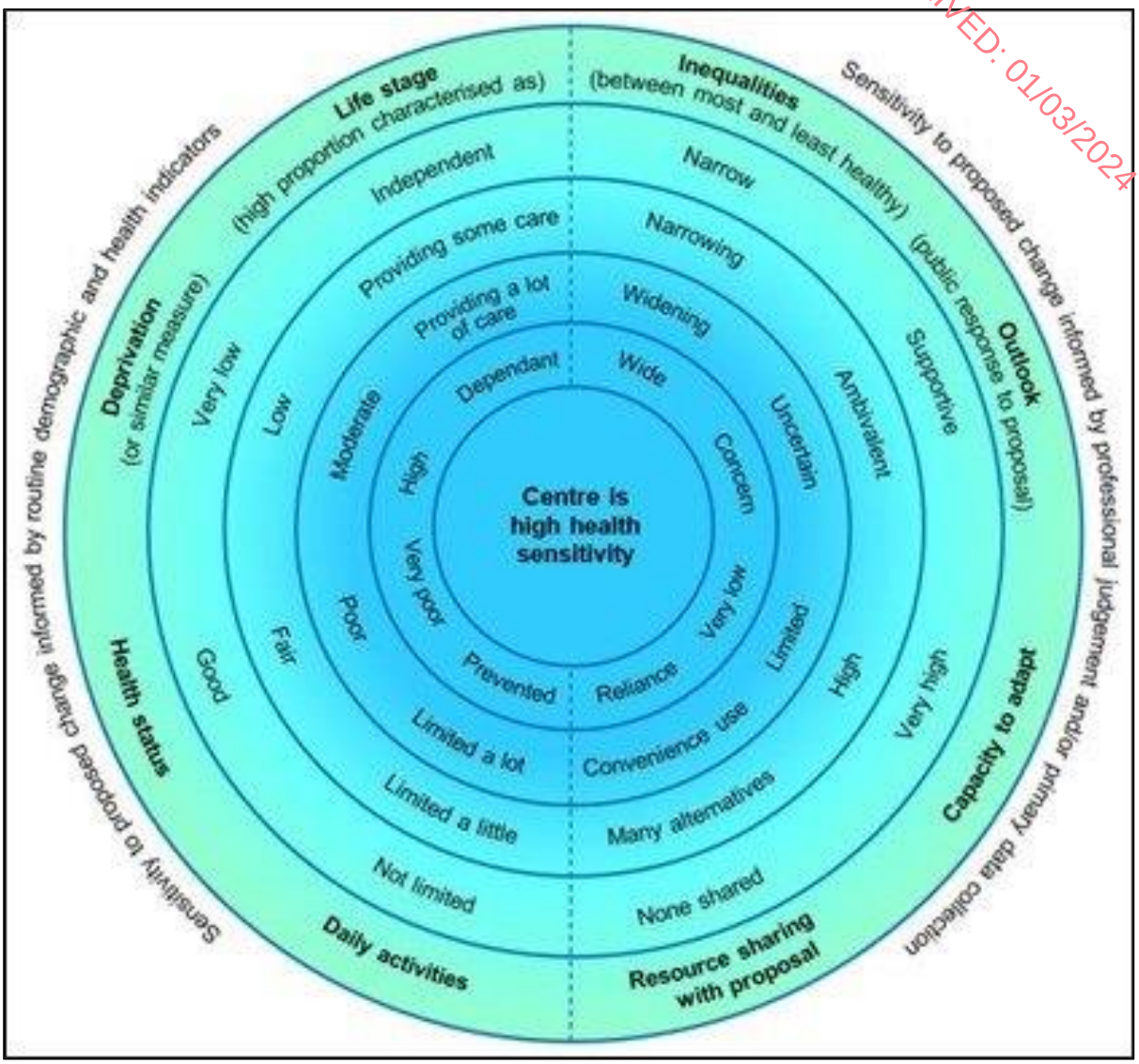
5.2.1 Health Sensitivity

The IPHI Guidance sets out (*Part 4 – Analysis: tools and resources*) a methodology for the determination of the health sensitivity of the local population. This methodology is summarised in Figure 5-1 below. The determined sensitivity in each factor was considered to determine an over-all sensitivity for the local population of both the immediate area and of the nearest population centre – Rathpatrick. The following sources were consulted in determining the sensitivity of the local population and the potential effects upon that population:

- Central Statistics Office (CSO) Census Data for 2006, 2011, 2016 and 2022 [32];
- CSO Census Mapping Small Area Population Maps [33]; and,
- Pobal Deprivation Maps [34].

The results are set out below.

Figure 5-1: Health Sensitivity: Conceptual Model



5.3 Receiving Environment

The CSO provides data on population and certain socio-economic aspects of the population at different levels, including:

- Province;
- County;
- Local Electoral Area (LEA);
- Electoral Division (ED);
- Towns/Settlements/Built Up Areas (BUAs); and,
- Small Population Areas (SA).

'Small Areas' (SAs) were created at the time of the 2011 Census to give greater clarity and context to population trends. As of the 2022 Census, BUAs have replaced Towns/Settlements. BUAs are made up of entire SAs.

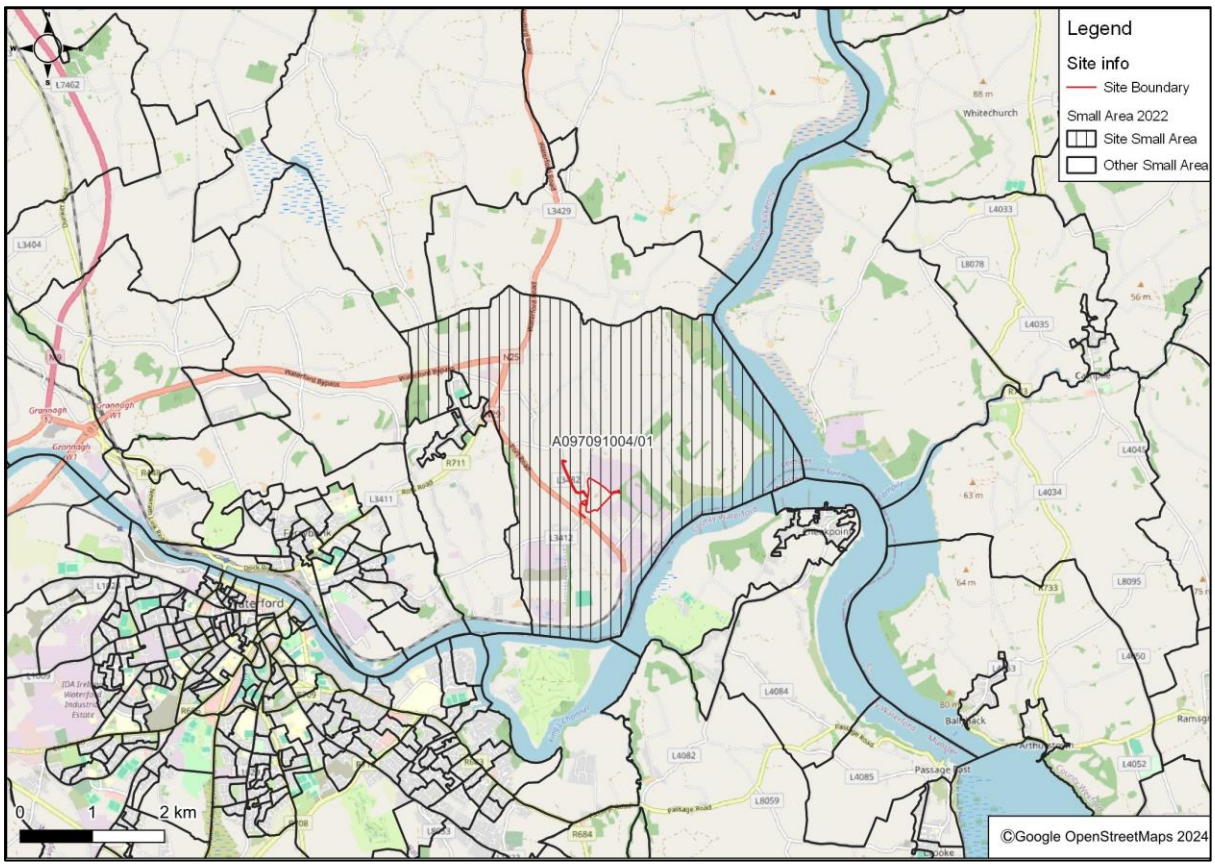
The borders of areas below County level may change from one Census to another, meaning direct comparisons between sets of Census data may not always be possible.

The Site is located within the ED of Rathpatrick, Kilkenny and SA - A097091004/01.

5.3.1 Small Area Population Statistics

The CSO population figures from the 2022 Census Data are set out in Table 5-1 below. The corresponding figures for the ED, LEA, County and State are provided for context. Please note that there were changes to the SA, ED and LEA boundaries between the 2016 and 2022 Census. Therefore, the population change figures should be regarded as a guide rather than an absolute.

Figure 5-2: Extent of Small Area A097091004/01



The CSO population statistics relevant to this EIAR are set out in Table 5-1 below.

Table 5-1: Population Figures

Area	Census Dates			% Change in Population		
	2011	2016	2022	% Change (2011)	% Change (2016)	% Change (2022)
Small Area 097091004	370	345	NA	-12%	-7%	NA
Electoral Division - Rathpatrick	1140	1095	413	-3%	-4%	+9%
Kilkenny	95,419	99,232	104,160	+9%	+4%	+2%
Ireland – State	4,588,252	4,757,976	5,149,139	+8.2%	+3.7%	+4%

* "NA" = The Small Area '097091004' in 2011 has since changed to 'A097091004/01' and encases the Electoral Division of Rathpatrick. Making the SA from 2022 the same as Rathpatrick.

Table 5-2 below gives varies key statistics for the Small Area A097091004/01. The same statistics for the local population centre (Rathpatrick), County Kilkenny and Ireland are also given for context.

Table 5-2:Population Statistics for the Local Area against County and National Figures 2016 - 2022

Data Set	SA 097091004 (2016)	SA A097091004/01 (2022)	County Kilkenny (2022)	Ireland (2022)
Permanent Private Households	132	155	102,286	1,841,152
% of Unoccupied Dwellings	0.00%	1.74%.	1.33%	13.00%
Persons in the local area during the 2016 census	345No.; 159No. female and 186No. male.	413No.; 193No. female and 220No. male	104,160No. 52,277No. female and 51,883No. male	5,149,139No: 2,604,590No. female and 2,544,549No. male
Age Breakdown (%)				
Aged 0 – 9	9.28%	9.93%	12.58%	12.39%
Aged 10 – 14	5.22%	5.08%	6.77%	7.27%
Aged 15 – 19	4.64%	5.08%	6.77%	6.56%
Aged 20 – 24	4.93%	3.87%	4.95%	5.96%
Aged 25 – 64	58.55%	51.33%	51.66%	52.74%
Aged 65 – 79	16.52%	20.82%	12.52%	11.56%
Aged 80+	0.87%	3.87%	3.85%	3.52%
% with Irish or UK Nationality	93.24%	92.93%	91.14%	84.52%
% Identifying as White Irish	91.18%	88.78%	84.42%	75.61%
% Identifying as Irish Traveller	1.18%	0.00%	0.62%	0.64%
% One adult or more	79.94%	83.50%	81.24%%	23.14%
% of One person households	5.90%	7.11%	8.02%	65.48%
% of Single Parents households	14.16%	9.39%	10.73%	11.38%
% Of household Owners/Occupiers	87.46%	91.60%	73.23%	65.77%
% Of household Renting	7.76%	2.80%	22.19%	27.48%
% Renting from Private Landlord	7.76%	2.80%	12.15%	17.96%
%Local Housing Authority/Housing Body	0.00%	0.00%	10.05%	9.52%
% with Stated Central Heating	96.92%	94.19%	88.38%	93.85%
(Oil-Fired)	71.54%	75.33%	54.17%	38.79%
(Coal-Fired)	16.15%	7.33%	6.41%	3.45%
(Wood-Fired)	4.62%	6.00%	3.18%	1.73%

Data Set	SA 097091004 (2016)	SA A097091004/01 (2022)	County Kilkenny (2022)	Ireland (2022)
(Electric-Fired)	1.54%	5.33%	7.51%	11.74%
(Gas-Fired)	0%	0.67%	21.21%	32.66%
% with confirmed Water Supply	95.38%	96.10%	99.86%	97.72%
(Mains Water Supply)	0.77%	3.90%	63.08%	79.90%
(Private Water Supply)	86.92%	87.66%	27.10%	9.90%
(Group Water Supply)	7.69%	6.49%	8.52%	7.69%
% with Stated Sewerage	95.38%	98.70%	53.08%	94.95%
(Mains)	11.54%	14.94%	39.73%	63.30%
(Septic Tank)	74.62%	71.43%	99.85%	24.78%
% Unable to work due to sickness or disability	6.10%	5.13%	8.81%	4.58%
% With a Disability (All Ages)	11.01%	20.34%	21.51%	21.55%
% Caring for a Disabled Person	4.64%	7.02%	6.24%	5.81%
Health:				
% Very Good / Good health	85.80%	79.42%	85.35%	82.89%
% Fair	7.25%	10.41%	8.50%	8.64%
% Bad / Very bad health	1.74%	1.45%	1.62%	1.74%

The numbers in Table 5-2 are not directly comparable, due to extensive boundary changes of the SA from 2016 to the most recent 2022 updates to the census data.

5.3.2 EPA Pobal Information

The 2016 and 2022 census statistics have been used by Pobal on behalf of the Government of Ireland to develop deprivation indices to help inform planning and policy decisions. Table 5-3 sets out the relevant factors which together indicate that the local area has "Marginally Below Average" deprivation levels for both 2016 and 2022.

Table 5-3: Deprivation Indices 2016-2022 for Small Area and County

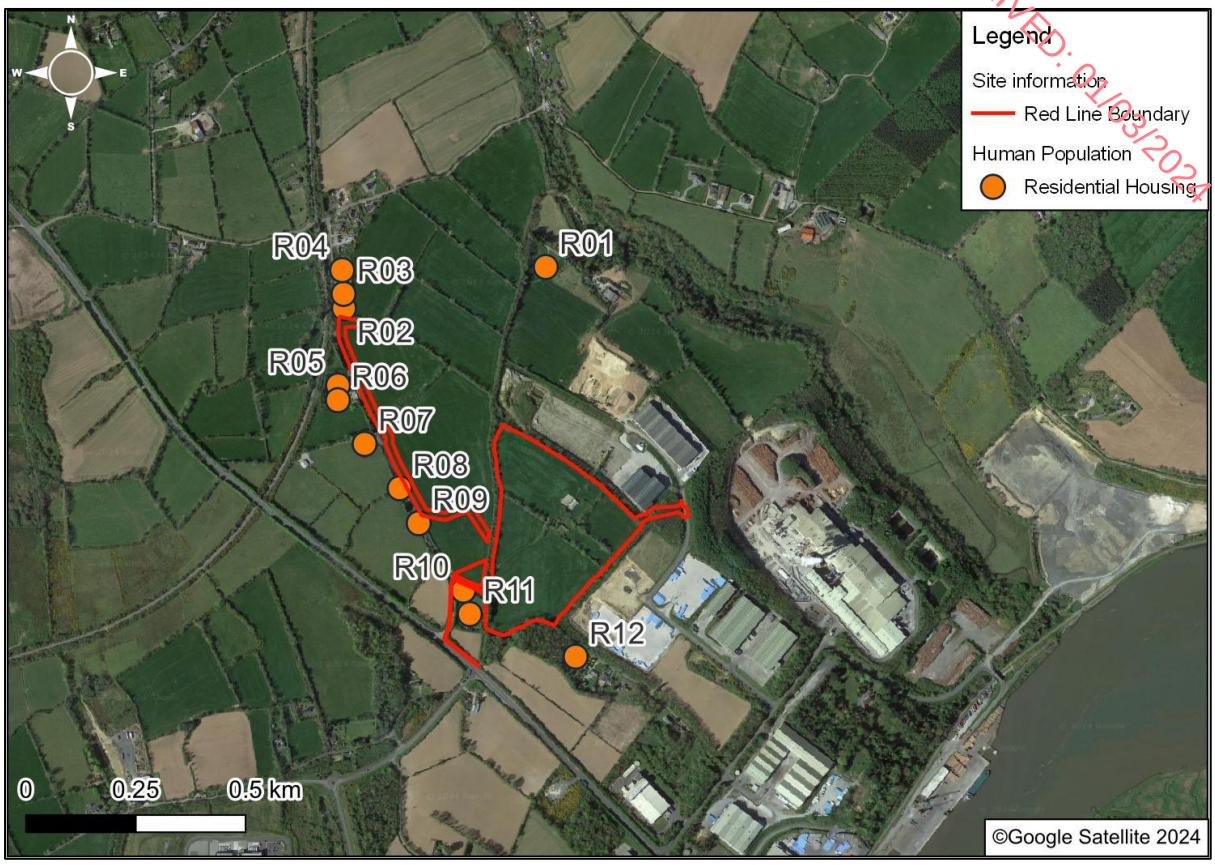
Data Set	SA 097091004 (2016)	SA 097091004/01 (2022)	County Kilkenny (2022)
Pobal HP Index	-3.32	-8.95	-0.41
Pobal HP Description	Marginally Below Average	Marginally Below Average	Marginally Below Average
Age dependency ratio (%)	31.88%	39.71%	36.63%
Primary education only (%)	14.00%	9.47%	10.03%
Third level education (%)	19.18%	26.32%	38.44%
Unemployment rate – male (%)	10.74%	17.50%	8.53%
Unemployment rate – female (%)	7.46%	4.76%	7.34%

5.3.3 Surrounding Land Use

The majority of residencies in the vicinity of the Site are made up of one-off housing and linear development. The Proposed Development is located immediately adjacent to residential properties to the west of the Site. The nearest residential area borders the west site boundary 15m (R08), (see Figure 5-3). There are also several residential properties along the L3482 local road that runs west of the boundary, one residential to the north and a small cluster of residential houses to the south of the Site boundary.

The surrounding land use in the area is industrial and port activities. The port is located to the southeast of the Site, along with industrial facilities such as Signode Ireland, Smartply and Store All (Smartply distribution), Store All Warehousing, Suir Shipping, Belview Bulk Storage, Target Fertilisers, O'Brien Cement. To the south and northwest of the Site are agricultural lands. Glanbia and Kilkenny Cheese are located southwest of the Site. SeedTech – Processing Plant & Logistics hub, Wilson Salt Ireland Ltd and Suir Shipping are located north of the northern boundary. Gorteens Castle, a historic landmark is located south of the Site.

Figure 5-3:Occupied Residential Housing Closest to the Boundary



5.3.4 Economic Activity & Employment

As the area is a highly productive industrial area, there are ample employment opportunities and economic activities in the area.

Table 5-4 below provides details on the economic status of those of working age (15-64) in the vicinity of the Site and its locality, including Rathpatrick, County and State figures are provided for context. The general employment figure for the Small Area is in line with the national average.

The Port of Waterford / Belview Port is a highly productive port and is the closest Irish Bulk Port to mainland Europe. The estimated annual value of the goods through Belview port was at €1.7 billion in 2017 with ca. >1,000 jobs in or supported by businesses in the port zone [35].

Table 5-4: Principal Economic Status of >15s (2022 Census)*

Area	In Work	Student	Retired	Caring for home/family	Unemployed	Unable to work (Health)
SA 097091004/01	51.00%	7.41%	22.51%	6.55%	7.12%	5.13%
Co. Kilkenny	55.61%	10.26%	16.88%	6.81%	4.82%	4.90%
Ireland	56.09%	11.10%	15.90%	6.58%	5.10%	4.58%

**Includes those looking for their first job*

Table 5-5 below provides details on the occupations of those of working age (including the former occupation for those not currently employed).

Table 5-5:Current or Former Occupations of Working Age Population (2022)

Data Set	SA 097091004/01	County Kilkenny	Ireland
Administrative/Secretarial Occupations	10.29%	8.79%	9.20%
Associate Professional/Technical Occupations	10.78%	10.51%	11.71%
Caring, Leisure, Service Occupations	5.88%	8.32%	7.35%
Elementary Occupations	1.96%	8.33%	8.15%
Manager/Director/Senior Officials	11.27%	7.73%	7.72%
Process, Plant and Machine Operatives	8.33%	6.87%	6.91%
Professional Occupations	14.71%	19.33%	20.31%
Sales and Customer Service Occupations	6.37%	5.76%	6.18%
Skilled Trade/Occupations	24.51%	17.35%	12.57%
Not Stated	5.88%	7.01%	9.90%

Table 5-6 below shows the percentage of working adults working within various industries, according to the 2022 Census, both in the immediate area (the Small Area) and the near vicinity of the Site. The County and National figures are provided for context. The relatively high proportion employed in agricultural and construction industries reflects the nature of the local area.

Table 5-6:Industry of Employment of Adults in Paid Employment (2022)

Area	SA	County Kilkenny	Ireland
Agriculture, Forestry & Fisheries	4.47%	7.22%	3.54%
Building and Construction	10.06%	6.89%	5.80%
Manufacturing	15.64%	11.60%	11.77%
Commerce/Trade	24.58%	23.13%	23.82%
Transport/Communications	9.50%	5.46%	9.15%
Public Administration	2.79%	5.70%	5.67%
Professional Services	21.79%	26.23%	24.48%
Other	11.17%	13.77%	15.76%

5.3.4.1 Employment Opportunities in the Surrounding Area

Opportunities for employment exists within the immediate surrounding area, with a wide range of services, which include:

Industrial

- Smartply Europe have various warehouses and facilities in the area, including Store All (Smartply Distribution) located east of the Site. Smartply are manufacturers of sustainable timber construction panels;
- SeedTech are located north of the northern boundary of the Site, SeedTech develop and produce arable seed varieties for Irish tillage farmers;
- O'Brien Cement is located south of the Site and are a cement manufacturer;
- Tirlán / Glanbia Ireland Belview is a dairy processing facility and is located southwest of the Site;
- Kilkenny Cheese is located adjacent to Tirlán, southwest of the Site and is a cheese manufacturing plant;
- Wilson Salt Ireland Ltd are located north of the Site which is a salt manufacturing plant;
- Signode Ireland is a manufacturer and distributor of packaging systems and is located southeast of the Site; and,
- Glanway is an Irish waste processor and producer of alternative fuels, it is located south of the Site.

Port Services

- Belview Bulk Storage are located south of the Site;
- Suir Shipping Ltd have various locations in the vicinity located north and south of the Site. Suir Shipping is a shipping service;
- StoreAll have multiple warehouses in the area for bulk storage, located southeast of the Site;
- Southeast Port Services Limited are a shipping agency and storage providers located southeast of the Site; and,
- DFDS Waterford (Container Division), which are a freight shipping service located south of the Site.

Other

- Target Fertilisers are a wholesaler of grass and tillage fertilisers and is located southeast of the Site; and,
- Moore Wealth Management are financial advisors located southeast of the Site.

The Site located is ca.2km from Waterford City centre and ca.10km from New Ross which are further employment opportunities near the area.

5.3.4.2 Existing Employment

The Proposed Development will allow the Applicant to continue to support local direct and indirect employment opportunities as GABM Limited has no set lifetime planned for the Proposed Development.

5.3.5 Human Health

This section sets out the existing situation with regards to human health.

5.3.5.1 Sensitivity

The population of the immediate Small Area was considered in terms of the categories set out in Figure 5-1 above. The results of this consideration are set out in Table 5-7 below. The overall sensitivity of the population of the Small Area to any resulting impact is considered to be "Low".

Table 5-7 Population Sensitivity 2022

Criteria	Classification	Basis
A097091004/01		
Life stage	Independent	The age dependency ratio for the area is 39.71%, this is significantly lower than the national rate of 53.2% [36].
Deprivation	Moderate	The deprivation index is marginally below average.
Health status	Good	79.42% of the population identify as having good or very good health. This is lower than the national level of 82.89% [37]. The % of the population unable to work due to health/disability is above the national figure. and the % of the population reporting 'bad/very bad' health is well below the national figure.
Daily activities	Limited a little	Although the % of the population caring for someone with a disability is higher than the national figure, the % of the population with a disability is below the national average
Inequalities	Narrow	The local population composition can be characterised as primarily consisting of individuals with Irish ethnicities. The % of the population with education only to primary level is higher than the national figure but the % of the population with education to third level and above is slightly lower than the national figure. The male unemployment is well below the national figure and the female unemployment rate is only slightly above the national figure. The rate of home ownership is well above the national figure and the % of households renting from Local Authority or Housing Bodies is well below the national figure.
Outlook toward the proposal	Supportive / Ambivalent	The local industrial area is likely supportive of the Proposed Development due to the accessibility of a construction material. No direct responses were received from local interest groups to a consultation request. However, the nearby residents may not be as supportive of the Proposed Development, as the area is a largely productive industrial area.
Capacity of health services to adapt	Very high	Given the 5-10No. of proposed employees who it is hoped will already live locally; the capacity of health services in the local area is highly likely to adapt to any small increased demand.

Criteria	Classification	Basis
A097091004/01		
Resource sharing with the proposal	Limited a little	The resource sharing with the Proposed Development is limited a high volume of residents and facilities utilising the groundwater aquifer. At present the existing junction operates within capacity with no queues and minimal delays during the AM and PM peak hour. The Site will not have high power or water requirements, and these requirements do not represent an increase in current requirements. A comparatively high % of the local population has oil-fired heating. Most of the local population have septic tanks and therefor do not depend on the sewerage network. Water will be supplied from a combination of mains water supply, rainwater harvesting and/or abstracted groundwater to the Proposed Development.
Overall Sensitivity Score		**Low**

5.4 Characteristics and Potential Impacts of the Proposed Development

This section examines the potential effects on population and human health that may arise from the Proposed Development during all phases of the Development. This includes the potential for unplanned events and their possible outcome.

The potential impacts that may arise if the Proposed Development does not take place are also examined.

5.4.1 Population

The CSO provides data on population and socio-economic aspects of the population at different levels for the entire state, at county level and for individual Electoral Districts (ED) and small areas within each county.

Once operational, the Proposed Development will provide for ca. 45 new full-time direct jobs that will have a positive, long-term impact on the local economy and employment. the products manufactured at the plant will have wider job creating opportunities for the construction sector. During construction it is estimated that up to 100 jobs will be created.

It is also estimated that the Proposed Development will create numerous indirect jobs in the local area through increased used of materials and logistics, which will also have a positive impact in the local area and beyond.

5.4.2 Human Health

The potential effects on human health, particularly potential impacts on residents in the immediate locality of the Site, are addressed in detail in the following specialist chapters of this EIAR. The conclusions of these chapters are considered here in the context of the low health sensitivity determined in section 5.3.5.1 above. Refer to the specific chapters for further details.

- Chapter 8: Water;
- Chapter 9: Air Quality;
- Chapter 10: Climate;
- Chapter 11: Acoustics;

- Chapter 12: Landscape and Visual;
- Chapter 13: Cultural Heritage;
- Chapter 14: Material Assets – Transport and Traffic;
- Chapter 15: Material Assets – Natural Resources, Energy and Waste;
- Chapter 16: Material Assets – Water Supply and Wastewater Treatment.

5.4.2.1 Safety

As with all industrial facilities, there is a potential for workplace health and safety risks. GABM Limited will operate in strict accordance with all relevant health and safety legislation. They will also operate a strict health and safety management systems during both construction and operational phases. Detailed health and safety plans will be developed for both construction and operational phases.

Bulk excavation activities will consist of the removal of the topsoil to the developed areas along with the excavation of drainage, services and building foundations.

The surplus soil will be used for the construction of a 3m high screen berm along the southern boundaries of the Site. These lands are under the ownership of the Applicant. The berm will be planted and will form a visual screen for residents living and businesses operating in the area and will also form a wildlife corridor for birds, bats, and mammals.

5.4.2.2 Unplanned Events

As with all similar developments, there is some risk that accidents or disasters outside the operator's control could result in a risk to the environment and the local population. Such incidents could theoretically include fire, flood, explosions, and oil/fuel spills arising from vehicle accidents. However, in practice these incidents are unlikely due to the following control measures:

Fire

Fire prevention, detection and fire-fighting facilities will be present at the Site, including:

- Fire alarm as per BS 5839 / IS 3218;
- A Fire Hydrant system;
- Double header hydrants will be provided no more than 46m apart and 6m away from the building;
- Fire Hose reels; and,
- Fire sprinklers.

In addition to these water systems the facility will have the following:

- Hand-held fire extinguishers at key locations.

The manufacturing process undertaken on-site means that there are very few sources of ignition. Any potential combustible materials will be segregated on-site. In addition, the layout of the Site means that there is very little risk of a fire spreading beyond any initial point.

The on-site manufacturing process minimizes potential ignition sources and combustible materials, including finished plasterboard. Plasterboard is a fire-resistant material. It is commonly used for interior finishes, where fire resistance classifications are required. Gypsum finished products are non-combustible as its core contains chemically combined water which, under high heat is slowly released as steam thus, effectively retarding heat transfer [38]. The storage of the finished product will be in accordance with best practices and relevant

regulations to ensure proper fire safety. This includes strict segregation and storage techniques specifically designed to mitigate fire risk.

Routine maintenance of the plant and equipment reduce the risk of fire within the Site. Therefore, unplanned events may result in the exposure of plant and equipment to fire, but the likelihood of a notable fire event or requirement for fire tender support is low.

5.4.3 Do Nothing Scenario

The Site is an agricultural/greenfield site zoned as Industrial and Port Related Operations within the Ferrybank Belview Local Area Plan 2017. As the Site in on development zoned lands, it is unlikely that the Site would remain in agricultural uses.

In the event that this Site is not developed, an alternative site will be sought to ensure the future viability of business opportunities are achieved.

Therefore, a 'Do-Nothing' scenario will have limited environmental benefits, such as energy and natural resource use, waste generation, emissions to air or water, and traffic impacts would not occur. However, this scenario would adversely impact on the economic development of GABM Limited The employment and associated social benefits for the local area would also not be realised. Refer to Chapter 3 for the need for the Proposed Development.

5.5 Proposed Mitigation Measures and/or Factors

Mitigation measures against the potential effects from the Proposed Development which may impact on human health, or the local population are considered in detail within the following chapters:

- Chapter 7: Land, Soils and Geology, provides an assessment of potential likely and significant impacts (if any) on the geological and soil environment which have occurred, which are occurring, or which can reasonably be expected to occur, because of the Proposed Development;
- Chapter 8: Water, provides an assessment of the likely impact of the Proposed Development on the receiving hydrology (surface waters) and hydrogeology (groundwater) with measures to avoid any potential contamination of water will be in place;
- Chapter 9: Air Quality, provides assessment of the potential impacts of the Proposed Development on air quality in the vicinity of the Site;
- Chapter 10: Climate, provides an assessment of the likely effects of the Proposed Development on climate change in the context of national greenhouse gas (GHG) emissions and relevant sectoral targets. This chapter also assesses the potential effects to the Proposed Development from climate change;
- Chapter 11: Acoustics, provides a description and assessment of the likely impact of the Proposed Development on noise and vibration;
- Chapter 12: Landscape and Visual Assessment, prepared by Macroworks and comprises a Landscape and Visual Impact Assessment (LVIA) and Glint and Glare (G&G) assessment to review the existing landscape setting of the Site and to assess the likely potential landscape and visual impacts arising from the Proposed Development. It also describes any applicable proposed mitigation measures to reduce any likely adverse potential visual impacts on the receiving environment; and,
- Chapter 14: Material Assets – Transport and Traffic, the findings of the transport assessment carried out for the proposed Plasterboard Plant at Gorteens, Co. Kilkenny. The existing transport features and surrounding road network is described,

the likely impacts on the road network are assessed and mitigation measures are proposed where required.

5.6 Cumulative and In-Combination Effects

In combination with other local businesses and enterprise in the area, refer to Table 5-8 below, the Applicant's Proposed Development will contribute to the local economy and community. In combination with other development in the wider area, including the port, the Applicant has a strong history of supporting the regional and national marketplaces with a variety of products and services. The cumulative impacts with regard to specific topics and human health are dealt with in each of the relevant chapters as set out in Section 5.4.

EPA IE licenced sites within 5km are presented in Table 5-8 below. As the Proposed Development will not require an IE licence, it is considered that there are no significant likely effects from its operation.

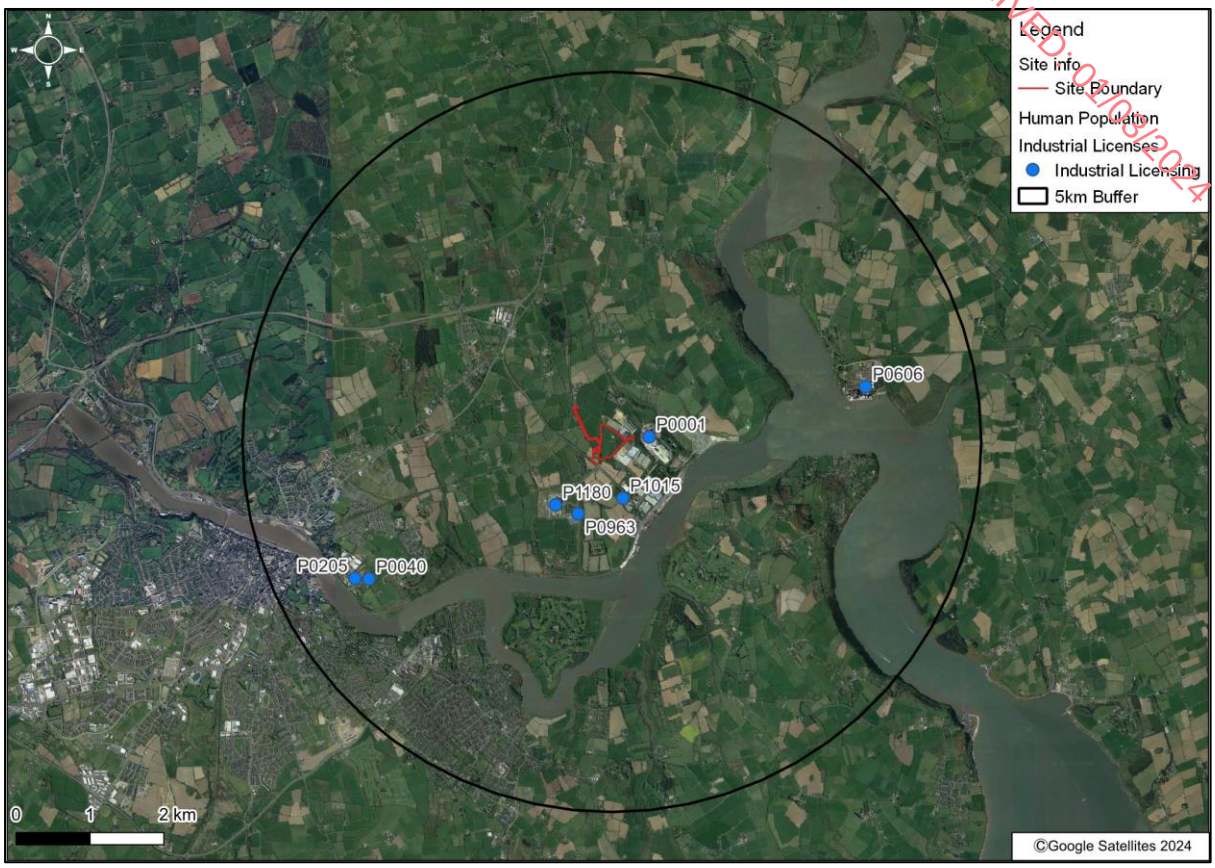
Table 5-8:Industrial Emission Licences within 5km of Proposed Development

Licence No.	Licensee	License Class	Emission	From Site	
				Approximate Distance	Direction
Industrial Emission Licenses					
P0001-04	Smartply Europe Designated Activity Company	8.7: Wood, Paper, Textiles & Leather Sector	Air • Particulates; • Condensable VOCs (excluding particulate matter); • TVOC; • Formaldehyde; • Total Aldehydes; • Isocyanate (as NCO group); • Phenol; • Carbon Monoxide; • NO_2; and, • Oxide of Sulphur. Groundwater • pH • Ammonia; • Nitrates; • Ortho-phosphate; • Chloride; and, • Relevant Hazardous Substances.	231m	East
P0040	Anglo Beef Processors Ireland Unlimited Company t/a ABP Proteins Waterford	7.2.1 Food & Drink Sector	Air • NO_2; • SO_2; and, • Particulates. Water • Temperature; • pH; • Biochemical Oxygen Demand; • Chemical Oxygen Demand; and, • Suspended Solids.	4.34km	West
P0205	Anglo Beef Processors Ireland Limited	7.2.1: Food & Drink Sector	Air • BOD; • COD; • Nitrogen;	4.5km	West

Licence No.	Licensee	License Class	Emission	From Site	
				Approximate Distance	Direction
			• Ammonia; and, • Phosphorus. <u>Water</u> • Suspended Solids;		
P0606	SSE Generation Ireland Limited (Great Island	2.1: Energy Sector	<u>Air</u> • Carbon Monoxide; • Oxides of sulphur (SO_2); • Nitrogen oxides (NO_2); and, • Dust. <u>Water</u> • Temperature; • Thermal Load; • Residual Chlorine; • Ammonia; • Suspended Solids; • Phosphorus; and, • BOD.	4.7km	East
P0963	Tirlán Limited	7.2.1: Food & Drink Sector	<u>Air</u> • NO_2: and, • Particulates. <u>Sewer</u> • Temperature; • pH; • BOD; • COD; • Suspended Solids; • Oils, fats and greases; • Phosphorous; and, • Nitrogen.	2.7km	Southwest
P1015	Glanway Limited	11.4(b)(i): Non-Hazardous Waste Transfer Stations Sector	<u>Air</u> • Odour; • Ammonia; • TVOC; • Particulates; and, • NO_2.	2.6km	South

Licence No.	Licensee	License Class	Emission	From Site	
				Approximate Distance	Direction
P1180	Kilkenny Cheese Limited	7.2.1: Food and Drink	Air • NO_2; and, • Odour. Sewer • Temperature; • pH; • BOD; • COD; • Suspended Solids; • Nitrogen; • Ammonia; • Phosphorus; • Sulphates; • Chloride; and, • Fats, Oils and Grease. Noise	2.8km	Southwest

Figure 5-4: Industrial Licensees within a 5km radius of the Site Boundary.



5.7 Interactions with other Environmental Attributes

Population and human health have the potential to be impacted positively or negatively under a number of environmental issues. The relevant interactions with other key topics are set out above.

5.8 Indirect Effects

The Proposed Development will result in positive indirect effects regarding local employment.

The Proposed Development will have a neutral-to-slight, positive, long-term effect regarding indirect local and regional employment such as:

- Operational staff;
- Machinery maintenance and facility upkeep;
- Refuelling of plant, equipment and delivery vehicles;
- Health and safety specialists; and,
- Licenced waste contractors for delivered waste.

5.9 Residual Effects

The residual effect will be a positive long-term impact on the local economy and employment as well as the wider economy. The residual effect with regard to human health and safety will be not significant given all of the control measures that will be put in place, the low sensitivity of the local population and the lack of impact on health services.

5.10 Monitoring

Monitoring requirements are discussed within the individual chapters below.

5.11 Reinstatement

Not applicable.

5.12 Difficulties Encountered in Compiling this Information.

No difficulties were encountered.

6 BIODIVERSITY

6.1 Introduction

This chapter of the report provides a description and assessment of the potential, likely and significant impacts of the Proposed Development on ecology.

A detailed ecological appraisal has been carried out by fully qualified and experienced MOR Ecologists in line with *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* [39]. This chapter details the methods and results of a desk-study and field surveys undertaken to establish the baseline ecological status of the Site and its immediate surroundings and to assess the potential impacts of the Proposed Development.

In addition, an assessment on potential effects on European Designated sites was undertaken and is presented in the Stage Two: Appropriate Assessment - Natura Impact Statement (NIS) which forms part of the planning application. The NIS should be read in conjunction with this chapter.

6.2 Methodology

6.2.1 Planning Context

6.2.1.1 Legislation / Policy Context

Within Ireland, a number of sites of international or national importance to nature conservation, as well as many species of animal and plants are afforded some degree of legal protection, for details see Box 1 below.

A study of biodiversity related planning policy at the national and local level has been undertaken for the Site and locality in order to highlight any potential conflicts with the relevant legislation and guidance documents.

Box 1 Designated Wildlife Sites and Protected and Otherwise Notable Habitats and Species

The National Park and Wildlife Service (NPWS) notifies sites in Ireland that are of international or national importance for nature conservation (although some sites that are of national importance for certain species have not been so designated).

Internationally important sites may also be designated as:

- Special Areas of Conservation (SACs): the legal requirements relating to the designation and management of SACs in Ireland are set out in the European Communities (Natural Habitats) Regulations 1997 (as amended) (Habs Regs);
- Special Protection Areas (SPAs): strictly protected sites classified in accordance with Article 4 of the EU Directive on the Conservation of Wild Birds (79/409/EEC), also known as the Birds Directive; and,
- Ramsar sites: wetlands of international importance designated under the Ramsar Convention, to which Ireland is a signatory.

Other statutory site designations relating to nature conservation are:

- Natural Heritage Areas (NHA): these represent examples of some of the most important natural and semi-natural terrestrial and coastal habitats in the country and are afforded protection under the Wildlife (Amendment) Act 2000. NHAs are legally protected from damage and receive protected from the date they are formally proposed for designation; and,
- Proposed Natural Heritage Areas (pNHA): these sites are afforded the same protection as NHA under the Wildlife (Amendment) Act 2000 from the date that they are formally proposed for designation.

Legally Protected Species

Many species of animal and plant receive some degree of legal protection. For the purposes of this study, legal protection refers to:

Box 1	Designated Wildlife Sites and Protected and Otherwise Notable Habitats and Species

- Species included in the Wildlife (Amendment) Act 2000, excluding species that are only protected in relation to their sale, reflecting the fact that the site disposal will not include any proposals relating to the sale of species; and,
- Species afforded protection under the Flora Protection Order 1999.

Other Notable Habitat / Species Categories

- Biodiversity Action Plan (BAP) species: those targeted in local or national BAPs as being of particular conservation concern (priority species).
- Red and Amber List birds: those listed as being of high or medium conservation concern as listed by Birdwatch Ireland [40].
- Other Irish Red Data Book species and Nationally/Regionally/Locally Notable species where appropriate.

6.2.1.2 National Planning Context

National Planning Policy Statement

The National Planning Policy Statement 2015 [41] states via Key Principle No.8, in relation to Biodiversity, that:

> *'Planning will conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance, from statutorily designated sites to sites of local importance, and including the conservation and management of landscape quality to the maximum extent possible, so that these intrinsic qualities of our country can be enjoyed for their collective contribution to the quality of life of this and future generations.'*

The same document, in relation to conservation of natural heritage, states as Key Principle No. 9 that:

> *'Planning will support the protection and enhancement of environmental quality in a manner consistent with the requirements of relevant national and European standards by guiding development towards optimal locations from the perspective of ensuring high standards of water and air quality, biodiversity and the minimisation of pollution risk.'*

The National Development Plan

The National Development Plan [42] also lists the following items as strategic investment priorities in relation national heritage and biodiversity:

- *'Implementation of the current and future National Biodiversity Action Plan, delivery of National Parks and Wildlife Service Farm Plans and LIFE projects, enhanced wildlife crime investigation capacity and identification and delivery conservation measures at designated sites as identified in the Prioritised Action Framework for Ireland (2021-2027).';*
- *'Investment in nature and biodiversity, to improve the quality of natural habitats and support native plants and animals, including those under threat, and to bolster broader societal wellness and sustainability goals.';* and,
- *'Future-proofing obligations under the Biodiversity Strategy 2030, including potential national designations and the preparation and delivery of a National Restoration Plan.'*

Project Ireland 2040, National Planning Framework

Project Ireland 2040 was launched by the Government in February 2018 [43] and incorporates two policy documents - the National Planning Framework and the National Development Plan to 2027.

Under the biodiversity section "Project Ireland 2040 National Planning Framework", the National Policy Objective 59 is to:

- *'Enhance the conservation status and improve the management of protected areas and protected species by:*
    - *Implementing relevant EU Directives to protect Ireland's environment and wildlife;*
    - *Integrating policies and objectives for the protection and restoration of biodiversity in statutory development plans;*
    - *Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites; and,*
    - *Continued research, survey programmes and monitoring of habitats and species.'*

The National Policy Objective 60 in the same document is to:

> *'Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance.'*

National Biodiversity Action Plan

The 4th National Biodiversity Action Plan (NBAP) 2023-2030 sets out a number of strategic objectives that lay out a clear framework for Irelands approach to biodiversity and demonstrates Ireland's commitment to protect our biodiversity and also halt decline [44]. The following outcome within the current NBAP was considered relevant to the Proposed Development and this report:

Outcome 2B of the NBAP:

> '*Biodiversity and ecosystem services in the wider countryside are conserved and restored.'*

6.2.1.3 Regional Planning Context

Regional Spatial and Economic Strategy for the Southern Region

The Regional Spatial and Economic Strategy for the Southern Region (RSES) [45] recognises the need to conserve and enhance biodiversity through co-ordinated spatial planning between the counties within the southern region of Ireland. This strategy came into effect on 31st January 2020.

Under the biodiversity section, Regional Policy Objective 126 states that the Southern Regional Assembly will:

a) *'Promote biodiversity protection and habitat connectivity both within protected areas and in the landscape through promoting the integration of green infrastructure and ecosystem services, including landscape, heritage, biodiversity and management of invasive and alien species in the preparation of statutory and non-statutory land-use plans. The RSES recognises the role of the National Biodiversity Data Centre through its Citizen Science initiatives;*

b) *Support local authorities acting together with relevant stakeholders in implementing measures designed to identify, conserve and enhance the biodiversity of the Region; seek and support the implementation of the All-Ireland*

Pollinator Plan, National Biodiversity Action Plan and National Raised Bog SAC Management Plan;

c) *Local Authorities are required to carry out required screening of proposed projects and any draft land-use plan or amendment/ variation to any such plan for any potential ecological impact on areas designated or proposed for inclusion as Natura 2000/ European Sites and shall decide if an Appropriate Assessment is necessary, of the potential impacts of the project or plan on the conservation objectives of any Natura 2000/European Site;*

d) *Support local authorities to carry out, monitor and review biodiversity plans throughout the Region. Planning authorities should set objectives in their land use plans to implement and monitor the actions as set out in the National and County Biodiversity Plans, as the conservation of biodiversity is an essential component of sustainable development. Local authorities should address the issue of fisheries protection and invasive introduced species and encourage the use of native species for landscape planting in rural areas, in the review of their biodiversity plans;*

e) *Support local authorities to work with all stakeholders to conserve, manage and where possible enhance the Regions natural heritage including all habitats, species, landscapes and geological heritage of conservation interest and to promote increased understanding and awareness of the natural heritage of the Region.'*

The RSES also contains policies relating to invasive species. Regional Policy Objective 127 states that it is an objective to:

a) *Support coordination between the Region's local authorities in terms of their measures to survey invasive species in their counties and coordinate regional responses;*

b) *Encourage greater awareness of potential threats caused by invasive species and how they are spread;*

c) *Carefully consider and implement the management of invasive species where there is a corridor, such as hydrological connections to European Sites in order to prevent the spread of invasive to sensitive sites.'*

6.2.1.4 Local Planning Context

Kilkenny City County Development Plan 2021 – 2027

The Kilkenny City and County Development Plan 2021-2027 [46](KCCDP) contains a number of policies and objectives that relate directly to the protection of biodiversity and natural heritage in the context of proposed developments [47]. The policies and objectives of the KCCDP with regards to the natural environment that are relevant to the Proposed Development are as follows [48]:

Objective 1A:

'*To implement the provisions of Articles 6(3) and 6(4) of the EU Habitats Directive and ensure that that any plan or project within the functional area of the Planning Authority is subject to appropriate assessment in accordance with the Guidance Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 20091 or any subsequent version, and is assessed in accordance with Article 6 of the Habitats Directive in order to avoid adverse impacts on the integrity and conservation'*

Section 9.1:

'The Council will support the implementation of the National Heritage Plan and National Biodiversity Action Plan. The Council will prepare and implement, in partnership with the Kilkenny Heritage Forum and all relevant stakeholders, a County Heritage Plan and County Biodiversity Action Plan. The Council will also support the implementation of key legislation and national and local policies, programmes and plans which identify, protect and promote Kilkenny's heritage.'

It is the aim of the Council to develop and support programmes which encourage active participation in identifying, recording, protecting, communicating and enjoying Kilkenny's heritage.'

Protected habitats and species designated for nature conservation (Section 9.2.1)

European Sites (Natura 2000) (Section 9.2.1.1)

'The EU Habitats Directive (92/43/EEC) and EU Birds Directive (2009/147/EC) provide for the conservation and protection of breeding and resting sites for rare and threatened species, and rare habitat types in a European context considered to be most in need of conservation. Such sites form part of an EU network of ecologically important and protected sites known as Natura 2000 sites and comprise:

- ***Special Areas of Conservation (SACs)** – these sites are selected for the conservation and protection of plant and animal species (other than birds) and habitats listed in Annex I and Annex II of the EU Habitats Directive (92/43/EEC) respectively.*
- ***Special Protection Areas (SPAs)** – these sites are selected for the conservation and protection of birds and their habitats designated under the EU Birds Directive 2009 (2009/147/EC) (first adopted in 1979) and transposed into Irish law by the Conservation of Wild Birds Regulations (SI 291 of 1985). There are 8 Natura 2000 sites within the County.'*

Natural Heritage Area (Section 9.2.1.2)

'Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are designated under the Wildlife (Amendment) Act 2000 and encompass nationally important semi-natural and natural habitats, landforms and geomorphological features. There are 34 Natural Heritage Areas in the county.'

Statutory Nature Reserve (Section 9.2.1.3)

'A Nature Reserve is an area of importance to wildlife which is protected under Ministerial order. Most are owned by the State. There are 4 Statutory Nature Reserves in the county.'

Wildfowl Sanctuary (Section 9.2.1.4)

Wildfowl Sanctuaries are areas that have been excluded from the 'Open Season Order' so that game birds can rest and feed undisturbed. Shooting of game birds is not allowed in these sanctuaries.

Protected Plant and Animal Species (Section 9.2.1.5)

'Certain plant, animal and bird species are protected by law. These includes plant species listed in the Flora (Protection) Order 2015 (S.I. No. 356 of 2015) (or other such Orders) and animals and birds listed in the Wildlife Act, 1976 and subsequent statutory instruments, those listed in Annex IV of the Habitats Directive (92/43/EEC), and those listed in Annex I of the Birds Directive.

The Planning Authority will consult with the National Parks and Wildlife Service (a) in respect of any proposed development where there is a possibility that such development may have an impact on a protected area of international or national importance, and (b) take account of any licensing requirements, when undertaking, or approving development which is likely to affect plant, animal or bird species protected by national or European legislation.

The Council will protect and, where possible, enhance the natural heritage sites designated under EU legislation and national legislation (Habitats Directive, Birds Directive, European Communities (Birds Chapter 9 Heritage, Culture and the Arts Kilkenny City and County Development Plan Volume 1 128 and Natural Habitats) Regulations 2011 and Wildlife Acts). This protection will extend to any additions or alterations to sites that may arise during the lifetime of this plan. The Council will also protect and, where possible, enhance the plant and animal species and their habitats that have been identified under European legislation (Habitats and Birds Directive) and protected under national Legislation (European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), Wildlife Acts 1976-2010 and the Flora Protection Order (SI94 of 1999).'

Development Management Requirements (Sections 9.2.1.1-9.2.1.5):

'Ensure that an ecological impact assessment is carried out, by suitably qualified professional(s), for any proposed development likely to have a significant impact on rare and threatened species including those species protected by law and their habitats. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.'

Objective 9A:

'Continue to identify and map habitats and green infrastructure of county importance, and raise awareness and understanding of the county's natural heritage and biodiversity identifying green corridors and measures to connect them.'

Development Managements Requirements:

- *'To ensure that development proposals, where relevant, improve the ecological coherence of the Natura 2000 network and encourage the retention and management of landscape features that are of major importance for wild fauna and flora as per Article 10 of the Habitats Directive.'*
- *'To protect and where possible enhance wildlife habitats and landscape features which act as ecological corridors/networks and stepping stones, such as river corridors, hedgerows and road verges, and to minimise the loss of habitats and features of the wider countryside (such as ponds, wetlands, trees) which are not within designated sites.'*
- *'To ensure that appropriate mitigation and/or compensation measures to conserve biodiversity, landscape character and green infrastructure networks are required in developments where habitats are at risk or lost as part of a development.*

'Objective 9B:

'To identify and map green infrastructure assets and sites of local biodiversity value over the lifetime of the Plan.'

Development Managements Requirements:

'Require all developments in the early pre-planning stage of the planning process to identify, protect and enhance ecological features and habitats, and making provision for local biodiversity (e.g. through protection of existing breeding sites, and provision

of appropriate new infrastructure such as swift, bat and barn owl boxes, bat roost sites, green roofs, etc.) and provide links to the wider Green Infrastructure network as an essential part of the design process.'

Woodlands, Trees and Hedgerows (Section 9.2.5)

'The Council will promote the planting of native tree and shrub species, by committing to using native species (of local provenance wherever possible) in its landscaping work and on County Council property and maximise the opportunity to enhance biodiversity within the City & County during the life time of the plan'.

Development Managements Requirements:

- *'To protect existing woodlands, trees and hedgerows which are of amenity or biodiversity value and/or contribute to landscape character of the county, and to ensure that proper provision is made for their protection and management, when undertaking, approving or authorising development.'*
- *'To ensure that when undertaking, approving or authorising development that sufficient information is provided to enable an assessment of impacts on woodlands, trees, and hedgerows.'*
- *'To have regard to, and seek the conservation of identified trees and woodlands from a) the National Survey of Ancient and Long-Established Woodlands, b) the Tree Register of Ireland (c) sites of significance identified in the Kilkenny Woodlands Survey 1997, (d) the National Survey of Native Woodlands, and (e) Survey of Mature Trees in Kilkenny City and Environs, in the assessment of planning applications.'*
- *'To retain hedgerows, and other distinctive boundary treatment such as stone walls, when undertaking, authorising or approving development; where the loss of the existing boundary is unavoidable as part of development, to ensure that a new hedgerow is planted using native species, and species of local provenance to replace the existing hedgerow and/or that the wall is re-built using local stone and local vernacular design.'*
- *'To discourage the felling of mature trees to facilitate development and, where appropriate make use of Tree Preservation Orders to protect important trees and groups of trees which may be at risk or have an amenity, biodiversity or historic value.'*
- *'To require the planting of native broadleaved species, and species of local provenance, in new developments as appropriate.*'

Invasive Species (Section 9.2.10):

Development Management Requirements:

- *'To require relevant development proposals to address the presence or absence of invasive alien species on proposed development sites and (if necessary) require applicants to prepare and submit an Invasive Species Management Plan where such a species exists to comply with the provisions of the European Communities (Birds and Natural Habitats) Regulations 2011-2015.'*
- *'For proposals connected to surface water systems, risks associated with the spread of crayfish plague shall be considered and applicants should submit a crayfish plague management strategy where appropriate.'*

Native Plant Species (Section 9.2.11):

'Where possible, the use of native plants and seeds from indigenous seed sources should be used on all developments and landscape projects/treatments. This will help to:

- *contribute to national commitments on the conservation of biological diversity by establishing native habitats and reducing the planting and dispersion of non-native plants.*
- *support a reduction in the threat posed by the importation of pests and diseases carried on non-native (and non-indigenously sourced) plant material.*
- *compensate for loss of habitat.*
- *maintain regional identity, landscape character and diversity.'*

Development Managements Requirements:

- *'The Council will promote the use of native plants and seeds from indigenous seed sources in all landscape projects.'*

Ferrybank-Belview Local Area Plan

The Ferrybank-Belview Local Area Plan (LAP) [49] outlines a strategy for the proper planning and sustainable development of an area of land in south Co. Kilkenny, stretching from Grannagh to Belview and from the River Suir to the line of the Waterford bypass (N25). The LAP Adopted by Kilkenny County Council on the 18th of December 2017. Came into effect on the 15th of January 2018. It is valid for six years following adoption by Kilkenny County Council. The Ferrybank Belview LAP contains a number of policies and objectives that relate directly to the protection of biodiversity and natural heritage in the context of the Proposed Development.

Objective 1A:

'*To implement the provisions of Articles 6(3) and 6(4) of the EU Habitats Directive*.'

Objective 1B:

'*To ensure that any plan within the functional area of the Planning Authority is subject to appropriate assessment in accordance with the Guidance Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009 and is assessed in accordance with Article 6 of the Habitats Directive in order to avoid adverse impacts on the integrity and conservation objectives of the site.'*

Development Management Standards (Section 5.6)

5DM3:

'*Encourage appropriate screening of future developments in the Belview Industrial area. The following principles will be applied:*

- *Existing woodlands and hedgerows should be retained and incorporated wherever feasible.*
- *The protection and buffering of existing residential developments will be a priority.*
- *Landscaping schemes for any development should form an integral part of the overall development proposal. A woodland planting buffer of 15-20 metres will generally be required inside any industrial site boundary unless a suitable alternative mitigation measure is agreed with the Planning Authority. This landscape buffer will be required to be densely planted with a mix of coniferous and deciduous species. In all cases the Council encourages advance planting which it considers would be beneficial to ensure some plant maturation prior to construction.*
- *Buildings and other structures shall be located so as to provide optimum screening and noise buffering to surrounding land-uses, particularly to existing residential properties. In cases where structures are to be constructed proximate to existing residential structures, the potential for these structures to impose on the neighbouring*

residential amenity by virtue of their heights and bulk should be appropriately mitigated in the assessment of all planning applications.'

5DM4:

'To require that all significant industrial developments in the Belview area must submit a Construction Management Plan prior to commencement of a development.'

Objective 8B:

'To protect and, where possible, enhance the natural heritage sites designated under EU Legislation and National Legislation (Habitats Directive, Birds Directive, European Communities (Birds and Natural Habitats) Regulations 2011 and Wildlife Acts). This protection will extend to any additions or alterations to sites that may be arise during the lifetime of this plan.'

Objective 8C:

'To protect and, where possible, enhance the plant and animal species and their habitats that have been identified under European legislation (Habitats and Birds Directive) and protected under national Legislation (European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), Wildlife Acts 1976-2010 and the Flora Protection Order (SI94 of 1999).'

Heritage Development Management Standards (Section 7.4)

7DMA:

'*Require the incorporation of natural features where appropriate and to protect existing woodlands, trees and hedgerows which are of amenity or biodiversity value and/or contribute to landscape character, and to ensure that proper provision is made for their protection and management, when undertaking, approving or authorising development*.'

7DMB:

'To ensure that when undertaking, approving or authorising development that sufficient information is provided to enable an assessment of impacts on woodlands, trees and hedgerows.'

7DMC:

'Ensure that an ecological assessment is carried out for any proposed development likely to have a significant impact on rare and threatened species including those species protected by law and their habitats. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment.'

7DMD:

'All lighting within the Plan area will be directional lighting designed specifically in relation to biodiversity.'

6.2.2 Assessment Methodology

The starting point for the assessment was to undertake a scoping exercise for those ecological receptors that would require further consideration as part of the assessment. This involved differentiating the biodiversity receptors (i.e. designated sites, habitats and species populations) that could be significantly affected by the Proposed Development.

The approach that was used for determining which receptors have the potential to be significantly affected by the Proposed Development involved using baseline data collected through the desk study (2km away for protected species and 15km for protected sites) and field surveys for the Site and to determine:

- Which, if any, of the species or habitat that have been recorded are legally protected or controlled (see Box 1); and,
- Which, if any, sites, areas of habitat and species that have been recorded are of importance for biodiversity conservation.

The next stage of the assessment was to determine whether the identified receptors are of sufficient biodiversity value that an impact upon them would be of potential significance in terms of this EIAR. In this regard:

- Biodiversity conservation value relates to the quality and / or size of sites or habitats, or the size of species' populations; and,
- Potential significance means that the effect could be of sufficient concern or, for positive effects, of such substantial benefit that it could be material to influencing the decision on planning.

Receptors that have been identified as having sufficient value, and that an impact upon them could be of potential significance, have been taken forward for further consideration. Legally protected species were also considered further. This involved:

- Identifying, for each receptor, any significant impact that is likely to be caused by the Proposed Development, which has the potential to lead to a significant effect and / or to contravene relevant legislation;
- Determining the area within which the likely impacts would cause a potentially significant impact on the identified receptor and / or could contravene relevant legislation (ecological zone of influence); and,
- If the receptor occurs or is likely to occur within the zone of influence and concluding that the receptor could be significantly affected and / or the relevant legislation contravened, the receptor would be subject to further assessment.

6.2.2.1 Evaluation of the Conservation Importance of the Site

In terms of biodiversity conservation value, identified receptors have been valued using the National Roads Authority Scheme [50], using the following scale:

- International Importance;
- National Importance;
- County Importance (or vice-county in the case of plant or insect species);
- Local Importance (Higher Value); and,
- Local Importance (Lower Value).

6.2.3 Desk Studies

The desk study focused on identifying European designated sites within a 15km radius of the Site, nationally designated sites within a 5km radius of the Site and records of legally protected and notable species within 2km of the Site.

The area for which biological data were collected was based on an assessment of the ecological zone of influence of the Site (i.e. the area that could be affected by the Proposed Development within which there is the potential for significant ecological effects).

The following literature information sources were checked for ecological information:

- Review of aerial maps of the Site and surrounding area;
- The Kilkenny County Council Planning Portal to obtain details about existing / proposed developments in the vicinity of the Site [51];

- The National Parks and Wildlife Service (NPWS) website was consulted with regard to the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment [52];
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions [53]; and,
- The Environmental Protection Agency (EPA) Maps website was consulted to obtain details about watercourses in the vicinity of the Site [54].

6.2.4 Field Surveys

An initial Site assessment was undertaken on 13th March 2023 by 2No.suitably qualified and experienced MOR ecologists. During this assessment, a habitat survey was undertaken at the Site using the using the Heritage Councils – '*A Guide to Habitats in Ireland*' [55] and was conducted in line with the Heritage Council's '*Best Practice Guidance for Habitat Survey & Mapping'*. This is the standard habitat classification system used in Ireland and includes both a desk based and field-based assessment. The survey aimed to identify the extent and quality of habitats present on the Site.

A follow-up habitat survey was carried out on the 31st May 2023 by 2No. suitably qualified and experienced MOR ecologists.

The assessments were also extended to identify the potential for these habitats to support other features of nature conservation importance, such as species afforded legal protection under either Irish or European legislation.

6.2.4.1 Protected / Notable Species Survey

Following the initial Site assessment, it was deemed necessary to undertake the following specialist surveys:

- Flora;
- Amphibians;
- Badger Survey;
- Bat Surveys;
- Breeding Bird Surveys;
- Otter Habitat Suitability Assessment; and,
- Arborist Survey.

These surveys were undertaken by suitably qualified MOR ecologists supported by external specialists as needed.

The methodologies used to establish the presence / potential presence of faunal species are summarised below. These relate to those species / biological taxa that the desk study and habitat types present indicated could occur on the Site.

Flora

The Site was assessed for the presence of notable / protected flora species in accordance with the following:

- Flora (Protection) Order 2022 (S.I. No. 235/2022); and,
- Ireland Red List No. 10 Vascular Plants [56].

Amphibians

The Site was assessed for its potential to provide sheltering, foraging and breeding habitat for amphibians in line with the NRA (now TII) – '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of Nations Road Schemes*' [57]. Habitats on the Site were assessed for their suitability for egg-laying and terrestrial phase of amphibians lifecycle, comprising of open areas with mixed-height vegetation, such as heathland, rough grassland, open scrub and waterbody margins. During the winter period, amphibians require areas that are well-drained and frost-free to enable them to survive the winter.

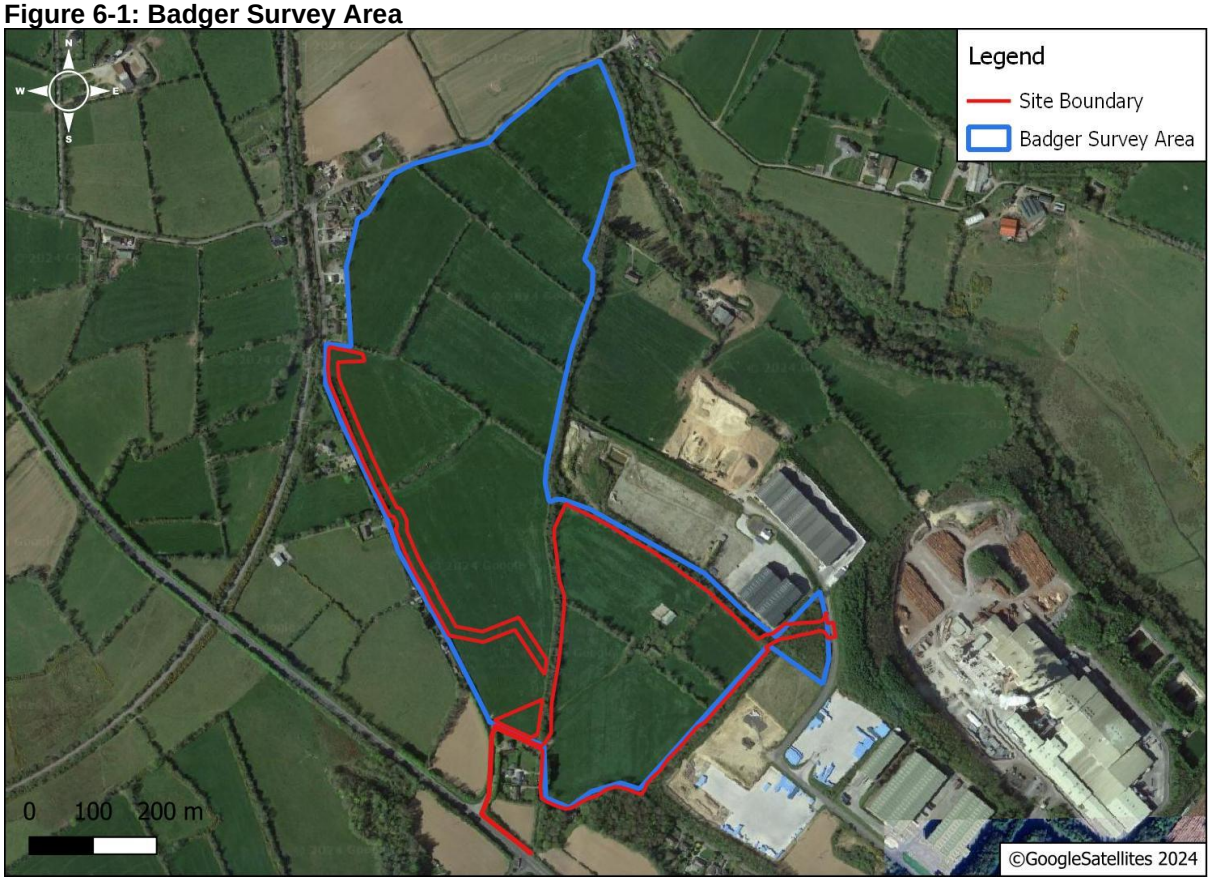
Badgers

A badger habitat suitability assessment was undertaken on the 13th March 2023 by 2No. suitably qualified and experienced MOR ecologists. This survey aimed to identify and examine areas where badgers might occur by noting any evidence of badger activity, within the survey area shown in Figure 6-1. This included:

- Mammal paths;
- Badger hairs caught in sett entrances / fences / vegetation;
- Paw prints;
- Evidence of foraging (usually in the form of 'snuffle holes');
- Latrines (shallow pits / holes occurring together comprised of exposed badger droppings); and,
- Badger setts.

A mammal path was assumed to be used by badgers if the character of the path (in terms of size) was appropriate and / or if any other signs were in close vicinity (e.g. a badger sett).

Figure 6-1: Badger Survey Area



The field survey carried out on the Site was conducted in line with the following relevant guidance for badgers:

- Scottish Badgers – *'Surveying for Badgers: Good Practice Guidelines'* [58];
- The Mammal Society – *'Surveying Badgers'* [59]*; and,*
- The NRA (now TII) – *'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes'* [60].

Camera Trap Survey

Following the initial badger survey undertaken at the Site, a large mammal hole was identified within the vicinity of the Site boundary. Therefore, in order to further investigate the usage of this mammal hole, a Browning *Strike Force: Sub Micro series HD PRO X Trail Camera* ('camera trap') was deployed at the mammal hole.

The camera trap was deployed for 9No. nights between the 11th April and 19th April 2023 and recorded all activity and motion around the mammal hole for this period. The data collected from this camera trap was then analysed and used to determine the use of the mammal hole.

Bats

An initial assessment was carried out on the 13th March 2023 to assess features considered suitable to support bat roosting, foraging and commuting on-site.

Assessment criteria for evaluating the potential suitability of the Site for bats was done in concurrence with '*Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd ed)' [61]. It should be noted that while a newer edition of this guidance has since been released ('*Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th ed.)*', this was published in September 2023, after the active bat survey season for 2023. Therefore, the guidance followed during the surveys was the most up-to-date at the time.

As part of the walkover the following inspections were undertaken:

- **Tree Inspection** - All trees that are due to be impacted by the Proposed Development area were assessed for the presence of features that could be utilised by roosting bats, using close-focusing binoculars. Please see Appendix 6-1 – Bat Report for criteria used as part of this assessment. External building inspection - all buildings that are due to be impacted by the Proposed Development area were assessed for the presence of features that could be utilised by roosting bats, using close-focusing binoculars, a powerful focused-beam light source and an endoscope. The inspection aimed to assess these buildings for the presence of features suitable for roosting bats. Please see Appendix 6-1 – Bat Report for criteria used as part of this assessment;
- **Emergence / Re-Entry Surveys -** Following the initial Site walkover, tree inspection and external building inspection, it was deemed that further assessment would be required for bats on-site, given the suitability of buildings on-site for roosting bats and hedgerows / treelines for foraging and commuting bats. The following bat surveys were undertaken:
    - Dusk emergence surveys were undertaken on the 15th June and 20th July 2023;
    - A dawn re-entry survey was undertaken on the 3rd August 2023;
    - Dusk transect surveys were undertaken on the 5th July and 15th August 2023; and,
    - A dawn transect survey was undertaken on the 4th August 2023.

    All surveys were undertaken by 4No. MOR ecologists following predetermined vantage points and transects; and,

- **Static Monitoring (SM4)** – Two (2No.) passive bat detectors, Wildlife Acoustics Song Meter 4 (SM4s), were placed within pre-determined locations to track bat activity for a period of static monitoring from the 26th July to the 8th August 2023.

Please see Appendix 6-1 – Bat Report for further details.

Birds

Bird Habitat Assessment

Breeding and Wintering Bird Suitability Assessment

The Site was assessed for its potential to support important assemblages of birds of rare or notable species, as well as designated bird species. The survey aimed to identify and examine the suitability of the Site for potential wintering and breeding birds. Any bird activity on-site and potential nesting habitats were noted.

The on-site habitats were noted to be suitable for nesting and foraging bird species.

Breeding Bird Surveys

Three (3No.) breeding bird transect surveys were undertaken by a suitability qualified and experienced MOR ecologists on 19th April 2023, 26th May 2023 and 9th July 2023. These surveys were conducted in line with the methodology described in:

- BTO – '*A Field Guide to Monitoring Nests'* [62]; and,
- *'Common Bird Census in Bird Monitoring Methods'* [63].

The potential breeding status of the recorded birds were based on the criteria described below:

- Non-breeding – Birds that were flying over the Site, birds that were foraging and not calling, birds that were loafing;
- Possible Breeding – Birds observed in suitable nesting habitat and displaying either territorial and / or courtship behaviours, nest building behaviours or observed visiting a possible nest; and,
- Confirmed Breeding – Birds observed either on nest or carrying faecal sac or food, sighting of a nest with eggs / chicks, used nests, eggshells or recently fledged young.

Please see Appendix 6-2 – Bird Report for further details.

Otter Habitat Assessment

The Site and surrounding areas were assessed for their potential to support otters. The assessment aimed to identify and examine areas where otter might occur by noting any evidence of otter observed. Evidence of otter searched for included:

- Holts (features log piles, caves and cavities);
- Slides (flattened areas of mud or vegetation);
- Paw prints;
- Evidence of foraging (usually in the form of feeding remains such as fish scales and shellfish); and,
- Spraints (isolated otter droppings).

Invasive Species

The Site was visually assessed for the presence of any noxious / invasive species that are regulated under Regulations 49 and 50 of the European Communities (Birds and Natural

Habitats) Regulations 2011 (S.I. 477 of 2011) [64] such as Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*).

The Site was also assessed for the presence of non-regulated invasive species that have the potential to affect local biodiversity.

Other Species

In addition, an assessment was carried out of the potential for the Site to support any other species considered to be of value for biodiversity, including those that were identified as occurring locally by the desktop study.

6.2.4.2 Survey Limitations

During the first detailed ecological survey undertaken at the Site in March 2023, it was noted that two sections of hedgerows had been recently removed. This included a section of hedgerow ca. 125m in length that separated three (3No.) fields in the northern section of the Site and also a section of hedgerow / treeline, ca. 30m in length along the western site boundary. MOR were advised by the Applicant that these hedgerows had been removed by the landowner in February 2023. These two (2No.) sections of hedgerows / treelines were unable to be surveyed as part of the EIAR.

For the purpose of this EIAR, MOR made conservative assumptions with regards to the habitat type that may have been present, based on aerial imagery and the findings of the other detailed surveys that were completed on adjoining lands. It is considered that given the results of multiple surveys that were successfully completed and the similar nature of the habitats on-site, the results of the breeding bird surveys that were completed provide an accurate assessment of the ecological value of the overall Site for breeding / wintering birds.

No other surveys constraints were identified.

6.2.5 External Specialist Surveys

6.2.5.1 Arboricultural Assessment

An arboricultural assessment of the trees within the Site was undertaken on the 4th & 5th October 2023 by qualified arboriculturist John Morris of John Morris Arboricultural Consultancy.

The arboriculturist assessment was carried out in accordance with BS5837: 2012 Trees in relation to design, demolition and construction – recommendations. A total of 170No. arboricultural features were assessed including 152No. individual trees, 12No. groups of trees, 4No. hedgerows and 2No. woodlands.

Please refer to the Arboricultural Assessment Report in Appendix 6-3 for full details.

6.3 Receiving Environment

6.3.1 Desk-Based Studies

Prior to conducting any site surveys, a desk-based review of information sources was completed. The findings of the desk-based review provided a valuable insight to the types of flora and fauna that may occur on-site and allowed for the identification of features / habitats located in the vicinity of the Site that may require further assessment.

6.3.1.1 Statutory Nature Conservation Sites

In accordance with the European Commission Methodological Guidance [65] a list of European sites that can be potentially affected by the Proposed Development has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government [66] states that defining the likely zone of impact for the screening and the approach used will depend on the nature, size, location, and the likely

effects of the project. The key variables determining whether or not a particular European Designated site is likely to be negatively affected by a project are: the physical distance from the project to the Site; the sensitivities of the ecological receptors; and the potential for in-combination effects.

All SPAs and SACs within 15km have been considered to assess their ecological pathways and functional links. As acknowledged in the OPR guidelines [67], few projects have a Zone of Influence this large, however the identification of European Designated sites within 15km has become widely accepted as the starting point for the screening process. For this reason, all SPAs and SACs in 15km have been identified for consideration as part of the screening.

Six (6No.) European designated sites were identified within 15km of the Site (Figure 6-2 and Table 6-1). No European designated sites are located within the Site.

Figure 6-2: European Designated sites within 15km of the Site

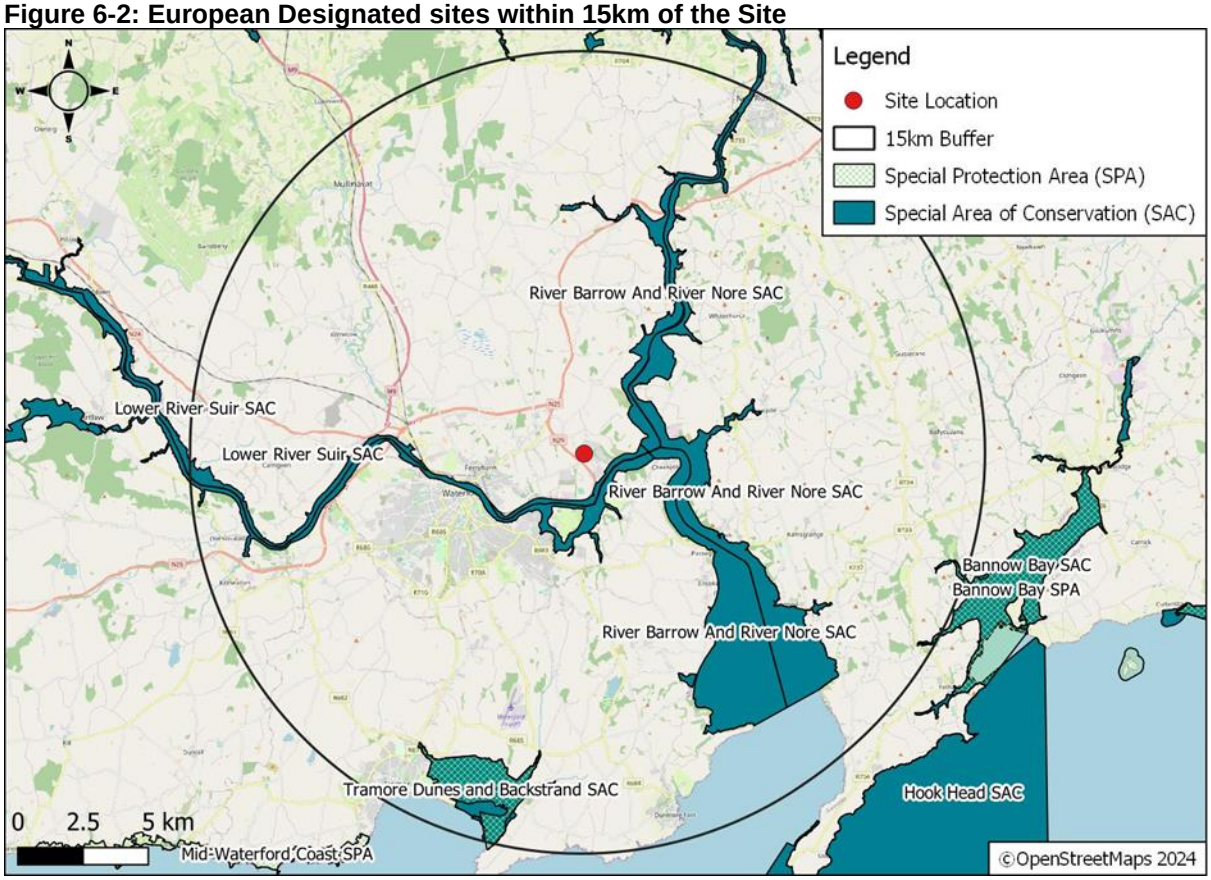


Table 6-1: European Designated sites with 15km of the Site

Site Name	Code	Distance	Direction from the Site
Special Areas of Conservation (SAC)			
Lower River Suir SAC	002137	750m	S
River Barrow and River Nore SAC	002162	1.8km	E
Tramore Dunes and Backstrand SAC	000671	11.1km	SW
Bannow Bay SAC	000697	13.8km	SE
Special Protection Area (SPA)			
Tramore Back Strand SPA	004027	11.1km	SW

Site Name	Code	Distance	Direction from the Site
Bannow Bay SPA	004033	14.4km	SE

Further consideration to the European designated sites listed in Table 6-1 is provided in the NIS that has been submitted as part of the overall planning application.

6.3.1.2 Natural Heritage Areas

The Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) within a 5km radius of the Site have been considered in line with the Kilkenny City and County Development Plan 2021-2027 *Development Management Requirements – Sections 9.2.1.1 – 9.2.1.5* [48].

No NHAs or pNHAs located within the Site or adjacent to the Site; however, there are three (3No.) pNHAs within 5km of the Site, illustrated in Figure 6-3 and described in Table 6-2.

Figure 6-3: Protected Sites within 5km

Table 6-2: Protected Site within 5km of the Site

Site Name	Code	Distance (km) & Direction	Description
Proposed Natural Heritage Areas (pNHA)			
Barrow River Estuary	000698	1.8km E	As per the River Barrow and River Nore SAC.
Kings Channel	001702	2.4km SW	No description available

Site Name	Code	Distance (km) & Direction	Description
Lough Cullen	000406	4.4km NW	Lough Cullen is the only natural lake in south Kilkenny and occupies a low-lying depression 6km north of Waterford. The main interest of the site lies in the flowering plants some of which are rare to the southeast region. Additionally, the Site is also of importance for snipe, curlew, lapwing and mallard during the winter months and an important breeding site for sedge warbler and reed bunting during the summer months

6.3.1.3 Protected Species

Table 6-3 provides a summary of records of legally protected or otherwise notable species held by the NBDC (accessed 12th February 2024) that occur within a 2km grid square of the Site over the last 10 years [53] (Grid Codes: S61L, S61M, S61R, S61S).

The parameter of 10 years was chosen on the basis of habitat and modification, it is considered that any records over 10 years old would not be representative of the current distribution of species populations. In addition, CIEEM's guidelines recommend that consideration be given to the biodiversity conservation value of the species that occur within this zone of influence (as appropriate) [39].

Table 6-3: Protected Species with 2km of the Site

Common Name	Scientific Name	Date of last record[2]	Designation
Amphibian Species			
Smooth Newt	*Lissotriton vulgaris*	28/04/2014	Wildlife Acts 1976 / 2000
Bird Species			
Barn Swallow	*Hirundo rustica*	10/05/2022	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Buzzard	*Buteo buteo*	10/05/2022	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Green List
Eurasian Curlew	*Numenius arquata*	17/07/2016	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section II Bird Species Birds of Conservation Concern Red List
Common Pheasant	*Phasianus colchicus*	10/05/2022	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section I and Annex III and Section I Bird Species
Great Spotted Woodpecker	*Dendrocopos major*	19/12/2022	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Mammal Species			

[2] Note that only species recorded within the past 10 years were included in this table. The parameter of 10 years was chosen to allow for habitat adaption and modification, it is considered that any records over 10 years old are not representative of the current distribution of species populations.

Common Name	Scientific Name	Date of last record[2]	Designation
Eurasian Red Squirrel	*Sciurus vulgaris*	23/02/2016	Wildlife Acts 1976 / 2000
Pine Marten	*Martes martes*	30/06/2020	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex V
West European Hedgehog	*Erinaceus europaeus*	12/10/2021	Wildlife Acts 1976 / 2000
Invasive Species			
American Skunk-cabbage	*Lysichiton americanus*	26/05/2021	Invasive Species: Medium Impact Invasive Species
Japanese Knotweed	*Fallopia japonica*	10/10/2019	Invasive Species: High Impact Invasive Species
New Zealand Pigmyweed	*Crassula helmsii*	07/09/2016	Invasive Species: High Impact Invasive Species
Spanish Bluebell	*Hyacinthoides hispanica*	04/04/2022	Invasive Species: Low Impact Invasive Species

6.3.2 Field Surveys

The following section provides details of the field-based assessments that were undertaken for the Site. The distribution of habitats and target notes identifying the location of features of interest are shown in Figure 6-4.

6.3.2.1 Habitats

Site Context and Surrounding Habitats

The Site is surrounded by agricultural land with treelines and hedgerows, residential properties typically located along the local roads, port related businesses and industrial facilities. Agricultural land borders the Site to the south, north and west, with a small number of residential properties interspersed within the vicinity.

Improved Agricultural Grassland (GA1)

Improved agricultural grassland was the dominant habitat within the Site.

At the time of the survey, these fields were all intensively managed and were species poor habitats. The species were predominantly made up of perennial ryegrass (*Lolium perenne*) and clover species (*Trifolium spp*.).

Mixed Broadleaf Woodland (WD1)

An area of immature woodland was located on the northeastern section of the Site as shown in Figure 6-4. The habitat was comprised of a dense mix of ash (*Fraxinus excelsior*), sycamore (Acer pseudoplatanus), wild cherry (*Prunus avium*), oak (*Quercus spp*.), hawthorn (*Crataegus monogyna*), elm (*Ulmus glabra*) and Scots pine (*Pinus sylevstris*).

Scrub (WS1)

Areas of scrub were recorded within close proximity to the derelict buildings, agricultural shed and associated area of hardstanding within the centre of the Site. Additional sections of scrub

were recorded within the eastern portion of the Site between the agricultural grassland and immature woodland. This area was highly influenced by agricultural practices on the Site.

The species comprised of hawthorn, elm, Laurel (*Laurus nobilis*), elder (*Sambucus nigra*), ash, field maple (*Acer campestre*), hazel (*Corylus avellana*) and rowan (*Sorbus aucuparia*).

Hedgerow / Treeline (WL1 / WL2)

Hedgerows are a key feature of the Site and along with the treelines provide the principle field boundaries. The quality of the hedgerows varies from well-structured and diverse to patchy and sparse.

The hedgerow / treeline comprised of hawthorn, blackthorn (*Prunus spinosa*), holly (*Ilex aquifolium),* wych elm, ash, pedunculate oak (*Quercus robur*), turkey oak (*Quercus cerris*), crab apple (*Malus sylvestris*), sycamore (*Acer pseudoplantanus*), beech (*Fagus sylvatica*), small leaf lime (*Tilia cordata*), wild cherry and plum (*Prunus domestica*).

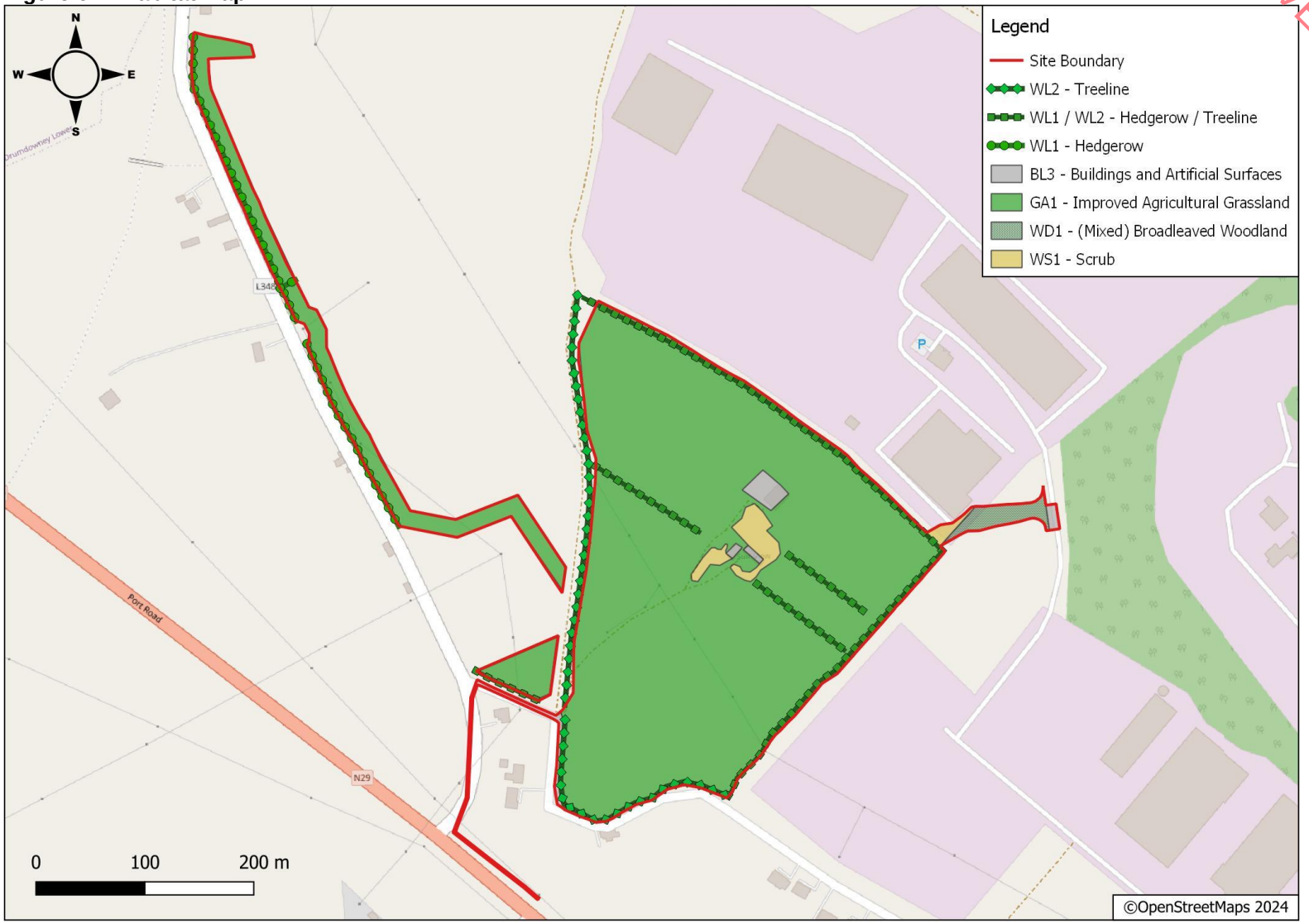
The understorey of these features contained a variety of common species such as nettles (*Urtica dioica)*, broadleaved dock (*Rumex obtusifolius)*, ivy (*Hedera helix)*, brambles (*Rubus fruticosus)*, cow parsley (*Anthriscus slyvestris)*, thistles (*Cirsium spp.).* Refer to Figure 6-4 for details on the locations of hedgerow / treelines.

Buildings and Artificial Surfaces (BL3)

Three (3No.) buildings were identified within the Site –Two (2No.) derelict houses and one (1No.) agricultural shed. Additionally, there was an area of hard standing that was previously used as an agricultural yard associated with the agricultural shed.

The two (2No.) derelict houses located on the Site were not in use and were overgrown with ivy and in poor condition, additional details are presented in Chapter 13. The L7482 local road forms part of the Site boundary.

Figure 6-4: Habitat Map



6.3.2.2 Flora

No plant species protected under the Flora Protection Order were recorded on-site.

6.3.2.3 Fauna

Amphibians

The NBDC holds records of smooth newt within 2km of the Site [53]. This record was from ca. 500m east of the Site within the ponds at Smartply Europe Ltd. However, no observations of the common frog spawn (*Rana temporaria*) or smooth newt *(Triturus vulgaris*) were made within the Site.

Amphibians require static or slow-moving water bodies to successfully lay their eggs and tend to favour shallow areas where they are less susceptible to being preyed on by fish. No waterbodies or drainage ditches were noted within the vicinity of the Site which would provide suitable breeding habitat for amphibians. However, the grassland habitats on-site and within the wider area may be suitable for amphibians during the terrestrial phase of their lifecycle.

Bats

The NBDC does not hold any records of the nine (9No.) resident Irish bat species within 2km of the Site [53]. As per the NBDC landscape suitability metric, the Site and surrounding area is of very high suitability for bats (Landscape Suitability Metric Score for all bats being 43.44).

The Site is located within a predominately rural landscape with areas of open agricultural land, tree / hedge lines both on-site and in the surrounding area.

Bats are known to follow linear features as they commute through the landscape and therefore the sections of continuous hedge / tree line along the boundaries of the Site are considered suitable for this purpose. The tree / hedge lines on-site also have features that are considered to be suitable to support roosting bats species, these features include thick ivy growth, knot holes, cracks, and loose bark. The areas of improved grassland are also considered to provide suitable foraging habitat for bat species.

There were three (3No.) buildings located within the Site boundary – two (2No.) derelict houses and one (1No.) agricultural shed. The two (2No.) derelict houses were not in use and were overgrown with ivy and in poor condition and were considered suitable for this species.

However, the bat surveys undertaken at the Site did not identify any roosting bats within the buildings surveyed. Bats were however identified foraging and commuting over the hedgerow / treelines bordering and traversing Site. Additionally, the static monitoring surveys identified between low and high levels of various bat species within the study area. It was concluded that the Site is of moderate value to foraging and commuting bats.

Please see Appendix 6-1 – Bat Survey Report for full details of the bat survey results.

Badgers

The NBDC holds records of badgers within 2km of the Site [53]. The hedgerows and treelines surrounding and traversing the Site provide suitable foraging habitat and connectivity to the wider landscape. In addition, the areas of agricultural grassland both on-site and within the wider area also provides further suitable foraging habitat for this species. It is therefore considered highly likely that badger utilise this area for commuting and foraging purposes.

[redacted] A camera trap survey was undertaken, with a camera deployed at the entrance of a large mammal hole to confirm the presence / absence of badger. The camera survey confirmed this large mammal hole as an active outlier badger sett and one (1No.) badger entering and exiting this large mammal hole

on more than one occasion during period the period it was deployed. An additional outlier badger sett is known to exist ca. 430m to the north of the Site within an area of woodland along the Millrace.

It should also be noted that during a dusk bat survey on the lands adjacent to the Site, a badger was sighted at TN4, travelling from north to south along the treeline before turning around and travelling back to the north and out of sight.

It is considered that the on-site habitats and the surroundings habitats provide suitable habitats for foraging and commuting badgers. The results of the badger surveys are shown in Figure 6-5 below.

Figure 6-5: Results of the Badger Survey

Bird Habitat Assessment

Winter Bird Habitat Assessment

It is considered that the agricultural grassland fields may provide suitable habitat foraging habitat for wintering birds. However, there are no on-site waterbodies that are considered suitable for wintering waterbirds or wildfowl. In addition, the on-site habitats are common throughout Ireland and within the immediate vicinity of the Site.

Breeding Bird Habitat Assessment

The broadleaved woodland, hedgerow / treelines and areas of scrub were considered to provide suitable nesting and foraging habitat for breeding countryside birds. In addition, the agricultural grassland on-site may provide suitable foraging habitat for breeding birds.

However, there are no waterbodies located on-site and as such it is considered that the Site does not have suitable habitat for breeding waterbirds. In addition, at the time of the Site surveys the agricultural grassland were being utilised for the production of fodder for livestock (i.e., silage production), which may provide suitable nesting habitat for ground-nesting birds.

Breeding Birds

During the breeding bird surveys, a total of twenty-six (26No.) species were recorded:

- Twenty-two (22No.) Green-listed BoCCI non-Annex I species– blackbird, blackcap, blue tit, buzzard, chaffinch, chiffchaff, dunnock, garden warbler, great tit, greenfinch, goldfinch, hooded crow, long-tailed tit, magpie, pheasant, pied wagtail, robin, rook, song thrush, stonechat, woodpigeon and wren;
- Three (3No.) Amber-listed BoCCI, non-Annex I species were recorded - barn swallow, goldcrest and lesser black-backed gull; and,
- One (1No.) Red-listed BoCCI, non-Annex I species was recorded – swift.

Of the species recorded three (3No.) were classified as '*Confirmed Breeding,*' buzzard, goldfinch and barn swallow. An active buzzard nest was noted in the hedgerow / treeline, goldfinch chicks were heard calling from a hedgerow and a barn swallow nest was noted in the agricultural shed. In addition, fifteen (15No.) other species were classified as '*Possibly Breeding'* and eight (8No.) species were classified as non-breeding.

Please see Appendix 6-2 – Bird Report for full details.

Otter Habitat Assessment

The NBDC holds no records of otter within 2km of the Site and no evidence of otter were noted during the Site surveys. Additionally, no suitable habitats were identified within the Site or in the vicinity of the Site for holting, foraging or commuting otters. The Site was not considered to be suitable to support otters.

Other Species

The NBDC holds records other protected species within 2km of the Site, including Eurasian red squirrel, pine marten and western European hedgehog [53]. The nearest record of the Eurasian red squirrel is on the opposite side of the River Suir and it is not considered likely that these individuals would be able to reach the Site. However, both pine marten and western European hedgehog have been recorded within the immediate vicinity of the Site. None of these were recorded within the Site surveys, however, the on-site habitats and the habitats within the immediate vicinity are considered suitable for supporting these species.

During the Site surveys, mammal runs were noted around and traversing the Site. Evidence of other species utilising the Site including rabbits, foxes and sika deer were noted in the form of visual sightings and droppings around the Site. Additionally, the on-site habitats provide suitable foraging habitats and connectivity to the wider landscape for a range of commonly occurring species such as those listed above as well as field mice, shrews, stoats and hares.

Invasive Species

The NBDC holds records of five (5No.) invasive species within 2km of the Site [53]. However, of these species only two (2No.) are considered to be high impact invasive species – Japanese Knotweed and New Zealand Pigmyweed. No invasive species were recorded during the Site surveys.

6.3.3 External Specialist Survey Results

6.3.3.1 Arboricultural Assessment

The arboricultural assessment undertaken concluded that the existing tree population on the Site comprises mature and over mature alder with a limited life expectancy and ash trees that are infected with Ash Dieback, and also have a limited life expectancy. It was identified that the existing on-site hedgerows are sparse in places and are comprised primarily with moderate quality trees. The survey also identified a number of low-quality trees and poor-quality trees.

None of the trees on-site were considered to be high quality trees. An Arborist Report has been provided under a separate cover in support of this planning application and includes the following elements:

- Tree Schedule;
- Tree Constraints Plan;
- Tree Impact & Protection Plan: and,
- Arboricultural Impact Assessment & Method.

6.4 Characteristics and Predicted Impacts of Proposed Development

6.4.1 Sensitive Design

6.4.1.1 Lighting Strategy

Nocturnal mammals are averse to excess lighting, subsequently, impacts could occur as a result of an inappropriate lighting strategy. A sensitive lightening strategy will be implemented across the entirety of the Proposed Development to minimise light spillage from the Site. The lighting plan considers both internal and external sources. This approach will ensure that lighting that will be installed within the Site will be sensitive for local wildlife while still providing necessary lighting for site operations.

The lighting strategy has been designed to minimise against potential impacts on nocturnal species in line with the Bat Conservation Trust (BCT) Guidelines on '*Bats and Artificial Lighting in the UK*' [68]. The lighting strategy which has been designed as part of the Proposed Development involves avoiding excessive lighting. An External Lighting Design Report has been prepared and is attached in Appendix 6-6.

6.4.1.2 Ecological Corridor

The Proposed Development has been designed to avoid and retain the treeline along the western boundary of the Site. This is to protect the ecological corridor running that runs north to south through as illustrated in Appendix 6-4. This ecological corridor provides suitable sheltering and foraging habitat for species within the vicinity of the Site and provides suitable commuting habitat for species such as badgers to the wider landscape. The protection of this ecological corridor and the proposed landscape management plan will provide connectivity to the north, east, west and south of the Site.

6.4.1.3 Landscape Management Plan

A comprehensive Landscape Management Plan will be implemented as part of the Proposed Development. This will also compensate for the previous loss of hedgerow / treeline lost on the Site and as a result of the vegetation clearance required as part of the Proposed Development. The required vegetation clearance on the Site will consist of the following:

- Removal of sixteen (16No.) trees (1,572m^2);
- Removal of four (4No.) groups of trees and scrub vegetation (735m^2);
- Removal of one (1No.) hedgerow (259m); and,
- Removal of a section of immature woodland (1,1562m^2).

This landscape plan comprises a screening planting mix around the northern and western boundary of the Site which will infill and bolster existing hedgerows and trees. Species within this screening planting mix will comprise of a native whip planting mis and advanced nursey stock and will be allowed to grow to reach maturity. Existing hedgerows will also be allowed to grow a minimum of 8m high and will be pruned for width and density.

The grassland will also be managed in a way that promotes species diversity, including measures that allow seed heads to form before mowing takes place. The landscape plan will ensure ecological connectivity on-site.

The species mixes to be planted on-site will be finalised in conjunction with the Project Ecologist. The proposed native hedgerow mix is outlined in Table 6-4 below, and the proposed screen planting mix is outlined in Table 6-5 below.

Table 6-4: Proposed Native Hedgerow Mix

Common Name	Scientific Name	% Mix	Size
Primary Structure			
Alder	*Alnus glutinosa*	60%	90-120cm / 8-10cm girth 3m BR standard trees
Secondary Structure			
Blackthorn	*Prunus spinosa*	15%	90-120cm
Holly	*Ilex aquifolium*	15%	90-120cm
Shrub Species Structure			
Bramble	*Rubus fruticosus*	2.5%	60-90cm
Hazel	*Corylus avellana*	2.5%	60-90cm
Dog-rose	*Rosa canina*	2.5%	60-90cm
Spindle	*Euonymus europaeus*	2.5%	60-90cm

Table 6-5: Proposed Screen Planting Mix Species

Common Name	Scientific Name	% Mix
High Canopy (Dominant)		
Pedunculate oak	*Quercus robur*	<20%
Scots Pine	*Pinus sylvestris*	
Low Canopy (Sub-dominant)		
Alder	*Alnus glutinosa*	20-25%
Downy Birch	*Betula pubescens*	
Wild Cherry	*Prunus avium*	
Understory and fringe (higher shrubs)		
Bird Cherry	*Prunus padus*	20-40%
Hazel	*Corylus avellana*	
Holly	*Ilex aquifolium*	

Common Name	Scientific Name	% Mix
Hawthorn	*Crataegus monogyna*	
Understory and edge (lower shrubs)		
Blackthorn	*Prunus spinosa*	15-25%
Dog-rose	*Rosa canina*	
Spindle	*Euonymus europaeus*	

6.4.2 Identification of Potentially Significant Effects on Identified Receptors

Based on the methodology that is set out in Section 6.2, Table 6-6 sets out the findings of the evaluation of important and legally protected receptors. Each receptor was assessed and a scoping justification for each receptor was provided for the construction and operational phases.

Table 6-6: Scoping Results and Justifications for Habitats and Species within the Site and Receiving Environment

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
Protected Sites				
European Designated Sites	European Communities (Natural Habitats Regulation 1997 as amended)	International Importance	A NIS has been prepared and will be submitted as part of the planning application. The NIS concluded that Proposed Development would not cause any significant adverse effects on any European designated sites or any of their designated features of interest provided the mitigation measures incorporated within the NIS are adhered. The progression to Stage 3 of the Appropriate Assessment process (i.e. Assessment of Alternatives Solutions) was not considered necessary.	European designated sites have been screened out from further consideration as part of the EIAR. See NIS submitted as part of the overall application for full further details.
Nationally Designated Sites	Wildlife Act 2000 (as amended)	National Importance	Nationally designated sites within 5km of the Site were investigated as per the Kilkenny County Development Plan (Sections 9.2.1.1 to 9.2.1.5) [48]. There are no Natural Heritage Areas (NHAs) within 5km of the Site, however, there are three (3No.) pNHAs within 5km of the Site – The River Barrow Estuary, Kings Channel and Lough Cullin. It is not anticipated that the Proposed Development will have any impact on these pNHAs based on the lack of impact pathways and the intervening lands between the Site and these pNHAs.	Natural Heritage Areas have been screened out from further consideration.
Habitats				
Improved Agricultural Grassland (GA1)	N/A	Local Importance (Lower Value)	The majority of the Site is comprised of improved agricultural grassland, which is intensively managed and currently being utilised for the production of fodder (silage) for livestock feed. This is a common habitat type throughout Ireland and provides limited ecological value. This habitat is one of the main habitats that will be lost and is not of significant conservation value and the loss is not considered significant.	This habitat has been screened out from further consideration.
Scrub (WS1)	N/A	Local Importance (Lower Value)	Only small areas of scrub are located on the Site and are located around the existing buildings. The areas of scrub located on the Site are not considered to be of significant ecological value based on their small size and structure and surrounding land use. The areas of scrub do however provide suitable habitat bird species.	This habitat has been screened out from further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
			All vegetation removal on-site will need to account for notable / protected species such as nesting birds, refer to Section 6.5.1.6 for further details. It should be noted that the Landscape Plan, attached as Appendix 6-4, provides details of additional planting on-site that will compensate for the loss of any vegetation removed.	
Mixed Broadleaf Woodland (WD1)	N/A	Local Importance (Higher Value)	During the Site surveys and the arboricultural assessment, an area of mixed broadleaf woodland was identified in the northeastern section of the Site. A dense section of ca. 1,562m^2 will need to be removed to facilitate the new access road into the Site. Based on aerial imagery, this section of woodland was planted ca. 2009. In order to compensate for the loss of this area of vegetation and the loss of the vegetation mentioned below, 10,562m^2 of screening tree planting mix is proposed as part of the Proposed Development, thereby resulting in an overall landscape gain on-site. Mitigation measures will also be implemented to protect and maintain all vegetation to be retained on-site or within the immediate vicinity of the Site, further details can be found in Section 6.5.1.2 and in Appendix 6-3. This habitat was considered to be higher local value for birds and terrestrial mammals and the loss of this habitat has the potential to negatively impact these species. Therefore, this receptor has been screened in for consideration.	This habitat has been screened in for further consideration.
Hedgerow / Treeline (WL1 / WL2)	N/A	Local Importance (Higher Value)	As part of the Proposed Development, vegetation clearance is required refer to Section 6.4.1.3 above. As part of construction works, an arboricultural method statement and Tree Impact and Protection Plan has been prepared with the purpose to provide a system of working to ensure retained trees are protected at all times during construction (Appendix 6-3). Furthermore, in order to compensate for the loss of hedgerow / treeline, landscape planting will be undertaken around the Site. This will include 10,562m^2 of screening tree planting mix, thereby resulting in an overall landscape gain on-site. Mitigation measures will also be implemented to maintain all vegetation to be retained on-site or within the immediate vicinity of the Site, further details can be found in Section 6.5.1.2 and in Appendix 6-3. These habitats are considered to be of high local value for birds, bats and terrestrial mammals and the loss of this habitat around the Site has the potential to negatively impact these species.	This habitat has been screened in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
Buildings and Artificial Surfaces (BL3)	N/A	Local Importance (Lower Value)	The buildings within the Site offer suitable habitat for nesting birds including barn swallows, as outlined in the Appendix 6-2 – Bird Report. Given the presence of suitable nesting habitat within / on the buildings, demolition works need to be undertaken outside of the nesting bird season (see breeding birds below). Nesting boxes for barn swallows will be installed as part of the Proposed Development as outline in Section 6.6.3. The bat surveys did not identify any bats roosting within the building. It is considered that the loss of this habitat will not be significant.	This habitat has been screened out from further consideration.
Flora and Fauna				
Flora	N/A	N/A	No plant species protected under the Flora Protection Order were noted on-site. Overall, the impact of the Proposed Development on both habitats and flora is considered unlikely to be significant.	Flora has been screened out from further consideration.
Amphibians	Wildlife Act 2000 (as amended) EU Habitats Directive Annex V	Local Importance (Lower Value)	The NBDC does hold records for amphibians within 2km of the Site. However, no suitable waterbodies or signs of amphibians were identified on-site. It should be noted that these species are relatively widespread and abundant in Ireland, however, they are of conservational interest and are protected under the Schedule V of the Wildlife Act. The Site is not considered to be of significant value to amphibians given the fact that no suitable waterbodies / drainage ditches for breeding amphibians were recorded within the Site. Nonetheless, should any amphibians be discovered on Site during the construction phase of the Proposed Development, the ECoW will be consulted for advice and any works that have the potential to impact on amphibians will cease until appropriate mitigation measures have been identified and established. Given that there will be no species-specific mitigation measures required for amphibians, this receptor has been screened out from further consideration.	Amphibians have been screened out for further consideration.
Bats	Wildlife Act 2000 (as amended) EU Habitats Directive Annex IV	Local Importance (Higher Value)	<u>Roosting Bats</u> The tree and building inspection identified a number of trees and buildings on-site with bat roost potential. However, following the completion of the emergence, re-entry and transect surveys, no evidence of bats roosting was observed on-site. It was however considered	Bats have been screened in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
			that the Site is of higher local value for bats in the area and that there may be bats roosting within the vicinity of the Site. In order to mitigate against any potential disturbances to roosting bats and to minimise potential impacts on bat species, mitigation measures (Section 6.5) will be put in place during the vegetation clearance works and the construction works. This includes for pre-construction surveys to confirm the current findings that no bats are roosting in the buildings to be demolished or tree's to be removed. Please refer to the Bat Report for full detail, Appendix 6-1. <u>Commuting and Foraging Bats</u> Evidence of commuting and foraging bats was observed on-site during the bat activity surveys. Following the emergence and re-entry surveys completed, it was concluded that the Site is of higher local value for commuting and foraging bats within the local area. Additionally, some species had higher activity levels recorded during the static monitoring surveys. In order to facilitate the Proposed Development, vegetation clearance is required refer to Section 6.4.1.3 above. As bats were identified using the linear features on-site for foraging and commuting purposes, further consideration will be given to the impact of the Proposed Development on foraging and commuting bats within the vicinity of the Site. The Proposed Development also provides opportunities to enhance the Site for bats, and an overall net increase in hedgerow / treelines will be achieved when the plantings detailed in the Landscape Plan become mature on-site. This will result in an increase in the provision of foraging and commuting habitats for bats on-site. This will ensure landscape connectivity for bats and allow them to continue using the existing woodland for foraging and commuting purposes. <u>Lighting Impacts</u> Bats are averse to excessive lighting, subsequently, the installation of inappropriate lighting, resulting in light spillage, has the potential to cause adverse effects to bats and other species within the area. It is important that appropriate lighting is installed for the proposed development and will be completed with sensitivity for local wildlife while still providing the necessary lighting for human usage.	

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
			Therefore, measures will be implemented to minimise potential impacts on bats from the proposed lighting. Overall, given the mitigation measures to be put in place throughout the lifetime of the project, the additional planting detailed in the Landscape Plan, along with the abundance of suitable habitat within the surround area it considered unlikely that foraging and commuting potential for bats will not be significantly impacted due to the Proposed Development.	
Badgers	Wildlife Act 2000 (as amended)	Local Importance (Higher Value)	The NBDC holds records of badgers within 2km of the Site. Furthermore, the hedgerows and treelines surrounding and traversing the Site provide suitable foraging habitat and connectivity to the wider landscape. As outlined in Section 6.3.2.3, evidence of badger was identified on-site. Outlier Sett [redacted] the outlier sett. This will be sought prior to the construction phase of the Proposed Development. To mitigate for the closure of the outlier badger sett, an artificial badger sett will be installed along the southern boundary of the Site within the landscaped areas. This will be installed along with the proposed landscaping prior to any works taking place within [redacted] The Proposed Development will result in the loss of areas of agricultural grassland and immature woodland that are both suitable for foraging and commuting badgers. However, given the availability of similar habitat within the adjoining lands and with the successful implementation of the landscape plan, it is not considered that the loss of these habitats would be significant. In addition, as part of the Proposed Development and the wider area, a landscape masterplan has been developed for the Site and the surrounding lands to ensure that ecological corridors and linkages are protected, maintained and enhanced. As part of the landscape design, sections of hedgerow and fencing will be installed to guide badgers into linear habitats around the perimeter of the Site.	Badger have been screened in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
			Given the badger activity within the Site, and the presence of an outlier badger sett, there is potential for this species to be disturbed or to become entrapped in trenches / excavations without appropriate measures put in place. In order to prevent or minimise impacts on non-volant mammals, including badgers, mitigation measures will be adhered to throughout the duration of the works, as discussed in Section 6.5.1.5. Badgers are nocturnal species and therefore, have the potential to be adversely affected by inappropriate lighting systems, for example, light spillage into valuable habitats adjacent to the Site. A lighting plan has therefore been developed to minimise any potential adverse effects to badger during the operational phase, refer to Section 6.5.2.1 for details.	
Birds	Wildlife Act 2000 (as amended)	Local Importance (Lower Value)	<u>Breeding Birds</u> The Site is considered to provide suitable nesting habitats for breeding birds through the treelines / hedgerows, on-site buildings and scrub, and provides suitable foraging habitats for breeding birds through the agricultural grassland, scrub and hedgerow / treelines. However, these habitats are abundant within the wider area, and it is considered that the Site is not a site of significant importance for breeding birds. During the surveys, three (3No.) species were confirmed to be breeding within the survey area – two (2No.) species within the hedgerow / treeline and one (1No.) species within the agricultural shed. In addition, fifteen (15No.) species displayed territorial behaviours that were classified as possibly breeding within the hedgerow / treelines. The majority of birds identified within the study area were observed within the hedgerows / treelines and woodland for nesting / possible nesting and were observed foraging within the agricultural grasslands. These habitats are common throughout the wider landscape. No ground nesting bird species were recorded during the surveys and no species were noted utilising silage or scrub habitat for nesting purposes. Although some bird species were noted foraging within the agricultural grassland, due to the intensive management of the land and field being mowed several times during the summer months it is considered that this habitat is of limited ornithological value. Overall, the Site is not considered to be of importance for breeding species. In order to facilitate the Proposed Development, vegetation clearance is required refer to Section 6.4.1.3 above. The Proposed Development will also require the demolition of the on-site buildings including the agricultural shed. Therefore, although the majority of the on-site hedgerows / treelines	Breeding birds have been screened in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
			will be retained and protected, mitigation measures will be required in order to ensure no impacts occur to breeding birds during the vegetation removal and demolition works (see Section 6.5.1.6). However, it should be noted that in order to compensate for the previous removal of hedgerow / treeline and the vegetation that will be removed as part of the Proposed Development, landscaping planting of include 10,562m^2 of screening tree planting, as outlined the landscape plan. <u>Wintering Birds</u> It is not considered that the Site is of importance for wintering bird species based on the desk-based assessment and the habitats present on-site. Wintering waterbird and wildfowl species tend to preference habitats similar to those present along the River Suir and the Waterford Estuary including mudflats, marshlands and coastal grasslands, all of which are located within the wider area. Therefore, it is considered that wintering waterbird species would be likely to utilise these areas as opposed to the on-site habitats. In addition, the on-site habitats may provide suitable foraging and roosting habitat for wintering countryside bird species; however, given the abundance of this habitat within the wider area, it is considered that the Site is not a site of importance for wintering bird species. Overall, the required vegetation clearance and loss of agricultural grassland on-site may result in a loss of foraging grounds to wintering bird species. However, the implementation of the landscape plan will provide suitable replacement habitat for these species. Therefore, based on the desk-based assessments, it is considered that the Proposed Development will result in a negligible impact on wintering bird species. <u>Disturbance</u> It is not considered that the Proposed Development will have a significant impact on birds given the nature of the habitats present on-site as well as the type of farming activities being undertaken on-site and the industrial activities within the wider area. Although, birds may be subject to some temporary disturbance during construction, this is not considered likely to be significant given the fact that birds are highly mobile and therefore will move away from disturbances. As such, it can be concluded that should any birds be disrupted during any of the works they will move to a suitable area elsewhere.	

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Screening Result
Otter	Wildlife Act 2000 (as amended) EU Habitats Directive Annex IV	N/A	The NBDC holds no records of otter within 2km of the Site in the last 10 years [69]. Additionally, no suitable habitats for otters were identified within the Site boundary and no signs of otters in the form of spraints, paw prints or holts were identified. The Site surveys did not identify any above ground hydrological connections to watercourses within the vicinity of the Site and that contain suitable habitats for otters. However, a section of the Site will be connected to the Drumdowney Lower stream via a proposed hydrological connection. Therefore, general mitigation measures will be implemented on-site in relation to water quality, this will ensure no potential impacts on otters occur which may be utilising the wider area or downstream of the proposed drainage connection. No species-specific mitigation measures will be implemented as part of the Proposed Development.	Otters have been screened out from further consideration.
Other Fauna	N/A	Local Importance (Lower Value)	During the on-site surveys undertaken on the Site and on the adjoining lands, evidence of other fauna species such as red fox, European rabbit and sika deer in the form of prints, droppings and sightings. Additionally, suitable habitats for these species were recorded within the Site and the adjoining fields. In addition, as noted in chapter 8 – water and the NIS, there is a hydrological link between the Site and the River Suir. Given the presence of a hydrological link, this receptor has been brough forward for further consideration see 6.5.1.1 below. Therefore, standard protection measures for these species will be implemented as part of the Proposed Development, as outlined in Section 6.5.1.5.	Other fauna have been screened in for further consideration.
Invasive Species	N/A	N/A	No invasive species were noted within the study area. However, as a precautionary approach this receptor has been screened in to ensure that no invasive species are introduced to the Site during the construction phase of the Proposed Development. Standard biosecurity measures will be implemented on-site during the construction phase in order to mitigate against the unintentional introduction of invasive, see Section 6.5.1.7.	Invasive species have been screened in from further consideration.

6.4.3 Summary of Potential Impacts

Following a detailed assessment, the following species and habitats were identified as significant receptors and were brought forward for further consideration, see Section 6.5.1 and 6.5.2 below:

- Hedgerows / Treelines;
- Nocturnal Species (Bats);
- Breeding Birds;
- Terrestrial Non-volant Mammals (Badger and Other Fauna);
- Invasive Species; and,
- Other Fauna Species.

As per the scoping justification outlined in Table 6-6, further consideration was required for each of the receptors listed above in order to develop appropriate mitigation to protect these receptors and avoid impacts arising from the Proposed Development refer to Section 6.5 below for further details.

In addition to the receptors listed above, general mitigation / best practice measures have been included for the Proposed Development. Mitigation Measures

The following mitigation measures will be incorporated and adhered to during the construction and operations phases of the Proposed Development to ensure that the works do not result in contravention of wildlife legislation.

6.5 Mitigation Measures

6.5.1 Construction Phase

During the construction phase, all works will comply with all relevant legislation and best practice to reduce any potential environmental impacts.

A detailed Construction Environmental Waste Management Plan (CE&WMP) has been prepared as part of this planning application and will be updated by the appointed main contractor and will be re-submitted to the planning Authority in advance of works commencing at the Site. The contractor shall ensure that all personnel working on-site are trained and ware of the measures detailed within the CE&WMP.

The following guidance will be referred to and will be followed during the construction phase of the project to prevent water pollution and impacts on flora and fauna that may occur within the area:

- CIRIA C741 – Environmental Good Practice on Site (4th edition) [17];
- CIRIA C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [18];
- CIRIA C753 – The SuDS manual [19];
- Guidelines for Treatment of Badgers Prior to the construction of National Road Schemes [22]; and,
- Guideline on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads [23].
- Guideline on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads [23].

The following mitigation measures will be incorporated and adhered to in order to ensure that the proposed works do not result in any contravention of wildlife legislation:

- All activities will comply with all relevant legislation and best practice to reduce any potential environmental impacts. The mitigation measures detailed within this EIAR and the NIS will be fully adhered to;
- An ecological clerk of works (ECoW) will be appointed for the duration of the project;
- The ECoW will either deliver or provide the resident engineer with sufficient environmental information to deliver a Site induction to all personnel working on-site. All personnel working on-site will be trained and made aware of the mitigation measures detailed within this EIAR, the CE&WMP and NIS;
- The ECoW will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works, to ensure that all of the works are completed in line with the mitigation measures detailed within this EIAR, the NIS and the CE&WMP;
- If protected or notable species are encountered during the operations at the Site, the ECoW will be contacted for advice;
- Protected and notable species posters will be erected on the Site notice board and maintained throughout the duration of the works; and,
- In advance of works, all Site personnel will receive a toolbox talk regarding notable and protected species. Everybody working on-site must understand the role and authority of the ECoW.

6.5.1.1 Protection Measures for Water Quality

Mitigation measures will be put in place in order to ensure that the construction and operational phase of the Proposed Development will not result in any deterioration to local water quality and subsequently no adverse effects to species and habitats downstream of the Site.

Measures to ensure the protection of water quality will be implemented as outlined in the accompanying NIS and in Chapter 8 (Water).

6.5.1.2 Protection for Hedgerows / Treelines

As part of the Proposed Development an Arboricultural Method Statement and Tree Impact and Protection Plan has been prepared that should be read in conjunction with this report. The purpose of these statements will be to provide a system of working to ensure retained trees will be protected at all times during construction. The Applicant is committed to ensuring compliance with all of the recommendations outlined in the arboricultural method statements.

As outlined in Section 6.4.1.3 above and illustrated in Appendix 6-3, the Proposed Development will require the removal of following vegetation.

All other trees will be retained and protected from unnecessary damage in line with Objectives 9A and 9B, and Section 9.2.5 of the KCDP. During construction, care will be required to protect trees and hedgerow from both direct and indirect disturbance. As outlined in the Arboricultural Method Statement the following protection measures will be adhered to during the works:

Tree Protective Fencing

- *'A protective fence will be erected around retained trees, prior to the commencement of materials or machinery being brought onto site, removal of soil or any form of construction. The area within this fencing will form the construction exclusion zone (CEZ) and it will be afforded protection at all times. No works will be undertaken within this zone that causes compaction to the soil, severance of tree roots or damage to tree canopies;*
- *The fence is to be sited in accordance with the Tree Impact & Protection Plan submitted as part of the Planning Application;*

- *Details of the minimum distance for fencing from trees can be found in the Tree Schedule submitted as part of the Planning Application;*
- *The area within this fencing will form the CEX and it will be afforded protection at all times. No works will be undertaken within this zone that causes compaction to the soil, severance of tree roots or damage to tree canopy;*
- *Details of the minimum distance for fencing from trees can be found in the Tree Schedule submitted as part of the Planning Application;*
- *The precise form of fencing can vary provided it is fit for purpose and prevents* damaging activities within the CEZ. For a proposal of this nature, a number of *fencing/protection solutions will be required including the Heras 151 system of fencing, timber boards and hessian sacking wrapped in chestnut cleft pale;*
- *The fences will have signs attached to it stating that it defines a CEZ and that no works are permitted beyond it and will remain in place for the duration of the works to prevent accidental disturbance and define the limits for construction vehicles and other construction staff;*
- *The protective fencing may only be removed following completion of all construction works; and,*
- *The following principles will be adopted by site personnel within the CEZ during construction, to ensure protection of retained trees:*
    - *No level changes.*
    - *No excavations.*
    - *No fires.*
    - *No use of herbicides.*
    - *No storage of materials, machinery or access for construction workers.'*

Site Compounds & Facilities

- *'Site compounds and facilities will be located outside of all Root Protection Areas (RPAs) and CEZs as identified on the Tree Impact and Protection Plan (TIPP).'*

Site Cranes and Machinery

- *'The location of all equipment should be sited outside of RPAs to avoid soil compaction.'*

Pollution Control

- *'Any storage or mixing station located outside of the construction exclusion zone will be located in a place that minimises the risk of contaminated runoff entering to prevent adverse physiological impacts on trees that may result from contact with rooting environments. This may be achieved by using a non-permeable membrane on the ground, surrounded by sandbags or sawdust to contain any spillage.'*

Temporary Ground Protection

- *'Where it is not practical to protect RPAs by use of protective fencing, BS5837 allows for the fencing to be set back and the soil shielded by ground protection. A range of methods can be used including retaining existing hard surfaces or structures that already protect the soil, installing new temporary surfaces, or a combination of both. Whatever the choice of method, the end result must be that the underlying soil remains undisturbed and retains the capacity to support existing and new roots;*

- *If fences need to be set back on a temporary basis, the following specifications will be implemented for temporary ground protection to protect roots and soil:*
    - *For pedestrian traffic, a plywood board with a minimum thickness of 40mm will be laid on a minimum of 100mm deep woodchip, with geotextile membrane beneath;*
    - *For small plant machinery with a gross weight of up to 2 tonne, interlinking aluminium or composite tracks with sufficient load bearing capacity will be laid on a minimum of 150mm deep woodchip, with geotextile membrane beneath;*
    - *For heavy machinery with a gross weight of up to 3.5 tonne, interlinking aluminium or composite track with sufficient load bearing capacity will be laid over a minimum layer of 200mm deep woodchip, with a geotextile membrane beneath;*
    - *For weights above 3.5 tonne a specialist temporary ground protection will be used that is capable of both supporting the required loads whilst providing protection to RPAs;*
    - *Any temporary protective surfaces will remain in place until all construction activity will be finished;*
    - *Upon completion of construction works, the temporary ground protective measures will be removed working backwards from on top of the system. This will need to be done carefully ensure that there is no excavation or compaction of the original surface or change in ground levels; and,*
    - *Once this material has been removed vehicular access to this part of the site will not be permitted.'*

Working within the Root Protection Area

- *'All excavation will be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air such as an Air Spade may be an appropriate alternative to hand digging, if available;*
- *All soil removal will be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of small roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage;*
- *If digging by hand, a fork will be used to loosen the soil and help locate any substantial roots. Once the roots have been located the trowel will be used to clear the soil away from them without damaging the bark. Exposed roots that are to be removed will be cut cleanly with a sharp saw or secateurs 100-200mm behind the final face of the excavation; and,*
- *Roots temporarily exposed will be protected from direct sunlight, drying out and extreme temperatures by appropriate covering. Roots greater than 25mm in diameter will only be cut in exceptional circumstances. Roots greater than 100mm in diameter will only be cut after consultation with the project arboriculturist.'*

Upgrading Existing Surfaces

- *'Where upgrading of existing hard surfaces will be required, the preferred option will be to leave the surface in place and install the new surface specification on top;*

- *If the retained surface is impermeable, it may be appropriate to remove or puncture sections to create a more favourable environment for roots beneath, before the new surface is laid, through consultation with the project arboriculturist;*
- *Where the existing surface is to be removed or upgraded, the surface layer will be excavated down the existing subbase and the new surface specification installed on top, to prevent any damage to roots beneath;*
- *It is recommended that where possible, new and upgraded hard surfaces will be porous (e.g. permeable brick paving, porous resin bound aggregate or tarmac) to allow the flow or water and oxygen to roots. Wet concrete should only be poured if an impermeable geotextile fabric has first been installed to prevent soil contamination from toxic leachate; and,*
- *New surfaces and upgraded surfaces will be set back from the base of stems by a minimum of 500mm to allow space for future growth and minimise the risk of distortion with new surface.'*

Services Routes

- *'All services and utilities will be installed within existing service routes and where possible outside of RPAs;*
- *Where installation of utilities or services is required within RPAs, working practices will be adopted in accordance with the National Joint Utilities (NJUG) 10, Vol 4, Issue 2, 2007 'Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees';*
- *In accordance with 4.1.3 of NJUG 10 2007, acceptable techniques in order of preference include: a) Trenchless; b) Broken Trench; and c) Continuous Trench. Trenchless methods involve the use of thrust boring machinery, whilst broken and continuous trench methods require that excavations within RPAs will be carried out using hand tools only; and,*
- *For a proposal of this nature, broken or continuous trench methods are the most appropriate and will be employed as per NJUG 10, to prevent any damage to tree roots or disruption to soil rooting environments.'*

Soft Landscaping

- *'To avoid damage to existing tree roots and prevent soil compact, any machinery used to remove the existing surface and ground vegetation for purposes of soft landscaping (e.g. seeding new lawns or laying turf) will be sited outside of RPAs. If this is not possible, hand tools must be used;*
- *The removal of the surface layer with RPAs must not exceed 50mm, to prevent exposure and damage of tree roots beneath;*
- *Soft landscaping works must not involve raising or lowering of the existing ground level within any RPA as this can starve roots of oxygen and cause irreversible physiological damage to trees;*
- *The use of rotavators within RPAs will be prohibited; and,*
- *Any level changes outside RPAs must be graded to marry existing soil levels within RPAs.'*

It is the responsibility of the main contractor to ensure that all site personnel fully understand the tree protection measures on the Site, that tree protection measures will be adhered to at all times, and that the project arboriculturist will be contacted if there are any issues related to trees.

6.5.1.3 Protection of Bats during the Felling of Mature Trees

In order to ensure that vegetation clearance works in relation to the Proposed Development do not have a significant impact on bats, the following procedures and mitigation measures will be implemented as part of the Proposed Development:

- In advance of construction commencing, updated bat inspections will be required to confirm the presence / absence of roosting bats within the trees due to be removed as part of the Proposed Development;
- Trees to be removed onsite will be removed under the supervision of the ECoW and will be felled using hand tools only. The ECoW will visually inspect the trees following the feeling for the presence of bats;
- Felled trees will be pushed gently to allow potential bats within to become active. Felled trees will then be left in place for at least 24 hours to allow bats to escape before removal offsite;
- If bats were to be found to be roosting within the trees, further measures will be considered in order to protect bats against disturbance and the NPWS will be consulted for advice and a derogation licence will be obtained, if required; and,
- The management and removal of trees at the Site will be undertaken in a systematic way to ensure that retained trees will not be damaged by the works.

6.5.1.4 Landscape Mitigation Plan

A Landscape Plan has been prepared showing planting locations and include a schedule of proposed planting and trees, attached as Appendix 6-4.

This comprehensive plan has been specifically designed to maintain a degree of connectivity to the wider landscape through the retention of hedge line / treeline where possible along with additional planting. The additional planting will be introduced on-site to compensate for the removal of vegetation during the Site clearance works. An area of ca. 10,562m^2 planting will be included in the Landscape Plan. This landscaping will incorporate into an overall Master Landscape Management Plan for the wider area and will connect into the ecological corridor and berms that are proposed to be both enhanced / planted as part of an adjoining development KCC Planning Ref: 2360426.

Further details on the Landscape Plan be found in Appendix 6-4.

6.5.1.5 Protection Measures for Nocturnal Species

Nocturnal species are averse to excessive lighting, subsequently, impacts could occur as a result of an inappropriate lighting strategy. Therefore, it is important that lighting installed for the Proposed Development will be completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. The following measures will be implemented during the construction phase:

- Construction should be limited to daylight hours in order to minimise adverse effects on nocturnal fauna;
- Avoidance of excessive lighting;
- Light Emitting Diodes (LED's) will be used, and the brightness will be set as low as possible;
- Lighting will be aimed only where it is needed, with no upward lighting;
- Lighting will be directed away from landscaped areas and retained sections of hedgerows, treelines and mature parkland trees;
- Lighting should be turned down / off when not required;

- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct light only where it is needed; and,
- The height of lighting columns should be reduced as much as possible, as lighting at a low level further reduces ecological impact.

6.5.1.6 Protection Measures for Non-Volant Mammals during Construction

Evidence of badgers were identified during the Site visits. Overall, it was concluded that the Site provides suitable foraging, commuting and sett construction habitat for badger.

Therefore, it is reasonable to conclude that badger and other terrestrial mammals could inadvertently enter and utilise the Site. As such, in order to ensure that works in relation to the Proposed Development will not have significant impacts on mammals, general construction procedures and mitigation measures, which are in line with the NRA '*Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes'* [22] will be undertaken.

- Prior to the commencement of construction on the Site, consultation with the NPWS regarding the outlier badger sett and updated surveys will be undertaken. The survey area will cover the Site and an area extending to 150m around areas where blasting or piling work may be required;
- Should the outlier badger sett or any other setts still be in use and identified as being active, a sett closure licence will be required from the NPWS prior to the commencement of construction;
- Appropriate mitigation measures will be implemented in line with the NRA '*Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes'* [22] and an artificial badger sett will be provided for within the vicinity of the Site at least six (6No.) months in advance of any sett closures. Further details are outlined in Section 6.6.1;
- As per NRA '*Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes'* [22]:
    - There will be no heavy machinery used within 30m of sett entrances;
    - Lighter machinery will not be used within 20m of sett entrances;
    - Light works including clearing of scrub or vegetation will not be undertaken within 10m of sett entrances; and,
    - During the breeding season (December to June) no works will be undertaken within 50m of the sett entrance, nor blasting or pile driving within 150m of the sett entrance.
- Where deep excavations will be required on-site, appropriate measures to protect mammals from ingress will be installed;
- Should construction works be required outside of daylight hours during the site clearance works, the appointed project ecologist will be consulted as required;
- The buildings and loose piles of woody debris on-site will be cleared in a systematic way under the supervision of the ECoW; and,
- If unidentified burrows or setts are identified within the works area during construction, works will cease within the area and the project ECoW will be contacted for advice.

6.5.1.7 Protection Measures for Breeding Birds

In order to ensure that no disturbances occur to breeding birds, the following measures will be implemented:

- Given the presence of barn swallow nesting within the agricultural shed, prior to demolition works a suitably qualified ECoW will inspect the shed and other buildings to ensure that there are no active nests;
- The demolition of the on-site buildings will take place outside the breeding bird seasons (1st March to 31st August);
- Vegetation clearance works will take place outside the breeding bird season (1st March to 31st August). This is as per Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amended) Act 2000, which states that the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated lands or hedgerows or ditches will be restricted during the besting and breeding seasons for birds and wildlife;
- In the event that demolition or vegetation clearance works need to be undertaken within the main breeding season, the following measures will be implemented:
    - The project ECoW will consult with the NPWS;
    - Prior to vegetation clearance on the Site, the project ECoW will inspect the Site; and,
    - In the unlikely event that birds nest within the active working area during the works, all works will cease with immediate effect and will not resume until the project ECoW has been consulted.

Following the implementation of above-mentioned mitigation measures it is considered unlikely that birds will be significantly impacted as a result of the Proposed Development. However, it should be noted that birds may be subject to some temporary minor disturbances during construction. However, as birds are a highly mobile species, should any birds be impacted, these birds will move away from the disturbance to a more suitable area. Therefore, this is not considered likely to be significant.

6.5.1.8 Biosecurity Measures for Invasive Species

No invasive species were identified on-site. However, in line with the *Development Management Requirements for Invasive Species* in Section 9.2.10 of the KCDP the following biosecurity considerations will be implemented on-site to ensure that no invasive species are introduced:

- All vehicles, machinery and any other equipment that may be used for the works will be washed and cleaned as required prior to being used on the Site to prevent the import of plant material / seeds;
- Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed;
- Any vehicles and machinery that are not clean will not be permitted entry to the Site;
- All materials to be imported to the Site including additional planting will be sourced from a reputable supplier and records of all material / supplies to the Site will be maintained;
- In advance of works, all site personnel will receive an induction regarding invasive species; and,
- Everybody working on-site must understand the role and authority of the ECoW managing the issue of the non-native species.

6.5.2 Operation Phase

6.5.2.1 Measures for Nocturnal Species – Lighting Strategy

The lighting design for the Proposed Development has been revised where possible to reduce lux levels and remove any excessive lighting associated with the Proposed Development. This included the following:

- Reducing the number of lights associated with the Proposed Development from 115 No. lights to 99No., a reduction of over 15%;
- Lighting along the southern boundary has also been revised so that all lighting along the southern boundary is facing inwards towards the building; and,
- Lux levels have been kept to a minimum with the average lux level across the Site ranging from 0.88lx to 1.48lx, as described above.

The proposed lighting design has been designed to reduce the potential to negatively impact light sensitive bat species, such as brown long-eared bats and *Myotis* species, along the northern and western boundaries, however, the lux levels beyond the immediate vicinity of the Site will be significantly lower. Additionally, levels along the southern and eastern boundary will be kept below an average of 1lx, minimising any potential impacts on light sensitive bat species.

However, it should be noted that the majority of the activity recorded onsite were attributed to common pipistrelle, followed by soprano pipistrelle and Lesiler's bats, which are considered to be less sensitive to light pollution than brown long-eared bats and *Myotis* species.

Following the installation of the lighting associated with the operational phase of the Proposed Development, a suitably qualified and experienced ecologist will undertake a further Site inspection to inspect the lighting patterns and lux levels along the hedgerows / treelines on the Site and the findings will be presented to the planning authority.

6.6 Ecological Enhancement Measures

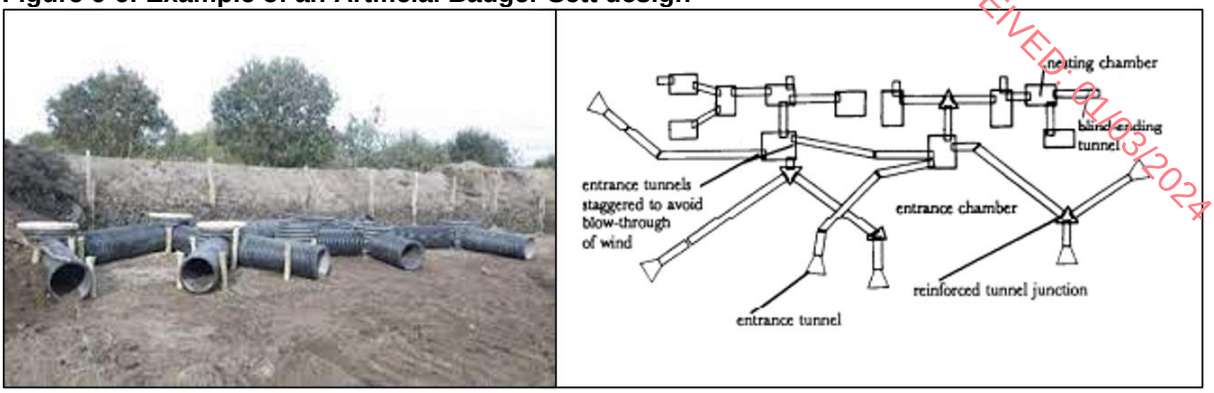
6.6.1 Artificial Badger Sett

Given that a sett closure licence will be required for the outlier sett within the vicinity of the Site, it is proposed that an artificial badger sett will be constructed in the vicinity of the Site. The location of this will remain confidential for its protection and discretion. This artificial badger sett will be constructed six (6No.) months in advance of the sett closure of the outlier badger sett. During this period, badgers will be attracted to utilise the artificial badger sett using means of attractive bait and bedding materials, as outlined in the NRA guidelines [22].

The design and construction of the artificial badger sett will be in line with the guidelines set out by the NatureScott guidelines [70] and agreed upon with the NPWS prior to seeking a sett closure licence. The timing of the artificial sett construction will be limited to outside the breeding season (June to November, inclusive). Guidance for the creation of Artificial Setts [70] can be found in Appendix 6-5.

Examples of potential designs of the artificial badger sett can be found in Figure 6-6.

Figure 6-6: Example of an Artificial Badger Sett design



6.6.2 Measures for Bats

Hedgerows / treelines are a linear habitat that provide continuous pathways across the Site, which provides a suitable commuting corridor / foraging habitat for bats. The majority of these features will be protected as part of the Proposed Development, as outlined in Section 6.5.1.2 and suitable habitats will be created as part of the screening planting.

Artificial bat boxes will also be erected on suitable trees within the Site. These will be placed in a position sheltered from strong winds or in locations exposed to the sun for parts of the day. The objective will be to create roosting habitat, along with the creation of a species rich habitat which will create an abundance of invertebrate life, which will be beneficial to the local bat population.

The bat boxes will be located in / close to linear features such as treelines and will be placed a minimum of 2m above the ground. The number and location of these bat boxes will be specified by an ecologist during the construction phase and their locations will be submitted to the planning authority. Additionally, these will be annually inspected and the results of which will be provided to the Planning Authority.

Figure 6-7 below shows suitable bat roost box examples including a pole mounted bat box, bat box Schwegler 1FF and Vivara Small Bat Box.

Figure 6-7: Examples of suitable bat boxes

6.6.3 Measures for Birds

A variety of bird nest boxes designed to attract a variety of nesting bird species will be erected on suitable trees within the Site. The creation of nesting habitat, along with the creation of species rich habitat will encourage an abundance of invertebrate life (a potential food source) will be beneficial to local birds. Refer to examples provided in Figure 6-8.

An example is the 1B Schwelger Nest Box - This nest box will attract a wide range of species and is available with different entrance hole sizes to prevent birds from competing with each other for the boxes.

Different bird species require difference entrance sizes as outlined below:

- The circular 26mm entrance hole suits blue, marsh, coal, and crested tit and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole;
- The circular 32mm entrance hole will attract great, blue, marsh, coal and crested tit, redstart, nuthatch, collared and pied flycatcher, wryneck, tree, and house sparrow;
- The 45mm entrance hole will attract starling; and,
- Open-fronted nest boxes will attract robins, wrens, pied and grey wagtail, song thrush and blackbirds.

The exact location of the bird boxes will be determined by an experienced ecologist after the completion of the construction phase. This will be to allow the ecologist to assess the exact conditions that have been created and thus to ensure that the bird boxes will be sited in the most appropriate location possible. However, bird boxes will be installed to be facing between north and south-east to avoid strong winds, rain, and sunshine. In addition, bird boxes should be tilted slightly forward to ensure that rain runs off the top and there should be a clear flight path to access the nestbox hole. Also, bird boxes with a hole should be placed ca. 2-4m off the ground, whereas open-fronted bird boxes should be placed lower than 2m among dense vegetation where predators will not easily see it.

It should be noted that the distance between nest boxes can vary. Species such as house sparrow and starling have a preference for nesting in colonies and therefore the bird boxes should be placed closer to each other, whereas species robins and tits can be highly territorial and therefore the nest boxes should be separate by a greater distance.

Additionally, these bird boxes will be subject to annual inspections and the results of which will be provided to the planning authority.

Figure 6-8: Variety of Bird Box Designs to Accommodate a Diversity of Species

Additionally, given that barn swallows were confirmed to be breeding with the agricultural shed on the Site, suitable alternate habitat will be provided as part of the Proposed Development. This will be through the installation of swallow nest in appropriate locations around the Site. Examples of swallow cups and swallow / swift nest boxes are shown in Figure 6-9.

The number and location of these boxes will be specified by the ECoW during the construction phase and their locations will be submitted to the Planning Authority. Additionally, these nest boxes will be subject to annual inspections and the results of which will be provided to the Planning Authority.

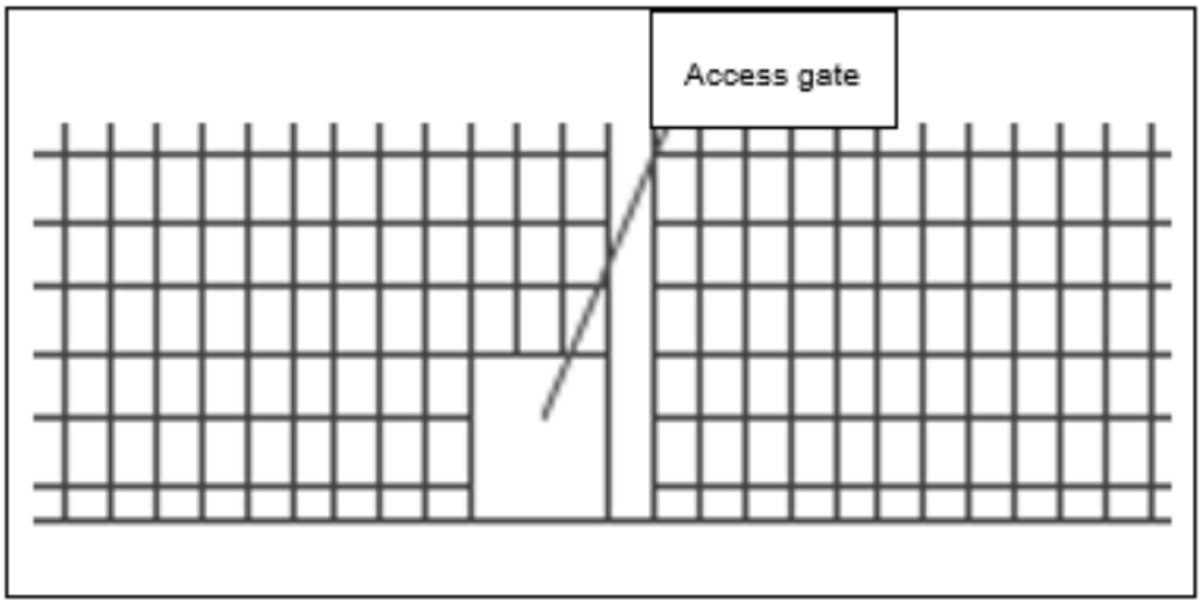
Figure 6-9: Examples of Swallow Nesting Cups / Boxes

6.6.4 Mammal Gates

There will be a requirement for security fencing along the northeastern boundary of the Site where Site access will be possible from the road. Two-way mammal gaps will be installed approximately along the perimeter fencing. Sections of the fencing will be raised or will include 'access gates' (300mm x 150mm) which allow small mammals to move freely across the Site. The 'access gates' will be suitably located at points along the perimeter fence in order to ensure connectivity for small mammals such as rabbits, badgers and foxes.

Additional mammal gates will also be located along identified mammal runs to ensure that these establish routes are not disrupted. Figure 6-10 provides an example of a mammal gate.

Figure 6-10: Mammal Gate Example



6.7 Cumulative and In-Combination Impacts

Following a review of the files on Kilkenny County Planning website, there are a number of projects that have been identified within the locality that have the potential to have an in-combination impact with the Proposed Development, as outlined Section 2.3. The key potential in-combination impacts include land take and loss of habitats such as hedgerows / treelines and agriculture grassland that are utilised by a number of foraging and commuting species. An overall landscape masterplan has been developed for the overall lands within the vicinity of Site, which are included in the Site's Landscape Masterplan drawing (refer to Appendix 6-4) and Engineering Drawing No. P802 'Overall Proposed Site Layout Plan'. The landscape masterplan includes additional areas of proposed landscape planting to compensate for the loss of vegetation.

The maintenance and upgrade works to be undertaken by Uisce Éireann to the water supply distribution network specified in Chapter 3 will all be undertaken along existing public roads where the existing pipes are located and as such these works will have an imperceptible cumulative ecological impact.

The Proposed Developments includes sensitive design / enhancement measures and proposed landscaping on the Site. Through the implementation of biodiversity enhancement measures along with the Landscape Plan, there will be an overall net gain of landscape planting to compensate for the loss of vegetation.

In addition, any potential cumulative impacts will be reduced as all works will be completed in line with relevant best practice and legislation and mitigation measures detailed within the EIAR. It is therefore considered unlikely that any significant cumulative impacts will arise as a result of the Proposed Development.

Overall, the Site is considered to be of higher local ecological value. It is anticipated that with the sensitive design measures, mitigation measures and ecological enhancement measures, the Site will not result in any significant cumulative impacts in relation to significant impacts on flora or fauna and will note cause adverse effects on the integrity of any European designated sites in combination with other plans and projects.

6.8 Interactions with other Environmental Attributes

Biodiversity interacts with the following environmental attributes:

- Chapter 7 – Soils and Geology: Excavations and stockpiling on the Site could adversely impact the integrity and quality of the trees / hedgerows on the Site. However, given that there will be no significant impact on retained trees / hedgerow due to the proposed mitigation measures, there will be no significant impact.
- Chapter 8 – Water: The ecological status of surface waters will not be significantly affected by any discharge to surface waters or water abstraction and there will not be a significant effect on any European designated site.
- Chapter 9 – Air Quality: A decrease in air quality could negatively impact biodiversity within the vicinity of the Site. However, as outlined in Chapter 9, air emissions from the Proposed Development will not a have significant impact on any European designated Sites or ecological receptors.
- Chapter 10 – Climate: The increase of Greenhouse gases and change in climate can negatively impact biodiversity, habitats and surroundings. However, the effects of GHG emissions associated with the Proposed Development was determined as not significant.
- Chapter 11 – Acoustics (Noise & Vibration): Fauna are often sensitive to the disturbances caused by acoustics. However, given the close proximity to existing nearby industrial development and the management of the grasslands on the Site, it is considered likely that fauna within the local area have been habituated to the acoustic environment. From the noise modelling undertaken in Chapter 11, it is anticipated that there will be no significant change to noise levels on any European designated sites or ecological receptors.
- Chapter 12 – Landscape and Visual Assessment: In assessment of the impact on landscape and visual aspects, cognisance has been given to the alterations to existing land cover at the Site. The Proposed Development will have a slight positive residual impact on local biodiversity based on the Site being of low ecological value and situated within an industrial zoned land.

6.9 Indirect Effects

No significant indirect impacts on biodiversity associated with the Proposed Development will occur.

6.10 Residual Effects

Based on the findings of a detailed desk-based study of all ecological information available for the Site and the wider area, multiple field surveys undertaken by MOR Ecologists and specialist subcontractors, it is considered that the Site is currently of a high local ecological value.

Without the implementation and successful establishment of the proposed landscaping on the Site, the Proposed Development will have a medium-long term impact on local biodiversity. Once the proposed mitigation measures, landscaping and sensitive design measures have been established, it is concluded that the Proposed Development will be in accordance with National, Local and Municipal planning policies and objectives.

Th proposed landscaping will also result in a net increase in the number of trees and length of hedgerows within the Site and will provide suitable habitat for birds, bats, badgers and other fauna that may occur within the area. Additionally, the proposed landscaping will connect with proposed landscaping on adjoining developments providing new ecological corridors, habitat connectivity and shelter for fauna in the area. Long-term there will be no significant impact on local biodiversity.

6.11 Monitoring

An ecological clerk of works (ECoW) will be appointed for the entirety of the construction stage and will undertake the necessary monitoring work both preconstruction and during construction as required to ensure the implementation of all of the specified ecological mitigation measures.

Post construction and following the installation of the lighting for the Proposed Development, the project ECoW will undertake a further site inspection in order to check the lighting patterns and lux levels along the Site boundaries and the findings will be presented to the planning authority.

The project ECoW will also undertake the necessary post construction monitoring to ensure all of the mitigation measures will be successfully implemented.

6.12 Reinstatement

Not applicable.

6.13 Difficulties Encountered in Compiling this Information

Refer to Section 6.2.4.2 for survey limitations. There were no other difficulties encountered compiling the information.

7 LAND, SOILS & GEOLOGY

7.1 Introduction

This chapter provides a description and assessment of the potential, likely and significant impacts (if any) on the geological and soil environment which have occurred, which are occurring, or which can reasonably be expected to occur, because of the Proposed Development.

7.2 Methodology

7.2.1 Legislative Context

The importance / sensitivity of the geological receptors within the Site was assessed on completion of the desk study as set out in Table 3-4 of the EPA's 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' [71]. The Guidelines are formally adopted and published by the EPA [71].

In addition to the EPA Guidelines, the assessment was carried out in accordance with the following guidance and tailored accordingly based on professional judgement:

- Institute of Geologists Ireland (IGI) Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements [72]; and,
- Institute of Environmental Management & Assessment (IEMA) Guide: A New Perspective on Land and Soil in Environmental Impact Assessment [72].

7.2.2 Desk Based Studies

A desk-based study of the Site was conducted using available geological information held by the Geological Survey of Ireland (GSI) for the general area and any available site-specific information, including the findings from on-site drilling of boreholes. The following sources were reviewed for this purpose:

- Geological Survey of Ireland (GSI) Public Data Viewer [73] ; [74]
- Environmental Protection Agency (EPA) Online Mapping [54] and,
- All available site investigation results.

7.2.3 Site Investigations

- 3No production wells (PW1, PW2 and PW3) were installed at the Site in March 2023 by Fogarty Drilling Ltd. on behalf of the Client to assess the potential yield (m^3/hr) of the aquifer to supply water for the Proposed Development.
- 3No groundwater monitoring wells were installed at the Site to assess the potential extent of the drawdown area affected by the abstraction of groundwater for production purposes. These wells were installed in April 2023 at the Site.
- Hydrogeological Testing and Analysis - Step tests and pumping tests were performed at PW1 as this well exhibited the potential to contribute a substantial volume of water for the Proposed Development. These tests were conducted by Campion Pumps Ltd and supervised and assessed by MOR during April / May 2023 (refer to Chapter 8 – Water).

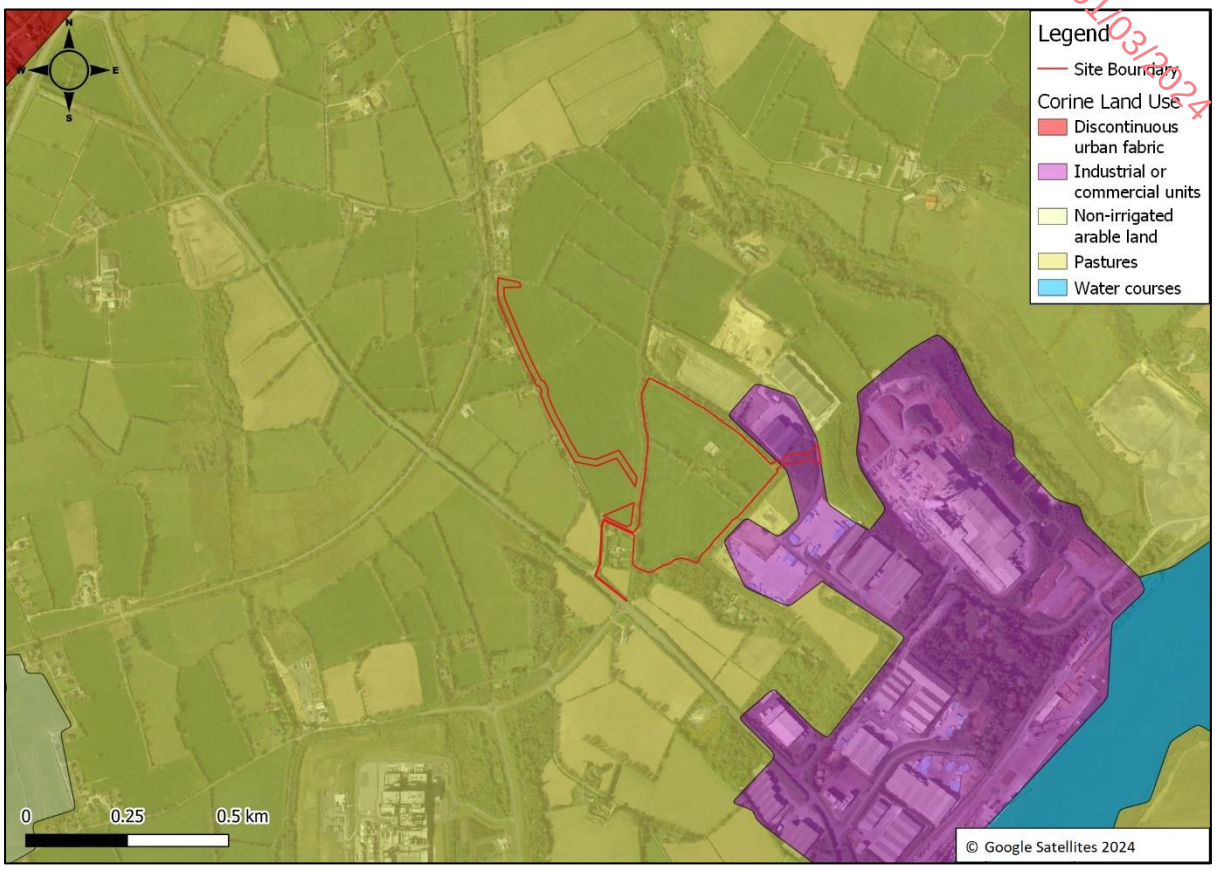
7.3 Receiving Environment

7.3.1 Current Land Use and Site Description

The land use at the Proposed Development is currently agricultural usage as pastures, as shown in Figure 7-1 below. Warehouses are being constructed east of the Proposed Development, with Belview Port located to the southeast. There is residential housing to the

northwest and southwest of the Proposed Development. The remainder of the surrounding lands in the close vicinity of the Proposed Development are also agricultural pastures.

Figure 7-1 Corine Land Use



7.3.2 Topography

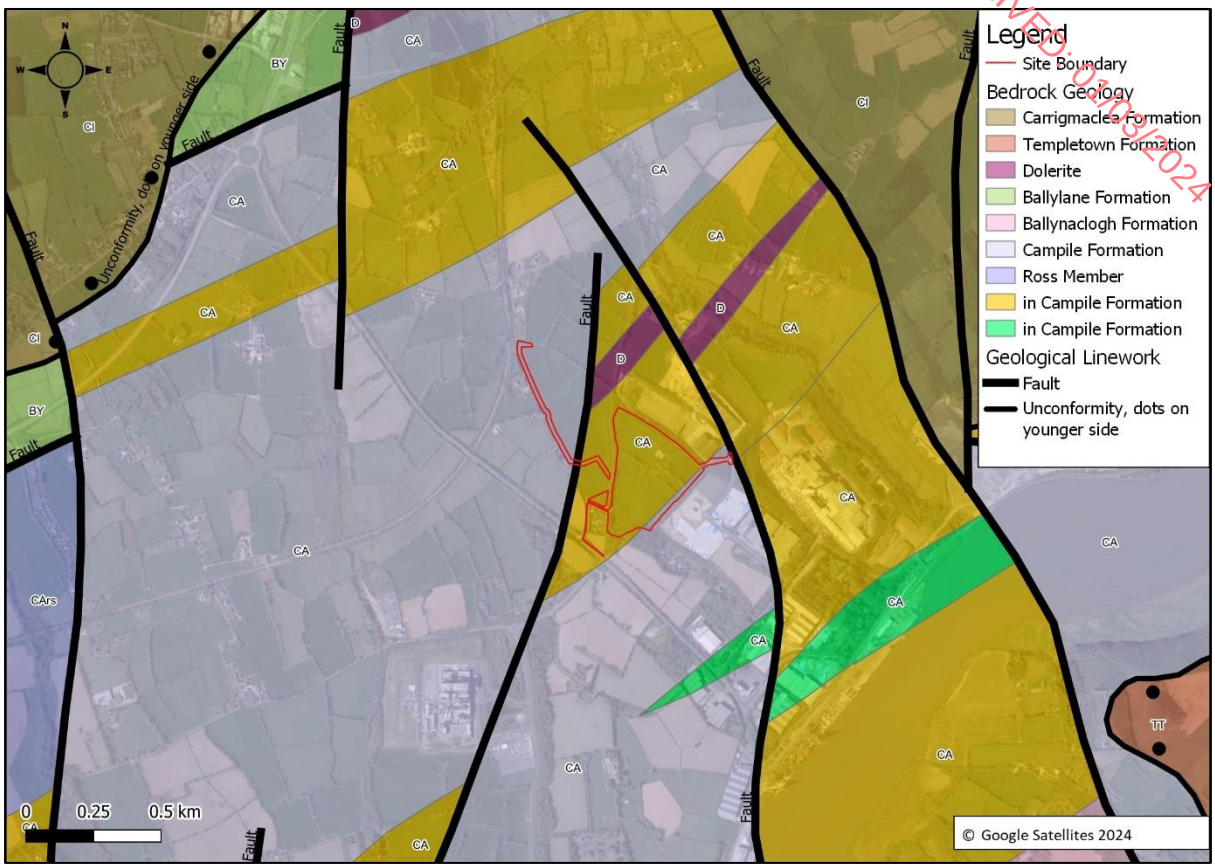
According to the GSI mapping online and the site visits undertaken during the hydrogeological testing and groundwater monitoring, the Site is generally flat, with a slope towards the southeast. Levels vary from 44.7mAOD in the southeast of the Site to approximately 55mAOD in the south of the Site according to the data from the topographic survey.

7.3.3 Bedrock Geology

According to GSI mapping [74], the bedrock beneath the Site comprises of multiple volcanic units. A small section along the eastern and the western boundary of the Site is comprised of the *Campile Formation* – Rhyolitic volcanics, with grey and brown slates. The majority of the Site is primarily felsic volcanics from the *in Campile Formation*, with a mafic unit of *Dolerite* intersecting with the northwest corner of the Site.

Two faults are present in the vicinity of the Site, running roughly north-south. The eastern fault is located approximately 100m east of the Site and the western fault located approximately 70m west of the Site. See Figure 7-2 below.

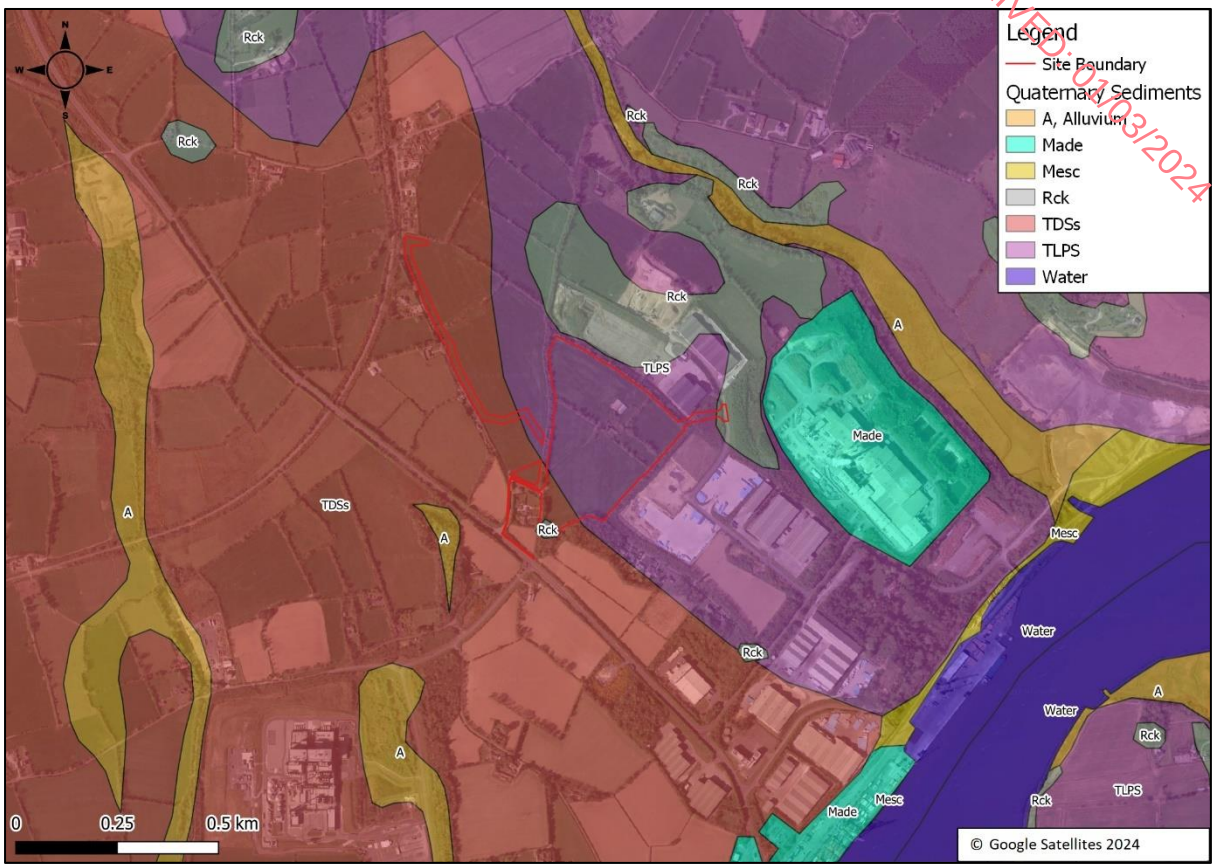
Figure 7-2: Bedrock Geology



7.3.4 Quaternary Geology

According to the GSI database [58], the Site is mainly comprised of till. To the south and west of the Site the till is predominately derived from Devonian sandstones. There is a small region of bedrock outcrop/subcrop on the southern tip of the Site, with the northern section of the Site also composed of outcrop/subcrop. The remainder of the Site is comprised of till predominately derived from Lower Palaeozoic shales. See Figure 7-3 below.

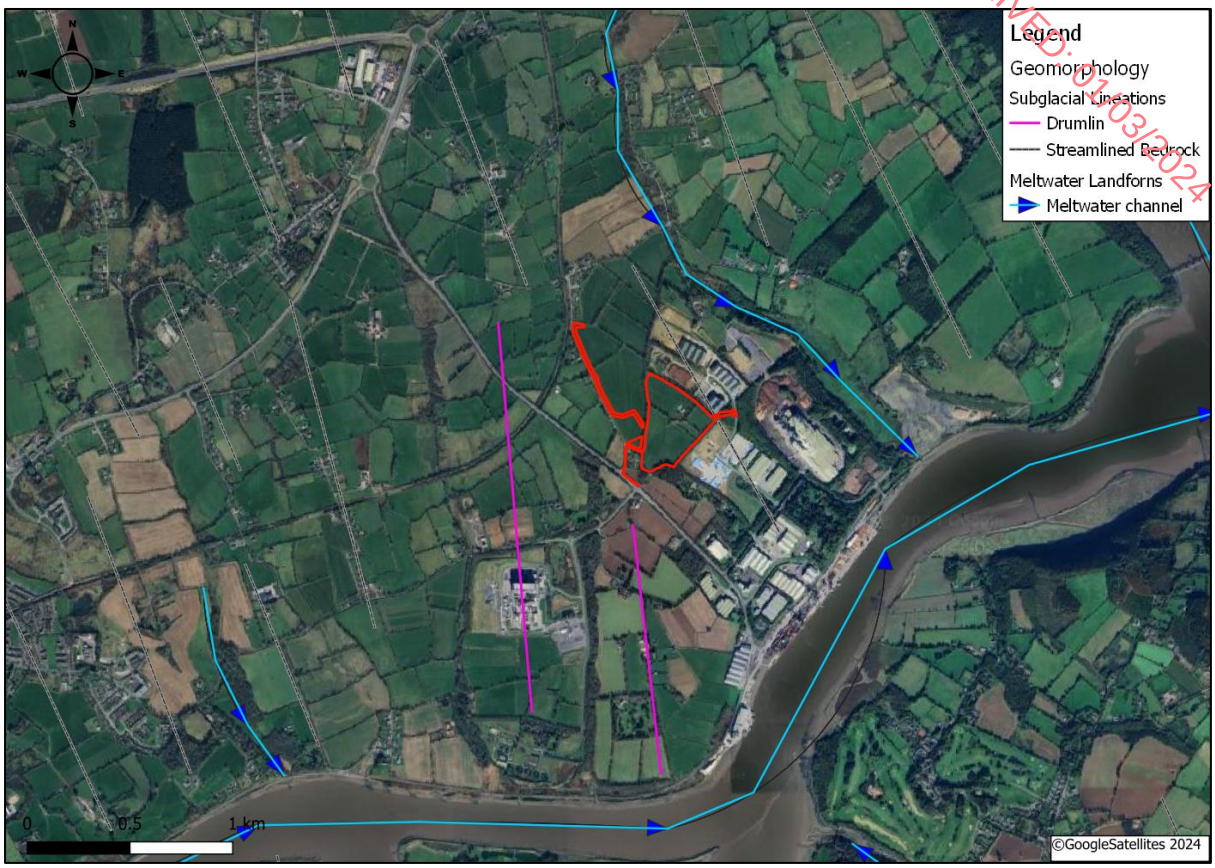
Figure 7-3: Quaternary Geology



7.3.5 Glacial Landforms

According to the GSI database [58], the Site is in a region of streamlined bedrock. These streamlines run approximately northwest to southeast, with one streamline cutting across the north and northeast of the Site. Additionally, there are two north-south Drumlins to the west and south of the Site and a meltwater channel to the north that flows southerly before curving southwest. See Figure 7-4 below.

Figure 7-4: Glacial Landforms



7.3.6 Geological Heritage and Economic Geology

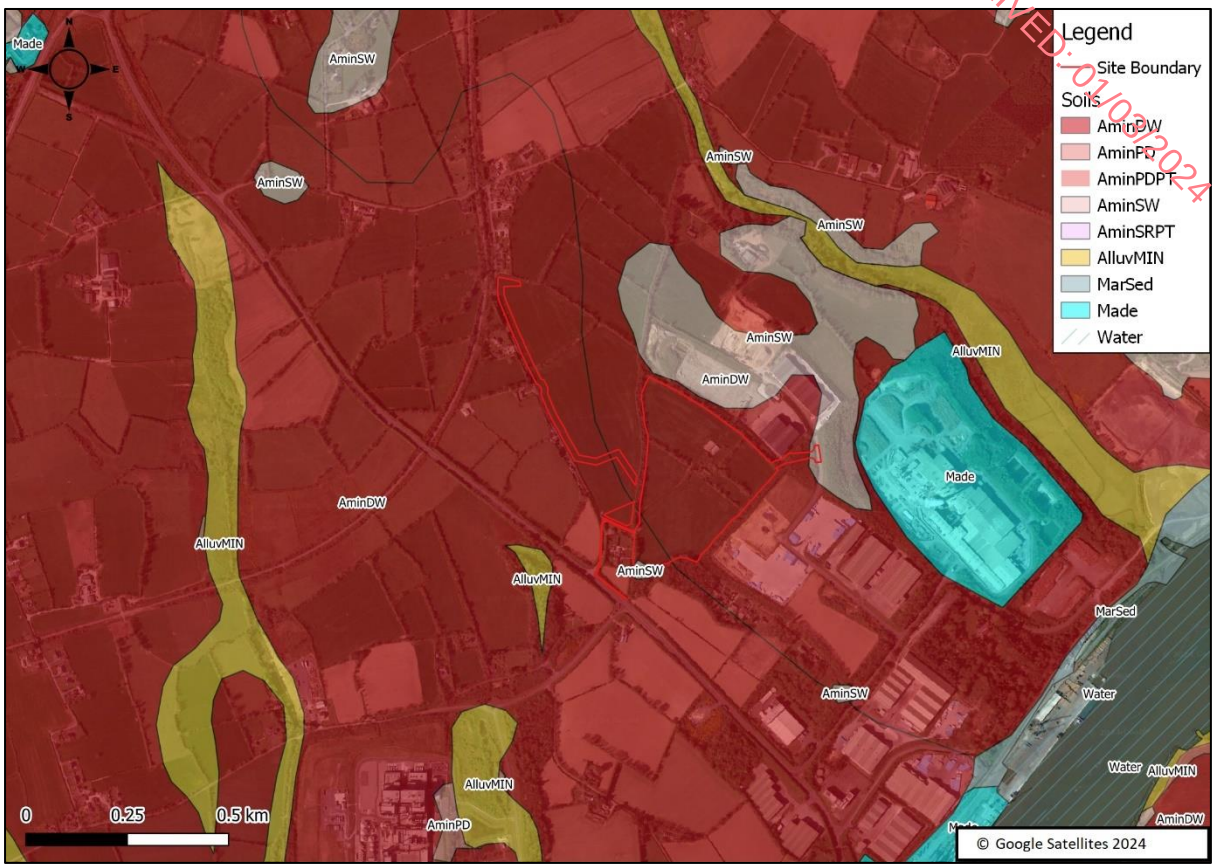
There are no notable geological heritage features within a 5km radius of the Site. The nearest geological heritage Site is the County Geological Site WD044, a low coastal cliff section, located 7.25km south-east of the Site.

According to the GSI database [74], the south of the Site is located in a region of “moderate” crushed rock aggregate potential, with a small area of “high” potential on the southern edge of the Site. A small area in the north that will comprise the access road is a region of “high” potential, with a small amount of “very high potential”. Another area in the west that will comprise the construction of the berm is also a region of “high” potential.

7.3.7 Soils

According to the GSI database [74] soil map, the Site is predominantly characterised by AminDW soil (deep well drained mineral (mainly acidic)) present across the majority of the Site. In the north of the Site, AminSW (shallow well drained mineral (mainly acidic)) soils are present, and they are also present along a small section on the southernmost edge of the Site. Refer to Figure 7-5 below.

Figure 7-5: Soils



According to Table 2 of the 2022 IEMA guidance, these soils have a "low" receptor sensitivity, based on the predominantly mineral nature of the soils, the lack of archaeological interest and the lack of community, recreational and educational usage of the land.

Utilising Table 3 of the same guidance, the magnitude of impact associated with the removal of soils from the Site is "Moderate" as the Proposed Development is between 5-20ha, and would result in the permanent loss of soil function as agricultural pasture. Therefore, under this guidance, the impact of the soil removal was negative and slight, which "are not material in the decision-making process" under the IEMA guidance.

7.4 Site Investigations

7.4.1 Installation of Groundwater Test Wells

The following ground conditions were encountered during the installation of the three (3No.) groundwater monitoring wells (MW1, MW2 and MW3) and three (3No.) production wells (PW1, PW2 and PW3) which were installed within the Regional Important Aquifer – Fissured bedrock (Rf) and within the *in Campile Formation* (felsic volcanics) that underlies the Site. Water samples were taken from groundwater monitoring wells MW1 and MW3, and the production well PW1.

MOR was not present during the installation of the production wells or groundwater monitoring wells. The borehole logs for the production wells and monitoring wells are presented in Appendix 7-1. Refer to Figure 7-6 for the location of the groundwater and production wells.

Well Location PW1

- Overburden – 0.0metres below ground level (mbgl) to ca. 6mbgl.
- Overburden composition – topsoil and clay.
- Total Depth (mbgl) – 72mbgl.
- Depth to bedrock (mbgl) – From ca. 6mbgl. Some loose fractured brown rock was encountered from 34.5mbgl to 36mbgl according to the logs supplied by the Client.

Well Location PW2:

- Overburden – 0.0mbgl to ca. 6mbgl.
- Overburden composition – topsoil and clay.
- Total Depth (mbgl) - 60mbgl.
- Depth to bedrock (mbgl) – From ca. 6mbgl.

Well Location PW3:

- Overburden – 0.0mbgl to ca. 6mbgl.
- Total Depth (mbgl) - 45mbgl.
- Depth to bedrock (mbgl) – Competent bedrock from ca. 6mbgl.

Well Location MW1:

- Overburden – 0.0 mbgl to ca. 6mbgl.
- Total Depth (mbgl) - 72mbgl.
- Depth to bedrock (mbgl) – From ca. 6mbgl.

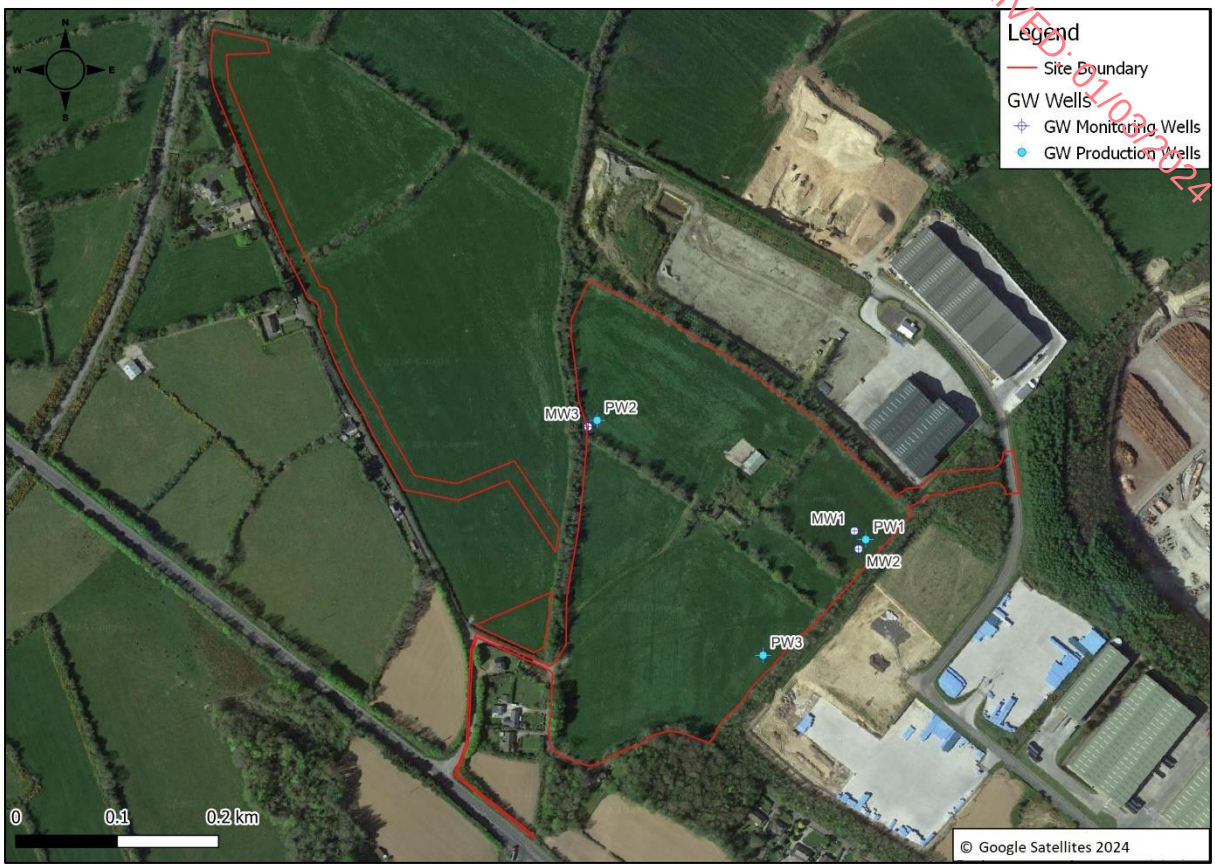
Well Location MW2:

- Overburden – 0.0 mbgl to ca. 6mbgl.
- Total Depth (mbgl) - 57mbgl.
- Depth to bedrock (mbgl) – From ca. 6mbgl. Unstable rock formation 49.5mbgl according to the logs supplied by the Client.

Well Location MW3:

- Overburden – 0.0 mbgl to ca. 6mbgl.
- Total Depth (mbgl) - 60mbgl.
- Depth to bedrock (mbgl) – From ca. 6mbgl.

Figure 7-6: Test well and groundwater well locations



7.5 Characteristics and Potential Impacts of Proposed Development

The Proposed Development will alter the existing land-use from agricultural to industrial use.

This change will involve 2No. distinct phases:

- Construction phase; and,
- Operational phase.

These two phases have been dealt with separately, as the impacts associated with each are distinct.

7.5.1 Construction Phase

Construction activities have the potential to impact soil and geology. This section describes and assesses any potential, likely and significant, direct and indirect impacts of the construction phase of the Proposed Development on land, soils and the geological environment.

Groundworks will be required to facilitate the proposed construction works. This will include the stripping of topsoil and excavation of weak subsoils. All excavated materials will be stockpiled and reused on Site for the reinstatement/landscaping works. As the material will be excavated, the filling element will commence. This will include a combination of excavated sub-soil and imported stone. The equipment involved in the Site clearance works will be excavators, dump trucks, trucks importing stone and rollers.

Excavation and on-site management of excavated topsoil and subsoil have the potential to impact land, soils and the geological environment. Construction of the Proposed Development will require the excavation of ca. 8,630m^3 of topsoil and 28,500m^3 of subsoil. All of these

excavated materials will be reused as part of the proposed landscaping for the Proposed Development.

There will be a berm constructed along the western boundary of the Site. The berms are proposed to be ca. 3m in height. This effectively will help to screen the Site from the west and southwest.

An estimated volume of ca. 78,000m^3 of stone will be imported to the Site to be used as fill material. The imported stone fill will also be compacted in layers to the required level to provide working platforms and formation levels for yards/roads etc. Imported stone will be delivered in trucks, with estimated peak-period deliveries in the region of 100 trucks per day.

The foundations and floor slabs will be constructed with large quantities of reinforcing steel which will be delivered to the site with some of the reinforcing cages, perhaps being prefabricated offsite, delivered and craned into position. There will be large concrete pours for various elements of the structure; including pile caps, ground beams and the ground floor slabs / yard slabs which will be poured in sections to an agreed phasing plan for the works.

The main equipment that will be used during this phase will be, excavators, dump trucks, bulldozers, cement spreaders, self-propelled stabilisation machines and heavy-duty vibrating rollers. Construction numbers will be approximately 50 during this phase of works. The estimated duration of this phase of the works will be approximately 2 months.

The primary access during the construction period will be the new access road and entrance. To form this, the existing scrubland will be removed. Any existing underground services in this area will be exposed and protected as required by the relevant utility company with a porous asphalt surface provided to tie in with the existing road surface. Drop kerbs will be provided locally to facilitate pedestrian and bicycle access. A flagman will be provided at the entrance to control traffic and ensure the safety of any pedestrians or cyclists in the vicinity of the construction entrance.

The excavation and management of excavated and reused material on-site are likely to have a neutral, permanent, slight impact on land, soils and geology.

Construction traffic will result in the temporary compaction of soils, but such activities will be limited to the construction phase and as such will not be likely to have a significant impact on lands, soils and the geological environment.

Construction activities may have associated risks of accidental spillages of contaminating substances, such as waste oil, fuel or chemicals directly onto soils, or onto other substrates with subsequent transfer to soils. Such occurrences may constitute a negative, short-term direct or indirect impact on the receiving environment that ranges from imperceptible to moderate depending on the magnitude of spillages or leaks.

Overall, the potential impact of the construction phase on soil and geology is likely to be a not significant, negative impact. Therefore, the construction phase mitigation measures outlined in Section 7.6 will be employed to reduce potential impacts from construction activities.

7.5.2 Operational Phase

The natural resources used by the Proposed Development will be:

- Gypsum rock; and,
- Water to be supplied from a combination of mains water supply and/or abstracted groundwater.

During the operational phase of the Proposed Development, there is the potential for an impact on land, soils and geological environment due to the risk of accidents or spillages (i.e. chemicals stored on-site, leakage of fuel, etc) and from any accidental spill/leakage from cars parked in parking areas or from on-site fuel storage used for maintenance equipment. Such

spillage/leaks are likely to be localised and short-term and therefore have a moderate to not significant negative impact depending on the magnitude of leak or spillage. In addition, the design of the Proposed Development will include for the storm water to be discharged into the ground (i.e. soakaway) which also has the potential to impact the land and soil. However, prior to discharge to the soakaway pit the storm water run-off will pass through a settlement tank to trap solids and a fuel/oil bypass separator (Klargestor NSBE025 Class 1 separator) to remove oil and hydrocarbons. The on-site testing to determine the infiltration rate was carried out in accordance with BRE 356 Soakaway design. The ground conditions and infiltration rates were determined to be suitable for the design of a soakaway pit. The soakaway tests results are presented in Appendix 7-2.

Further design measures that have been implemented into the design of the Proposed Development include:

- Loading and unloading of materials will be carried out in designated areas inside a warehouse, being all plant enclosed;
- Appropriate oil and silt traps will be installed;
- Any tanks, pumps and sumps that contain substances that have the potential to cause environmental harm will be fitted with a high-level alarm; and,
- All tank, container and drum storage areas will be rendered impervious to the materials stored therein.

Overall, the impact on land, soils and the geological environment during the operational phase was considered to be a short-term, neutral impact. Mitigation measures referenced under Section 7.6 and 8.6 will also minimise any identified potential land, soils and geological environment risks associated with the operational phase of the Proposed Development.

7.5.3 Unplanned Events

As with all industrial facilities, there is some risk of accidents at the Site or disasters outside of the operator's control which could result in a potential risk to the environment. Using a risk-based approach, the primary accidents that have the potential to have an impact on land and soils in the vicinity of the Site are set out in Table 7-1 below.

Table 7-1: Land and Soils Unplanned Events

Hazards	Likelihood	Consequence	Reasoning
Collision / accident involving delivery truck arriving at / departing from the Site resulting in the release of substances	2	3	Measures will include but are not limited to the following: • Speed limits and a traffic management system will be implemented on-site; • All transit areas will be paved; • Spills will be contained within the site drainage system which will contain an emergency shut off valve; • Operational procedures as part of the facility's Environmental Management System (EMS) will be in place for incoming and outgoing materials; and, • An adequate supply of suitably absorbent materials will be kept on site to deal with any spills.
Leakage from bunds and drainage system to ground	2	3	All bunding and drainage systems will be designed in accordance with best practice, appropriate EPA guidance. Measures will include but will not be limited to the following: • Drains will be impervious to the material they contain; • All drainage systems will be inspected on a regular basis.
Fire - resulting in the emission of fire water to soils	2	3	Measures will include but are not limited to the following: • The facility will have an adequate fire prevention plan; and, • The drainage will contain an emergency shut off valve.

(1) Likelihood rating 1-5 where 1 is very unlikely and 5 is very likely
(2) Consequence rating 1-5 where 1 is trivial and 5 is massive

7.6 Proposed Mitigation Measures

The mitigation measures for the protection of soils and geology, as well as the protection of surface water and groundwater, which are related to the soils and geology, are described below and in Chapter 8 (Water). Mitigation measures outlined in Chapter 6 (Biodiversity) are also applicable to the protection of soils during the construction phase.

7.6.1 Construction Phase

During the construction phase, the methods of working will comply with all relevant legislation and best practices in reducing the environmental impacts of the works. Construction phase impacts are a short-term localised impact. However, to minimise the potential impacts arising from the construction phase on land, soils and the geological environment, the works will be carried out taking cognisance of the best industrial practice procedures.

Construction phase mitigation measures are detailed in Chapter 8 – Water and Chapter 9 – Air are also applicable to land and soils.

Specific aspects of the proposed construction mitigation measures are highlighted below:

7.6.1.1 Soil Management / Stock Piling

Stockpiling of excavated material will be required and will be appropriately managed on-site during the construction phase. To minimise the overall impact on soils arising during the construction works, the following mitigation measures will be adhered to;

- Temporary berms will be constructed around stockpiles to prevent run-off during rain events;
- Stockpiles will be dampened down during dry periods to prevent wind dispersion: and,
- The stockpiles will be clearly segregated; and,
- All stockpiles will be maintained a minimum distance of 20m from the access road.

Specific control measures will be specified in the RWMP for the handling and temporary storage of any potentially contaminated materials that may be encountered during the works.

7.6.1.2 Oil Storage / Refuelling

In order to minimise the impacts on land and soils from potential spillages during the construction phase, the following measures will be implemented:

- All plant and machinery will be serviced before being mobilised to the Site;
- All oil stored on-site for construction vehicles will be kept in a locked and bund protected area;
- Preventative maintenance and relevant maintenance logs will be kept for all on-site plant and equipment;
- Drip trays will be used for fixed or mobile plant such as, pumps and generators in order to retain oil leaks and spills;
- Refuelling of plant and machinery will be completed in a controlled manner using drip trays (bunded container trays). Fuel containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile containers. Bunds for the storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored. In addition, an emergency spill kit with oil boom, absorbers, etc., will be kept on-site in close proximity to any fuel storage tanks or bowsers for use in the event of an accidental spill;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- All deliveries to on-site oil storage tanks will be supervised. Records will be kept of delivery dates and volumes;
- Only designated trained operators will be authorised to refuel plant on-site;
- The Site manager shall ensure that all personnel working on-site are trained and aware of the mitigation measures detailed within the EIAR;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills;
- A procedure will be drawn up, which will be adhered to during the refuelling of on-site vehicles. This will include the following:
    - Fuel will be delivered to plant on site by a dedicated tanker or in a delivery bowser dedicated to that purpose;

- In the case of a bowser, the driver or supervising foreman will check the delivery bowser daily for leakage;
- The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur;
- Where the nozzle of a fuel pump cannot be placed fully into the tank of a machine then a funnel will be used; and,
- Each area of work will have a designated fuelling area. Section foremen shall identify these areas to their plant operatives.

- Every equipment associated with the storage of fuel on site will be designed and installed to relevant standards; and,
- All valves will be of steel construction and the open and close positions will be clearly marked.

7.6.1.3 Concrete Handling During Construction

The measures detailed below will be employed when poured concrete is being used in the construction process. Concrete will be used for various elements of the piling and foundations structures. The production, transport and placement of all cementitious materials will be strictly planned and supervised. Measures related to the use of poured concrete will include:

- All concrete pours will be planned with risk assessment to avoid any impacts;
- Full washing out of trucks will occur at the dedicated area (i.e. batching plant);
- Water supply points, if required, will be agreed with the appointed Contractor in advance of the works;
- Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that all joints between panels achieve a close fit or that they are sealed;
- Chemicals used will be biodegradable where possible;
- Any spillages will be cleaned up immediately and disposed of correctly;
- Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening;
- Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete;
- Surplus concrete will be returned to the batch plant after completion of a pour; and,
- Designated wheel wash areas will be provided at each phase exit point for the duration of the construction works.

7.6.2 Operational Phase

During the operational phases of the Proposed Development, the facility will operate under a waste permit and as best practice, the following mitigation measures will be employed to prevent any potential impact on soils and geology:

- The integrity and water tightness of all tanks, bunding structures, containers and underground pipes and their resistance to penetration by water or other materials carried or stored therein will be tested and demonstrated by GABM Limited prior to the commencement of production activities. This testing will be carried out by GABM Limited at regular intervals;
- An adequate supply of suitable absorbent materials will be kept on-site to deal with any spills; and,
- Loading and unloading of materials will be carried inside the warehouse within an area protected against spills and runoff in accordance with relevant EMS procedures.

7.7 Cumulative and In-Combination Impacts

There will be no cumulative or in-combination impacts due to the Proposed Development as the excavated material will be reused on-site. The topsoil, and subsoil will be reused in the formation of the landscape berms at the Site.

7.8 Interactions with other Environmental Attributes

Land and soils interact with other environmental attributes as follows:

- Chapter 5 – Population and Human Health:
    - Potential impacts associated with the change in land use at the Site and management of potentially contaminated soils could impact on human health and wellbeing. However, given that there will be no significant impact on soils and geology there will be no significant impact on population and human health;
- Chapter 6 - Biodiversity:
    - Potential impacts on the underlying soils and geology could also impact on water quality and therefore ecological aquatic ecology. Excavations or stockpiling activities have the potential to produce siltation that could impact ecological conditions However, given that there will be no significant impact on soils and geology or water quality, due to the proposed mitigation measures, there will be no significant impact on biodiversity;
- Chapter 8 - Water:
    - In the event of soil contamination, there could be a negative impact on the underlying aquifer (groundwater) and surface water quality. Any soil erosion or siltation could also impact on surface water quality. These impacts are assessed in Chapter 8 (Water);
- Chapter 12 - Landscape and Visual:
    - Soil excavations and changes in landform during the construction works are assessed in Chapter 12. The overall impact on soils and geology at the Site, including during construction, will not be significant.
    -
- Chapter 15 - Material Assets: Natural Resources, Energy and Waste:
    - Aggregates (i.e. crushed rock) will be imported during the construction phase - see Chapter 15 for further details.

7.9 Indirect Effects

No indirect effects expected.

7.10 Residual Impacts

Implementation of the mitigation measures will ensure that any impact arising from both the construction phase and the operational phase of the Proposed Development will be not likely and not significant.

7.11 Monitoring

Given the nature of the Proposed Development and the proposed works, no monitoring is considered necessary.

7.12 Reinstatement

Not applicable.

7.13 Difficulties Encountered in Compiling this Information

There were no difficulties encountered in compiling this information.

8 WATER

8.1 Introduction

This chapter of the EIAR provides a description and assessment of the likely impact of the Proposed Development on the receiving hydrology (surface waters) and hydrogeology (groundwater). The existing surface water and groundwater regimes at the Site are described in terms of flood risk, drainage patterns, water quality and resources present (factors).

8.2 Methodology

8.2.1 Desk-Based Studies

A desk-based study of publicly available water quality and flood risk data was undertaken in order to characterise the receiving environment, using the following data sources:

- EPA Online Mapping [54];
- GSI Spatial Resources Map Viewer [73];
- OPW Flood Risk Mapping [75] ; and,
- River Basin Management Plan (RBMP) for Ireland 2022 – 2027 [76].

8.2.2 Site Investigations

- Groundwater samples were collected from 2No groundwater monitoring wells (MW1 and MW3) 1No production well (PW1) at the Site. PW1 was sampled 4th May 2023 and MW1 and MW3 were sampled on 23rd May 2023. Additionally, groundwater level measurements were collected for all 3No wells during the 23rd May monitoring event.
- A step test was undertaken at the production well (PW1) on 26th April 2023 to assess the potential discharge to be maintained for the duration of the pumping tests. A pumping test was carried out from 2nd May to 12th May followed by a recovery phase to assess the sustainable yield for the operational phase of the Proposed Development. The data analysis is presented in Section 8.4.

8.3 Receiving Environment

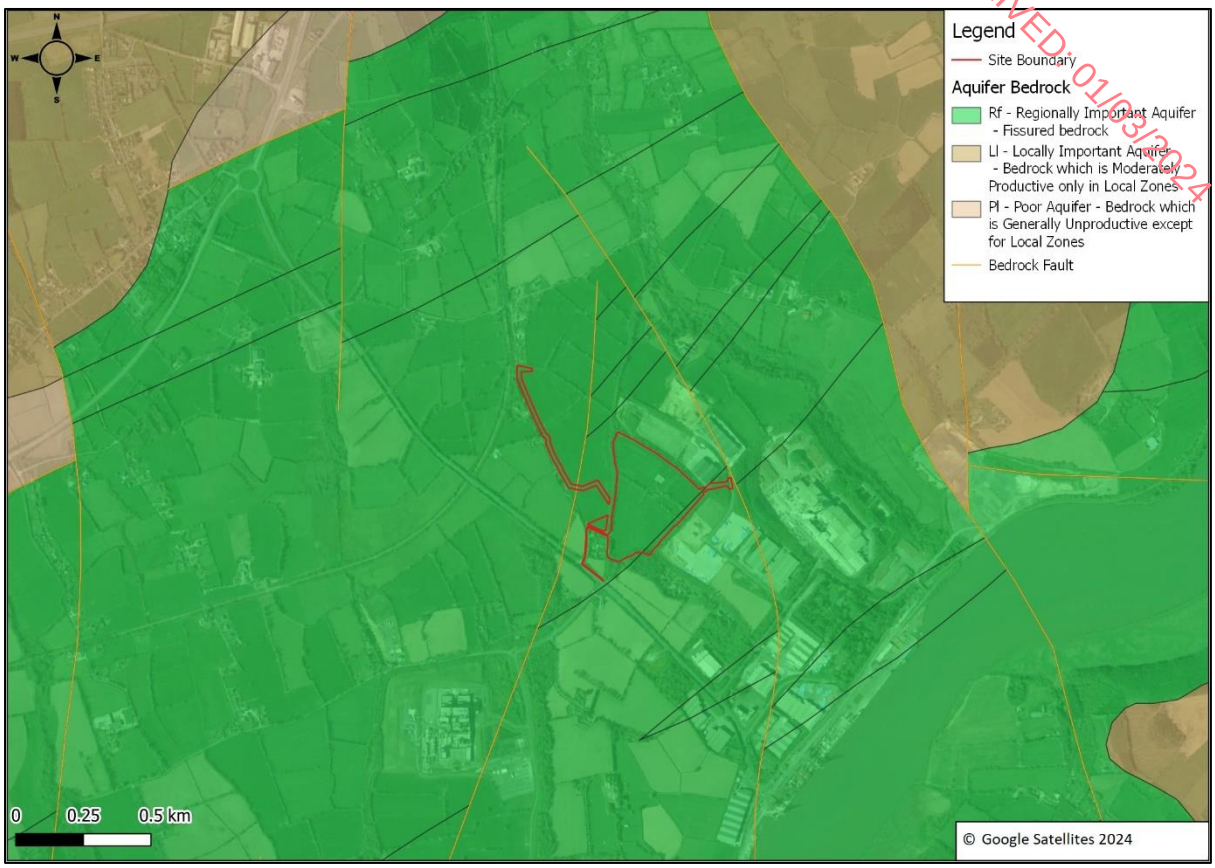
8.3.1 Hydrogeology

8.3.1.1 Aquifer Characteristics

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor aquifer), referring to the scale and production potential of the aquifer. Refer to Figure 8-1 below.

According to the GSI, there is no sand and gravel aquifer present beneath the Site, but the bedrock aquifer underlying the Site is classified as a (Rf) Regionally Important Aquifer – Fissured bedrock.

Figure 8-1: Groundwater Aquifer



8.3.1.2 Groundwater Body Status

The European Communities Environmental Objectives (Groundwater) Regulations, (S.I. 366 of 2016) [77]came into effect on 15th July 2016. The aim of the Regulations is to achieve the environmental objectives established for groundwater by Article 4 (1) (b) of the WFD (2000/60/EC) [78].

Classification of groundwater bodies differs from that undertaken for surface water bodies, in that the surface water standards relate to ecological status. Groundwater status does not directly assess ecology, but the classification process takes account of the ecological needs of the relevant rivers, lakes and groundwater dependant terrestrial ecosystems that depend on contributions from groundwater. Another key component of the groundwater classification is assessment of the impact of pollution on the uses (or potential uses) of groundwater from the groundwater body, for example water supply.

The objectives of the WFD are to protect all high-status waters, prevent further deterioration of all waters and to restore degraded surface and groundwater to good status.

The Site is underlain by the Waterford (IE_SE_G_149) groundwater body [79].The Waterford (IE_SE_G_149) groundwater body is designated as good status (2016-2021). It is also considered 'Not at risk' of meeting the objectives of the WFD to achieve "good" quantitative status by 2027.

8.3.1.3 Groundwater Vulnerability Rating

The GSI provides a methodology for aquifer classification (refer to Table 8-1) based on vulnerability (Extreme, High, Moderate or Low), referring to the ease with which groundwater may be contaminated by human activities (vulnerability classification primarily based on the permeability and thickness of subsoils). The groundwater vulnerability along the western edge is classified as moderate and the centre of the Site is classified as high. This increases through

extreme vulnerability to the north, south and east of the Site, with a region of Rock near/at the surface on the southern edge of the Site and within the planned access road area in the north of the Site. Refer to Figure 8-2.

Figure 8-2: Groundwater Vulnerability

Table 8-1: Groundwater Vulnerability Rating

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate Permeability (e.g. sandy subsoil)	Low Permeability (e.g. clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	> 3.0m	3.0 – 10.0m	3.0 – 5.0m	> 3.0m	N.A.
Moderate (M)	N.A.	> 10.0m	5.0 – 10.0m	N.A.	N.A.
Low (L)	N.A.	N.A.	> 10.0m	N.A.	N.A.

1 - N.A. = not applicable
2 - Precise permeability values cannot be given at present
3 - Release point of contaminants is assumed to be 1-2m below ground surface

8.3.1.4 Groundwater Use and Source Protection

The Groundwater Protection Scheme for Kilkenny County Council [80] aims to preserve the quality of groundwater in County Kilkenny for drinking purposes and other beneficial uses, for the benefit of present and future generations, through the following objectives:

- Assist the statutory authorities in meeting their responsibilities for the protection and conservation of groundwater resources;
- Provide geological and hydrogeological information for the planning process, so that potentially polluting developments can be located and controlled in an environmentally acceptable way;
- Integrate the factors associated with groundwater contamination risk, to focus attention on the higher risk areas and activities, and to provide a logical structure within which contamination control measures can be selected.

There are no public supply source protection areas in the vicinity of the Site. The closest area is the Glenmore PWS which is located ca. 9.6km to the north of the Site. Groundwater flow at the PWS is estimated to follow topography, flowing south-west [81] [80]. As such, it is unlikely there is a hydrogeological link from the Site to the Glenmore PWS.

A search of the GSI groundwater well database was conducted to identify registered wells in the surrounding area. There are ca. 13No groundwater wells recorded within a 2km radius of the Site (refer to Table 8-2). The location of the identified ground water wells is presented in Figure 8-3.

Table 8-2: Available Groundwater Well Information

Borehole ID	Centre Distance from Site	Grid Reference (Irish Grid)	Well Type	Total Depth (m)	Townland	Yield (m^3d)
2611SWW150	0.01km S	113710, 265300	Unknown	22.9	Gorteens	43.6
2611SWW151	0.39km SE	113470, 265710	Agri. & Domestic Use	22.6	Gorteens	-
2611SWW152	0.58km N	114920, 265330	Public Supply (Co. Co.)	100	Drumdowney Lower	1206
2611SWW132	0.79km W	114590, 264560	Agri. & Domestic Use	45.7	Drumdowney Lower	76.4
2611SWW156	0.81km SE	113090, 265910	Industrial Use	5.5	Gorteens	-
2611SWW155	0.91km SE	112890, 265740	Industrial Use	5.5	Gorteens	341.5
2611SWW131	1.03km NW	115070, 264560	Unknown	24.1	Rathpatrick	54.6
2611SWW133	1.15km N	115490, 265410	Unknown	45.7	Drumdowney Upper	32.7
2611SWW153	1.26km SW	112880, 264350	Public Supply (Co. Co.)	95	Gorteens	1402
2611SWW130	1.91km NW	116090, 264540	Unknown	13.4	Luffany	30.5
2611SWW149	1.93km SW	113070, 263450	Unknown	-	Kilmurry	-
2611SWW027	2.19km SE	112550, 267270	Domestic Use Only	-	Faithlegg	-

Figure 8-3: Groundwater wells within 2km of the Site

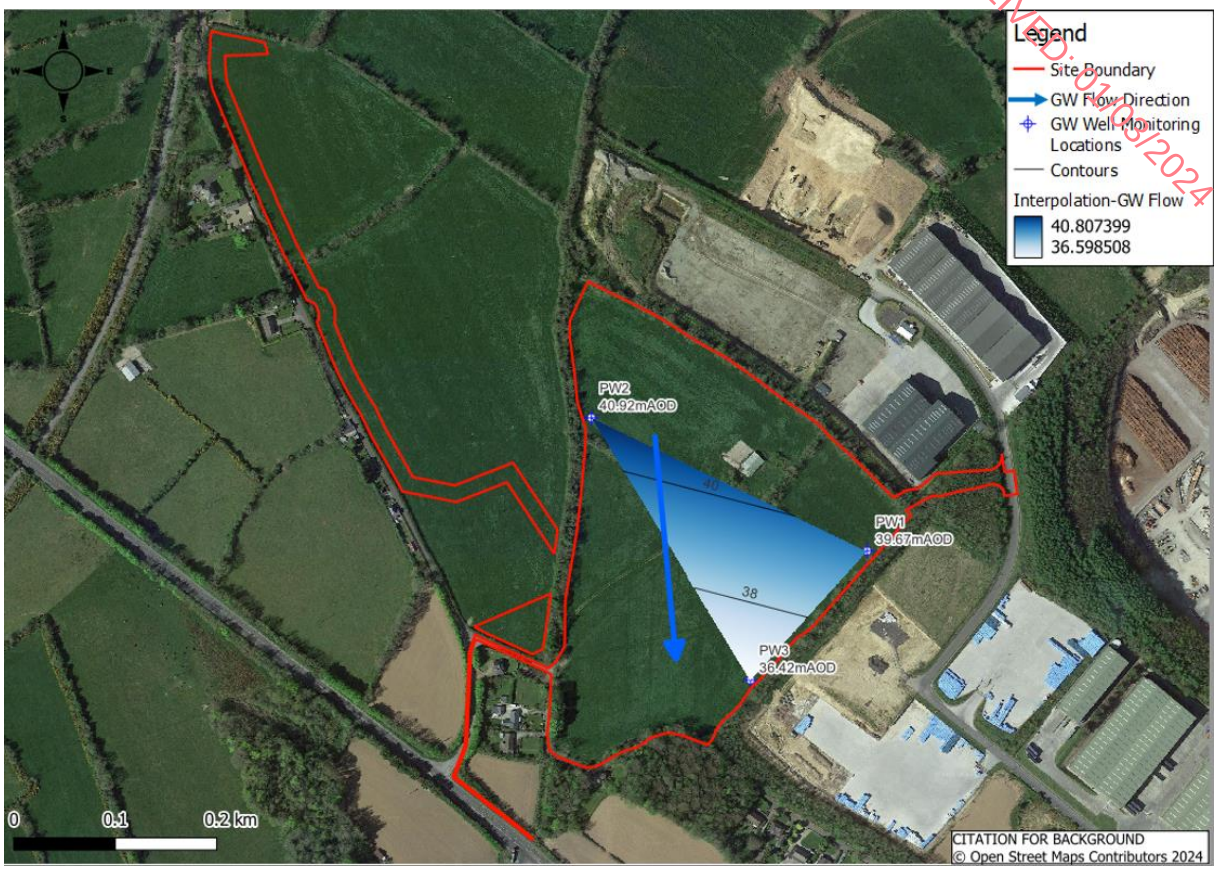
8.3.1.5 Groundwater Levels and Flow Direction

Groundwater levels measured across the Site ranged between 36.42mAOD (metres above ordnance datum) at PW3 to 40.92mAOD at PW2 (Table 8-3). Based on measured groundwater levels, groundwater flow beneath the Site is inferred to be to the south (Figure 8-4).

Table 8-3: Site Groundwater Level Measurements

Well ID	Total Depth	Water Level	mAOD
		April 2023	April 2024
	mbtoc	mbtoc	
PW1	73	14.82	39.67
PW2	60	8.57	40.92
PW3	45	7.79	36.42

Figure 8-4: Groundwater Flow Direction



8.3.1.6 Groundwater Monitoring

Groundwater samples were collected from MW1, MW3 and PW1 on 1No. occasion (refer to Figure 7-6 in Soil Chapter). The wells were purged prior to sample collection in accordance with standard best practice methods using dedicated equipment to avoid cross contamination. Therefore, a representative groundwater sample was collected from all wells. During purging, water quality measurements were taken as well as notes on the physical appearance of the purged water. After purging, the groundwater samples were decanted into labelled containers supplied by the laboratory. All samples were collected in accordance with best practice procedures (ISO 5667-11:2009).

Laboratory Analysis

3No. groundwater samples were collected at PW1, MW1 and MW3 and were analysed for the following parameters:

- Field Measured Parameters (only MW1 and MW3);
    - Temperature, Dissolved Oxygen, Electrical Conductivity, Oxidation Reduction Potential and pH;
- Indicators, inorganics and nutrients;
- Total Coliforms and *E.coli*
- Dissolved Metals: arsenic, boron, cadmium, calcium, total chromium, copper, total iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, sodium and zinc;

- Semi-Volatile Organic Compounds (SVOCs), including Polycyclic Aromatic Hydrocarbons (PAHs), phenols and phthalates;
- Volatile Organic Compounds (VOCs) (including BTEX/MTBE);
- Total Petroleum Hydrocarbons (TPH).

Groundwater Assessment Criteria

Laboratory analytical results for groundwater samples collected were compared, where applicable, to the following groundwater generic assessment criteria (referred to hereafter as groundwater GAC) and drinking water assessment criteria (referred to hereafter as drinking water DWAC):

- Statutory Instrument S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended 2012 (S.I. No. 149 of 2012) as amended 2016 (S.I. No.366 of 2016) and as amended 2022 (S.I. No. 287 of 2022). [82]
- Drinking Water Regulations 2014 (S.I. No. 122 of 2014) as amended (S.I. No. 464 of 2017, S.I. No. 286 of 2022 and S.I. No. 99 of 2023). [83]

In the absence of Groundwater Regulation Values for specific parameters, the following assessment criteria were used for indicative purposes:

- The Interim Guideline Values (IGVs) for Groundwater from the Environmental Protection Agency (EPA) (2003), 'Towards setting guideline values for the protection of groundwater; Interim Report' [84],

All of the above assessment criteria are referred to as GAC for the purposes of assessing groundwater quality results.

Groundwater Analytical Results

The analytical results for the groundwater are presented in Appendix 8-1 and the laboratory reports are presented in Appendix 8-2.

Groundwater analytical results for indicators, inorganics and nutrients were observed to be below the respective acceptance limits, except for Nitrate (as NO_3) which exceeded the IGV limit (25mg/l) at MW1 (26mg/l) and Nitrite (as NO_2) which exceeded the GAC (0.375mg/l), DWAC (0.5mg/l) and IGV limits (0.1mg/l) at MW3 (1.06mg/l).

Groundwater analytical results for total coliforms exceeded the IGV (0cfu/100ml) and DWAC (0cfu/100ml) limits at PW1 (4cfu/100ml), MW1 (15cfu/100ml) and MW3 (1cfu/100ml). E.coli concentrations exceeded the DWAC limit (0cfu/100ml) at PW1 (4cfu/100ml), MW1 (15cfu/100ml) and MW3 (1cfu/100ml).

Groundwater analytical results for dissolved metals, SVOCs, VOCs, Additional SVOCs, TPH, PAHs and Phthalates were observed to be below all their respective acceptance limits at PW1, MW1 and MW3.

8.4 Hydrogeological Analysis

Hydrogeological testing was undertaken at location PW1 due to the good yield encountered during drilling.

8.4.1 Step Tests

A step test was conducted at PW1 on the 26th of April 2023 to estimate the potential yield (m^3/hour) of the aquifer and establish the sustainable pumping rate of the well (m^3/hour).

A summary of the results of the step test carried out is presented in Table 8-4 below.

Table 8-4: Step Test Summary Information

Step	Date	Time Started	Time since start of test (minutes)	Drawdown at end of step (m)	Average pumping rate during step (m^3/h)
1	26/04/23	09:26	0	ca. 1	ca. 8.2
2	26/04/23	10:26	60	ca. 2.4	ca. 9.8
3	26/04/23	11:22	116	ca. 4.7	ca. 15.2
4	26/04/23	12:23	177	ca. 8	ca. 21.9

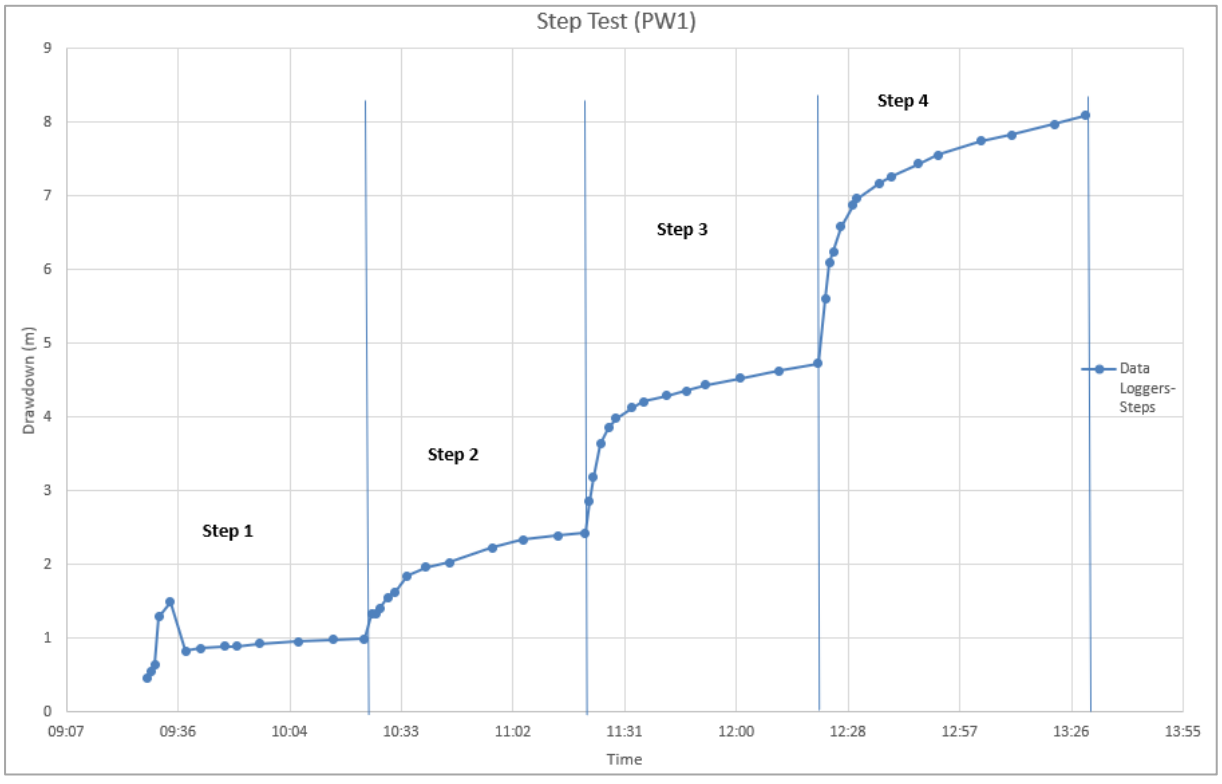
A summary of the depths to water in the test well is presented in Table 8-5 below.

Table 8-5: Summary of water levels in the test well during the step test

Stage	Date	Time	Water level (mbgl)	Drawdown (mbgl)
Initial rest water level	26/04/23	09:20	14.88	0
End of Step 1	26/04/23	10:24	15.87	0.99
End of Step 2	26/04/23	11:21	17.3	2.42
End of Step 3	26/04/23	12:21	19.6	4.72
End of Step 4	26/04/23	13:30	22.97	8.09

The monitored water levels during the step test are presented in Figure 8-5 below.

Figure 8-5: Monitored water levels in the pumping well during the step test



8.4.2 Constant Tests

Pumping Test

The pumping test was carried out to assess the aquifer's response to constant pumping at a specific discharge rate and to estimate the potential drawdown (m) at the Site due to the water abstraction.

The constant rate pumping test (pumping test) was conducted over a period of 10No consecutive days (ca. 240 hours) following a period of 10No days recovery after the pumping test. The pumping test started on the 2nd of May 2023 at 11:00 and finished on the 12th of May 2023 at 13:15. PW1 was left to recover following the pumping test.

The static water level at PW1, before the start of the pumping test, was 15metres below ground (mbgl) at 10:45 on the 2nd May 2023. The 240 hours pumping test started at 11:00 on the same day. At the start of the test, the water level dropped (drawdown) to 18.06mbgl at a discharge rate of 21.58m^3/hour. The discharge rate was decreasing as the pumping test was taking place and as the drawdown was increasing. An average discharge rate of approximately 14.18m^3/hour was achieved during the entire pumping test. Refer to Table 8-6 for the average flow rate (m^3/hour) and drawdown maintained during the pumping test.

Table 8-6: Average Flow Rate and Drawdown

Date (Pumping Test)	Average Flow Rate (m^3/hour)	Drawdown (mbgl)
02/05/23	14.88	11.51
03/05/23	20.00	18.41
04/05/23	18.51	25.57
05/05/23	17.00	30.84
06/05/23	15.50	35.18
07/05/23	13.90	36.31
08/05/23	12.90	36.26
09/05/23	11.60	32.64
10/05/23	10.70	32.59
11/05/23	10.50	33.79
12/05/23	10.40	33.26

The pump was switched off at 13:15 on the 12th May 2023, the last water levels measured at the test well before the pump was switched off was 22.78mbgl at a discharge rate of 10.22m^3/hour.

Figure 8-6 below shows drawdown versus time for the pumping well (PW1), PW3 and monitoring wells MW1, MW2 and MW3 through the pumping and recovery periods. Drawdown is the difference between the measured water level and the initial water level prior to pumping commencing. The measured drawdowns at the end of the 240 hour period in each well are shown in Table 8-7 below at a discharge rate of ca. 11m^3/hr.

Figure 8-6: Pumping test and recovery test

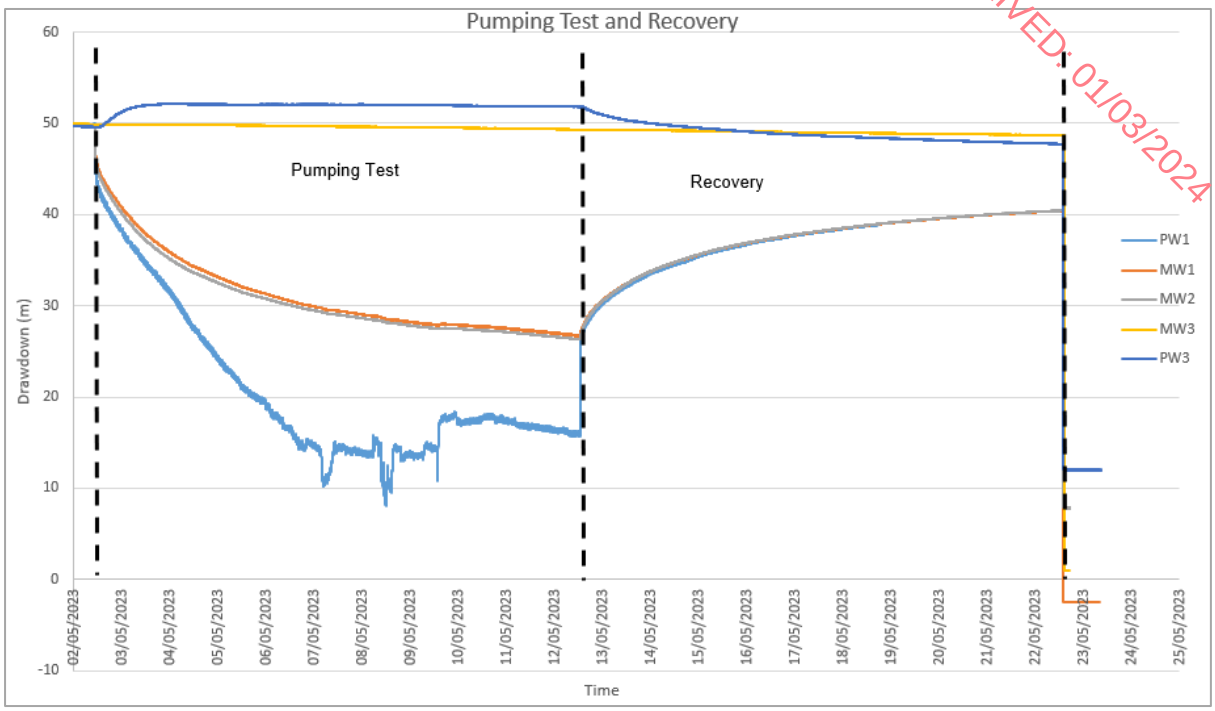


Table 8-7: Measured drawdown at end of 242.15 hr period of pumping – discharge rate of 11m3/hr

Well ID	Distance from PW1 (m)	Drawdown (m)
PW1	0	ca. 35
MW1	ca. 10	ca. 25
MW2	ca. 10	ca. 25
PW2	ca. 290	No drawdown observed
MW3	ca. 300	No drawdown observed
PW3	ca. 160	Increasing water level in the well observed during pumping – well recharging

The data from the pumped well and the monitoring wells from the pumped period have been analysed using the Jacob-Cooper Method. This method involved plotting drawdown versus log time and fitting a straight line to the data to estimate aquifer transmissivity, refer to Appendix 8-3 for the data and graphs. Hydraulic conductivity is then estimated by dividing the aquifer transmissivity by saturated aquifer thickness (assumed to be 57m based on the log for PW1).

Hydraulic conductivity (K) and transmissivity (T) values were not calculated for MW2 as this well had the same response to pumping as groundwater monitoring well MW1 (refer to Figure 8-6 above). Figure 8-6 shows that PW2 and MW3 were unaffected by the pumping at PW1 and PW3 data was not analysed as potential groundwater discharged from PW1 was getting into this well. Two (2No) pumping tests analysis were carried out at PW1 and MW1 which

corresponds with the early data coming from the early stages of the pumping tests and the late data corresponding with the later stages of the pumping tests. The two (2No) different stages identified in the data were potentially due to the fact that the upper part of the aquifer is more permeable (i.e. potentially more fractures) than the lower parts of the aquifer and it dries out quickly as the drawdown increases. The calculated values are presented in Table 8-8 below.

Table 8-8: Transmissivity and hydraulic conductivity values – Pumping test

	PW1 – Early Data	PW1– Late Data	MW1– Early Data	MW1– Late Data
Transmissivity (m^2/day)	74	1.4	55	3.9
Hydraulic conductivity (m/day)	0.82	0.025	1	0.071

Recovery Test

The pump was switched off at 13:15 on the 12th of May 2023, ca. 242.15hours after the start of the pumping test. The recovery in water levels in the pumped well and the monitoring wells was then monitored for a period of ca. 241.5 hours (from the 12th of May to the 22nd of May 2023) using the data loggers installed. The recovery data is presented in Figure 8-6 above.

The recovery data from the pumped well and the monitoring wells have been analysed using the Theis Recovery Method. Refer to Appendix 8-3 for the data and graphs.

Hydraulic conductivity (K) and transmissivity (T) values were calculated for the production well (PW1) during the recovery test and for MW1 during the recovery test. The calculated values are presented in Table 8-9 below.

Table 8-9: Transmissivity and hydraulic conductivity values – Recovery test

	PW1	MW1
Transmissivity (m^2/day)	6.3	5.8
Hydraulic conductivity (m/day)	0.11	0.11

The estimated transmissivity and hydraulic conductivity values are similar to those obtained for the pumping test analysed for the late data.

8.4.3 Drawdown Area

A prediction of the drawdown at the Site during the pumping test (after 240 hours pumping) at a potential discharge rate of 7.5m^3/hr has been calculated using the Dupuit-Thiem equation for unconfined aquifers.

The Dupuit-Thiem equation is normally used to assess flow towards a pumping well in unconfined aquifers under steady-state conditions. For the formulation of the equation, it is assumed that flow is laminar, radial and horizontal towards the well.

The Dupuit-Thiem equation to calculate drawdown at the Site is as follows:

$$h_2 = \sqrt{\frac{Q}{\pi . K} ln\left({}^{r_2}/_{r_1}\right) + h_1^2}$$

Where;

- Q is the discharge rate (m3/day)
- K is the hydraulic conductivity (m/day)
- r2 is the distance to point 2 from the pumped well (m)
- r1 is the distance to point 1 from the pumped well (m)
- h1 is the height of the water column above the base of the aquifer at point 1 (m)
- h2 is the height of the water column above the base of the aquifer at point 2 (m)

Drawdown at point 2 (s2) is equal to the saturated aquifer thickness minus h2.

The predicted steady state drawdown (s2) in water levels, using the formula above, due to pumping at a rate of ca. 7.5m^3/hour from PW1 are presented in Table 8-10 below. These drawdowns have been calculated using a hydraulic conductivity of 0.11m/d (from recovery test), the estimated steady state drawdown in the monitoring well MW1 with a pumping rate of 7.5m^3/hr of 17.0m as s1[3] and a distance of ca. 10m for r1 (distance from pumped well PW1 to monitoring well MW1). The following distances from the pumped well have been used as r2 for the other wells:

- PW2 is located ca. 290m to the north-west of the pumped well. However, the drawdown has not been calculated for this well as it showed the same response as MW3;
- MW3 is located ca. 300m to the north-west of the pumped well;
- PW3 is located ca. 160m to the south-west of the pumped well. However, no drawdown has been calculated for this well as the pumped data showed that the pumped water was getting into this well during the pumping test;
- MW1 and MW2 are located ca. 10m to the south-west of the pumped well and the same response to pumping is expected at those wells;

Table 8-10: Drawdown – Unconfined Aquifer

	Well located at 100m from PW1	**Well located at 200m from PW1**	**MW3 - Well located at 300m from PW1**
Predicted head - h_2 (m)	52.91	56.22	58.07
Predicted drawdown - s_2 (m)	4.09	0.78	Negligible

Using the Dupuit-Thiem equation, predicted drawdown with abstraction from the bedrock aquifer at 7.5m^3/hr is predicted to be 1m at ca. 190m from the pumped well, 0.5m at ca. 212m from the pumped well and 0.0m at ca. 236m from the pumped well (PW1). The location of production well PW1 is shown in Figure 8-4 above.

Based on the comprehensive analysis that was undertaken, it can be concluded a yield of ca. 7.5m3/hour (ca. 180m^3/day) was determined to be the sustainable yield for the test well. This abstraction rate is predicted (using the Dupuit-Thiem equation) to result in a steady state

[3] s1 (drawdown at MW1 of 17.0m) has been calculated for a discharge rate of 7.5m^3/hr utilising the actual discharge rate from the pumping tests (11m^3/hr) and the actual drawdown (ca. 25m) during the pumping test.

drawdown at MW3 located ca. 300m northwest from the pumped well (within the boundary of the Site) of negligible and therefore it will not be any predicted drawdown beyond the 300m of the pumped well (PW1). It has been estimated that there will be no drawdown beyond a distance of ca. 236m from PW1.

There are no known offsite or third party abstraction wells located within this proximity to the production well PW1 (i.e. 236m). According to the GSI mapping, the closest groundwater well is located within a residential dwelling ca. 0.01km south of the Site boundary and ca. 340m southwest of PW1 which use is unknown. Another groundwater well, within a residential dwelling, is located ca. 490m south of the production well (PW1) with an agri & domestic use. Therefore, it is envisaged due to the distance to those private well that the bedrock aquifer will be readily capable of providing a sustainable yield without impacting on any private or public wells in the vicinity of the Site.

A water sample was taken at the production well (PW1) during the pumping test and at MW1 and MW3 during a monitoring event. The quality of the groundwater beneath the Site is generally good, with the only exception of micro exceedances at the 3No wells. There were also slightly exceedances in nitrate at MW1 and nitrite at MW3.

8.4.4 Hydrology

The following subsections provide the hydrological context of the Site.

8.4.4.1 Surface Waterbodies

According to the EPA Maps, the Luffany_010 (IE_SE_16L680750) is located ca. 40m east of the Site, at its closest point. Two streams form part of the Luffany_010 waterbody, the Luffany Stream and the Drumdowney Lower Stream (IE_SE_16L680750), which merge 0.67km east of the Site (closest point). Both streams flow southeast and continue southeast after merging, flowing into the Lower Suir Estuary (Little Island - Cheekpoint).

The Site is located within the Suir Catchment (Catchment ID: 16) and subcatchment Blackwater [Kilmacow]_SC_010 (subcatchment ID: 16_29). Refer to Figure 8-7 below.

Figure 8-7: Surface Water in the Vicinity of the Site

8.4.4.2 Surface Water Quality

The EU Water Framework Directive (2000/60/EC) establishes a framework for the protection of both surface water and groundwater. Transposing legislation outlines water protection and water management measures required in Ireland to maintain high status of waters where it exists and to prevent any deterioration in existing water status under the River Basin Management Plan (RBMP).

The second cycle of the RBMP: 2018-2021 is currently concluding and under the 3rd cycle all eight River Basin Districts (RBDs) have merged to form one national RBD. The 3rd cycle RBMP has not yet been published, however a draft was made available for consultation in September 2021 [61].

According to the WFD, the Luffany_010 risk status is under review, and it is categorised as having “moderate” ecological potential in the most recent 2016-2021 assessment window. The Lower Suir Estuary (Little Island - Cheekpoint) is considered “at risk” [39] and is therefore at risk of failing to meet the objectives of the WFD to achieve “good” status by 2027. It is categorised as having “moderate” ecological potential in the most recent 2016-2021 assessment window.

8.4.5 Flood Risk Assessment (FRA)

The OPW’s Catchment Flood Risk Assessment and Management (CFRAM) maps [85], Flood Hazard Mapping, along with historical mapping (i.e. 6” and 25” base maps) were reviewed to assess flood risk in the area of the Site.

CFRAM mapping has been completed for the Site and shows that the Site is not located within any fluvial or pluvial flood zones. There is no identification of areas that are “prone to flooding” on the available historical 6” or 25” (inch) within the Site boundary [85].

No flood events or recurring flood incidents were identified at the Site or in its vicinity from the OPW's Flood Hazard Mapping (see Appendix 8-4 for a copy of the Past Flood Event Local Area Summary Report for the Site). The closest mapped flood event is a recurring event located 2.94km southeast of the Site, at Cheekpoint. The last report on the recurring event was in 2006, where the flood was identified as occurring in a local pub as a result of high tide and strong winds.

The area up to 2km surrounding the Site is not located within any predicted flood extents or areas at elevated risk of flood for both pluvial and groundwater flooding in current or predicted future scenarios on the OPW datasets. However, there is a moderate probability National Indicative fluvial flood zone (based on theoretical flood extent modelling) associated with Luffany Stream to the 0.32m north-east of the Site and a predicted flood extent for coastal/river flooding located 1.04km south of the Site, at the edge of the River Suir.

8.4.6 Protected Ecological Sites

The following Special Area of Conservation (SAC) are located in the vicinity of the Site, both of which are downstream of the Luffany_010 (IE_SE_16L680750) waterbody adjacent to the Site:

- Lower Suir SAC – It is located ca. 0.85km to the southeast of the Site (Site code – 002137).
- River Barrow and River Nore SAC – It is located ca. 1.9km to the east of the Site (Site code – 002162), where the Lower Suir SAC ends.

See Chapter 6 of this report for detailed description of these SACs. There are no other Natura Sites in the vicinity of the Site that could be potentially hydrogeological connected to the Site.

8.5 Characteristics and Potential Impacts of the Proposed Development

8.5.1 Construction Phase

Construction works in general can potentially impact on groundwater and surface water quality. Prior to the construction works, the Site consisted of agricultural fields with the primary contaminants of concern being nutrients, pesticides and suspended solids if a suitable pathway was present.

Major groundworks will be required to facilitate the proposal construction works, including the stripping of topsoil and excavation of soils. The excavation of soils will be limited to the overburden area which ranges from 0.0mbgl to 9.0mbgl according to the information obtained from the borehole logs at production wells locations PW1 and PW2. The construction works should not have the potential to pose a risk to the underlying bedrock aquifer, considering that the excavation of soils will take place above the water table. Therefore, temporary construction dewatering of groundwater will not be required during the 14 months of the construction phase.

During the construction phase, there is the potential for sediment could run off the Site into drains discharging to the Luffany Stream (EPA Code 16L68) and the Drumdowney Lower Stream (EPA Code 16D30), which merge 0.67km east of the Site (closest point). Both streams flow southeast and continue southeast after merging, flowing into the Lower Suir Estuary (Little Island - Cheekpoint). As there is a hydraulic connection between both streams and Natura Sites, ca. 0.9km southeast of the Site, mitigation measures will need to be implemented to ensure that the construction works will not result in any impacts on the Natura Sites. Pilling works and other sub-surface works will not have the potential to impact on these protected sites.

Potential impacts on groundwater and surface water quality during the construction phase can also be attributed to the incorrect handling of deleterious materials such as lubricants, waste oils, fuel spills from on-site plant, cement, etc.

There is the potential for a slight, short-term impact on surface water / groundwater during the construction phase from accidental spillages from machinery into the ditches and groundwater, excavations at the Site (i.e. topsoil and subsoils) and within drainage ditches and therefore, potentially into surface water and / or groundwater which require mitigation.

8.5.2 Operational Phase

The design of all drainage and bunding will be undertaken in accordance with relevant best practice guidelines. Refer to Chapter 16 for further information.

8.5.2.1 Water Supply

The Proposed Development has been designed to ensure that ca. 30% of the water used in the manufacturing process will be recycled to reduce the overall process water demand.

The Proposed Development will use a combination of mains water supply and/or abstracted groundwater from an on-site well. It is proposed to install rainwater harvesting at the Site to also provide a source of water for the Site. The roof water run-off will be collected by rainwater downpipes into the rainwater harvesting drainage system. The roof water will be then stored in 3No. overground rainwater harvesting tanks, and they will serve the proposed building when required. The overflow volume of roof water has been considered for the surface water soakaway capacity and the soakaway has been sized accordingly to include all storm water run-off from the roof in extreme rain events. The 3No. rainwater harvesting tanks have a total capacity of 900m^3 of water.

The water demand for the Proposed Development will be ca. 363m^3/day. The proposed water supply will be metred by a bulk meter at the connection point and extend through the Site forming a loop around the perimeter of the building. A boundary box with a water meter will be fitted on the main service line. The proposed watermain will be a 110mm diameter polyethylene pipe and the network includes air valves, sluice valves and hydrants. Double header hydrants will be provided no more than 46m apart and 6m away from the building for firefighting purposes.

A pre-connection enquiry application for the water supply for the development was submitted to Uisce Eireann (UE). UE has completed the review of the pre-connection enquiry and provided a 'Confirmation of Feasibility' that confirms that the required volume of water will be available for the process subject to an extension to the public supply network. The provided approximate watermain tie in point will be located on the N29 road. An extension from the public watermain tie-in point in the N29 will be required to reach to the applicant's boundary. The extension from the tie-in point will travel northwest along the N29 and turn onto the L3482 local road, down a short section of a public road to the applicant's boundary. The UE confirmation of feasibility reference number is: CDS23001741 and is included in Appendix 3-2. Robust hydrogeological testing has confirmed that ca. 7.5 m^3 per hour of groundwater will also be able to be abstracted from the underlying bedrock aquifer in a sustainable manner.

The hydrogeological assessments completed have confirmed that the underlying bedrock aquifer will be readily capable of providing a sustainable supply of water to the Proposed Development. It was determined that no drawdown was predicted beyond an approximate distance of 236m from the production well (PW1). Therefore, it was concluded that any private supply wells located beyond this distance from PW1 would have an imperceptible impact on their yields. Based on GSI mapping the closest groundwater well is located within a residential dwelling ca. 0.01km south of the Site boundary and ca. 340m southwest of PW1 and as such will not be impacted by the proposed on-site abstraction.

8.5.2.2 Stormwater Discharge

Approximately 54,000m^2 of the Site area will be impermeable following construction. This area requires draining via a surface water drainage system.

The stormwater run-off from the Site has been divided into 2No. areas. The first area comprises the plasterboard plant and concrete yard. The storm water run-off from the building and yard areas will be collected via a new drainage system, comprising of 450mm diameter main drainage pipe, service drains, downpipes, gullies, and manholes. 2No. main drainage lines will be provided that run around the perimeter of the building and discharge to a soakaway pit that will be located south of the building. Prior to discharge to the soakaway pit the storm water run-off will pass through a settlement tank to trap solids and a fuel/oil bypass separator (Klargester NSBE025 – Class 1 separator) to remove oils and hydrocarbons, which has the potential to infiltrate into the aquifer (receptor). The 2No. drainage lines will be separate and as such each drainage line will be provided with their own dedicated settlement tank, separator, and monitoring chamber for sampling water quality.

The on-site testing to determine the infiltration rate was carried out in accordance with BRE 365 Soakaway design. The ground conditions and infiltration rates were determined to be suitable for the design of a soakaway pit. The infiltration rate at the proposed soakaway location was determined to be $1.76x10^{-5}$ m/sec. The soakaway was also sized in accordance with BRE 356 Soakaway design. Refer to Appendix 7-2 (Soil Chapter) for the soakaway tests report.

The soakaway pit is located ca. 100m south of the production well PW1. This soakaway will be used to treat storm water roof run-off and storm water yard run-off from the Proposed Development, which is unlikely to be contaminated once is discharged into the soakaway given the design measures proposed (i.e. settlement tanks, separator and monitoring chamber). Given that the regional groundwater flow direction is towards the Estuary and the fact that the soakaway pit is located cross-gradient to the production well PW1, it is unlikely that there will be an impact to the production well (PW1) from the soakaway pit discharging to ground.

The second area that requires storm water management is the proposed access road to the east. Stom water run-off from this area is to be located via a new drainage system comprising of a drainage pipe ranging from 300mm – 375mm in diameter, road gullies, manholes and service drains. Prior to discharging to an existing 300mm diameter storm water drain, located at the proposed entrance, the storm water will flow through a fuel/oil bypass separator (Klargester NSBE025 – Class 1 separator) to remove oils and hydrocarbons. Discharge to the existing storm water drain will be limited by a hydrobrake that will limit flow to 26l/s. The greenfield run-off from the Site has been calculated to be 40l/s in line with the Greater Dublin Strategic Drainage Study (GDSDS) and in line with best practice. The access road storm water drain has been designed to cater for adequate storage during a 1 in 100-year storm event with an allowance of 30% increase in rainfall included in the design to account for climate change.

During the operational phase, the potential for suspended solids to have an impact on groundwater quality will be no significant by conducting adequate maintenance on a regular basis. Oil spillages have the potential to have a significant impact into the aquifer, however due to the mitigation measures proposed in chapter 8.6, this impact will be minimised.

8.5.2.3 Foul Wastewater Discharge

There will be no direct discharge of foul wastewater into the receiving environment. A pre-connection enquiry application for the foul water loading for the development was submitted to UE, which competed the review of the pre-connection enquiry application and provided a confirmation of feasibility document confirming that the existing UE foul drainage system has capacity to cater for the Proposed Development and they provided a foul sewer tie-in location in the public road at the southern boundary. The confirmation of feasibility reference no is: CDS23001741.

Therefore, under agreement with UE, the foul water drainage for the development will be collected via a new 150-225mm diameter foul sewer network that will flow to the southern boundary by gravity along the western boundary. The proposed foul drain will be connected

to an existing IW foul water manhole located just outside the development boundary in a public road. Thus, the foul wastewater will be discharged into the public foul sewer system and there will not be direct impact on surface waters or groundwater as part of the Proposed Development. Details on the foul wastewater are presented in Chapter 3 and 16.

8.5.3 Unplanned Events

As with all industrial facilities, there is some risk that unplanned events at the Site, e.g. accidents, which are typically outside of the operator control could result in a risk to the environment.

The risks identified in Chapter 7 – Land and Soils are also equally applicable to surface water and groundwater. Further risks specific to surface water are identified in Table 8-11.

Table 8-11: Unplanned Events: Water

Hazard	Likelihood	Consequence	Reasoning
Discharge of foul wastewater effluent to the public sewer	1	3	Measures will include but are not limited to the following: • Discharge will comply with legal standards of the EPA in accordance with BAT.
Discharge of contaminated surface water to the nearby streams/rivers	1	3	Measures will include but are not limited to the following: • The drainage system will include settlement tanks, emergency shut-off valves and interceptors. • Surface water discharges will be monitored on regular basis according to best practice. • Surface water trigger values will be set for the Site once an adequate data set is available. • Personnel will be trained to respond to emergency responses.
Spillage of chemicals	1	3	Measures will include but are not limited to the following: • The drainage system includes settlement tanks, emergency shut off valves and interceptors. • An emergency shut off valve will be installed. All raw materials will be stored in accordance with BAT and appropriate EPA guidance. Measures will include but are not limited to the following: • All relevant external storage of chemicals or liquids within bund protected zones/containers. • Tanks and bunds will be impervious to the material they contain. • All tanks, bunds and pipes will be inspected in accordance with best practise.

(1) Likelihood rating 1-5 where 1 is very unlikely and 5 is very likely

(2) Consequence 1-5 where 1 is Trivial and 5 is Massive

8.6 Proposed Mitigation Measures and/or Factors

8.6.1 Construction Phase

General construction mitigation measures are outlined in other chapters of the EIAR such as Biodiversity (Chapter 6) and Soils (Chapter 7). Specifically, with regard to the protection of surface water and groundwater, the measures outlined in the section will be adhered to.

- C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [18].

The proposed measures to remove the risk from potential contamination and emergency procedures to be implemented in the event of an accidental release or spill of potentially contaminating substances are outlined below. These procedures will be communicated to all relevant Site staff.

At a minimum the following measures will be in place:

- Appropriate class 1 bypass petrol/oil separator and silt traps will be installed for the protection of surface water and groundwater;
- Fuels, lubricants and hydraulic fluids for equipment used will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice;
- Prior to any works commencing, all construction equipment will be checked to ensure that they are mechanically sound, to avoid leaks of oil, fuel, hydraulic fluids and grease;
- Adequate spill kits including absorbent booms and other absorbent material will be maintained on-site;
- All contractor workers will be appropriately trained in the use of spill kits;
- Any spillage of cementitious materials will be cleaned-up immediately;
- The use of concrete pours for various elements of the precast concrete pile structures including pile caps, ground beams and the ground floor slabs/yard slabs will have the potential to impact groundwater. Where possible, use pre-cast or modular to reduce on-site batching; and,
- Any sediments impacted by contamination will be excavated and stored in appropriate sealed containers for disposal off site in accordance with all relevant waste management legislation.

The following additional measures will be implemented during general earthworks at the Site (i.e. stripping of topsoil and excavation of subsoils):

- As much as practicable works will not take place within or immediately adjacent to the drainage ditches during heavy rainfall events or immediately after a heavy rainfall event.
- Any areas of bare soil along or immediately adjacent to the drainage ditches will be:
    - Covered with a sediment control fabric immediately following the works. This fabric should be of a type which also allows the establishment of new vegetation;
    - Reseeded within the next growing season; and,

- Inspected regularly until new vegetation is established.

- All stockpiles will be kept a minimum distance of 20m from drainage ditches.

There will be no direct discharges to the any of the surface water drainage systems within the vicinity of the Site during the construction phase.

As a result of the mitigation measures, there will be no likely significant effects on surface or ground water or the environment.

8.6.2 Operational Phase

There will be a surface water drainage connection between the Site and the Lower River Suir SAC and the River Barrow and River Nore SAC, as a result of the proposed drainage system. Therefore, the Site will be hydrologically linked to these receptors via the existing proposed surface water drainage in the northeast corner of the Site, along the proposed new Site access.

Should pollutants from the Proposed Development enter the River Suir / Lower River Suir SAC, through the surface water run-off discharging from the Site into the River Suir / Lower River Suir SAC, these pollutants could adversely affect the water quality. However, prior to discharging to an existing 300mm diameter storm water drain, located at the proposed entrance, the storm water will flow through a fuel/oil bypass separator (Klargester NSBE025 – Class 1 separator) to remove oils and hydrocarbons. The discharge to the existing storm water drain will also be limited by a hydrobrake that will limit flow to 26l/s. Therefore, such measures will ensure that there will be no potential impairment of water quality due to the increased storm water run-off.

The storm water run-off from the rest of the Site will be collected via a new drainage system, which will run around the perimeter of the building and discharge to a soakaway pit located south of the building. Prior to discharge to the soakaway pit the storm water run-off will pass through a settlement tank to trap solids and a fuel/oil bypass separator (Klargester NSBE025 – Class 1 separator) to remove oils and hydrocarbons, which has the potential to infiltrate into the aquifer (receptor).

Therefore, it can be concluded that the Proposed Development during the operational phase will not have any adverse effects on water quality of the Lower River Suir SAC and River Barrow and River Nore SAC through either surface water or groundwater quality.

The design of all drainage and bunding will be undertaken in accordance with relevant best practice guidelines. In addition, the following will also be undertaken:

- Stormwater collected on-site will undergo continuous testing as per best practise.
- The settlement tank and oil interceptor will be service and maintained, including the removal of sediments offsite periodically by a permitted contractor to a licensed facility, to prevent the release of finer sediment into the drainage ditch.
- There is no requirement for process water drainage as there is no process waste generated from the development.

GABM Limited will comply with any future water abstraction regime. The design of the Proposed Development will seek to maximise the benefit of rainwater harvesting in order minimise the volume of water that will need to be sourced from the public mains and abstracted from the underlying groundwater.

8.7 Cumulative and In-Combination Impacts

The water to be supplied for the production needs of the Proposed Development is based on a combination of recovered water from rainwater harvesting, mains water supply and/or

abstracted groundwater. In addition, the Proposed Development has been designed to ensure that ca. 30% of the water used in the manufacturing process will be recycled to reduce the overall process water demand.

There are a number of industrial facilities in close vicinity to the Site, one of which is adjacent to the southeast of the Proposed Development and a further one located ca. 500m southwest of the Proposed Development which are IE licenced and are extracting groundwater for their production needs. The hydrogeological analysis undertaken at the Site determined that the production well PW1 installed in the aquifer beneath the Site would potentially yield ca. 7.5m^3/hr. Additionally, the tests showed that there will be no drawdown beyond 236m of PW1 and therefore, abstracting groundwater at a discharge rate of 7.5m^3/hr for the Site would not impact on the local hydrogeological environment (i.e. the availability of groundwater for the other facilities). Consequently, there will be no cumulative and In-Combination Impacts in terms of groundwater abstracted from PW1.

The water quality within the Lower Suir Estuary is 'At risk' of failing to meet their Water Framework Directive (WFD) objectives by 2027. The other facilities around the Site ultimately discharge into the Lower Suir Estuary. There will be no discharges from the Proposed Development to the nearby surface water bodies and consequently, there will be no cumulative and In-Combination Impacts in terms of discharging to the Estuary.

8.8 Interactions with other Environmental Attributes

Water interacts with other environmental attributes as follows:

- Chapter 5: Population and Human Health:
    - In the unlikely event of groundwater contamination, there would be a negative impact on the nearby population and human health. However, based on the low risk of this occurring, the proximity to any groundwater protection zones, the design of the Proposed Development and the mitigation measures in place in Chapter 8, this impact will be not significant.
- Chapter 6: Biodiversity:
    - The ecological status of surface waters will not be significantly affected by any discharge to surface waters or water abstraction and there will not be a significant effect on any protected site.
- Chapter 7: Soils and Geology:
    - In the unlikely event of soil contamination, there would be a negative impact on the underlying aquifer. However, based on the low risk of this occurring with the proposed mitigation measures in place, in Chapter 8, and the design of the Proposed Development this impact will be not significant.
- Chapter 15: Natural Resources, Energy and Waste:
    - Improper waste storage and disposal would have a negative impact on groundwater. However, based on the low risk of this occurring with the proposed mitigation measures in place in this chapter and chapter 15, and the design of the Proposed Development this impact will be not significant.
- Chapter 16: Water Supply and Wastewater:
    - Due to groundwater abstraction, there would be an impact on the local hydrogeological environment. However, based on the low risk of this occurring with the proposed mitigation measures in this chapter and chapter 16, and the design of the Proposed Development this impact will be not significant.

8.9 Indirect Impacts

No indirect impacts are expected.

8.10 Residual Impacts

As a result of the design of the Proposed Development and the prevention and mitigation measures to be taken, there will be no significant effect on surface and groundwater quantity or quality from the Proposed Development. The Proposed Development will not cause a deterioration in surface or groundwater quality status to compromise the ability of any surface or groundwater to meet the objectives of the Water Framework Directive.

There will be no significant discharges of pollutants from priority or other polluting substances to groundwater or surface waters during either the construction or operational phases therefore the chemical status of the surface and groundwater will not deteriorate. Considering direct, indirect and cumulative impacts, and the proposed mitigation measures, the residual impact associated with the Proposed Development on the hydrological or hydrogeological regime will be not significant.

8.11 Monitoring

During the construction phase, compliance with all relevant regulations and best practice standards will be monitored by the contractor.

A program of monitoring for surface water and groundwater will be undertaken to ensure all discharges from the Site will be in compliance with any requirements stipulated by the Local Authority.

8.12 Reinstatement

Not applicable.

8.13 Difficulties Encountered in Compiling this Information

No difficulties were encountered when compiling this information.

9 AIR QUALITY

9.1 Introduction

This Chapter of the EIAR was prepared by the MOR team and provides a description and assessment of the potential impacts of the Proposed Development on air quality in the vicinity of the Site. Potential impacts on air quality arising from the Proposed Development are assessed in this chapter and include:

- Nuisance dust arising during the Construction Phase;
- Potential impacts from traffic associated with the Proposed Development during the Construction and Operational Phases; and,
- Point source emissions arising from the Operational Phase including:
    - PM_{10} emissions from the operation of 1No. Calciner, 2No. Dryer Stacks and 10No. warehouse filters.

9.2 Methodology

The following standards and guidance documents were used to evaluate the baseline conditions and in the assessment of potential air quality impacts:

- Air Quality Standards Regulations 2011 (S.I No. 180/2011) [86];
- Air Dispersion Modelling Guidance Note (AG4), 2020 [87];
- Environmental Protection Agency – Air Quality in Ireland 2021 [88];
- Environmental Protection Agency – Air Quality in Ireland 2022 [89];
- Transport Infrastructure of Ireland – Air Quality Assessment of Specified Infrastructure Projects, 2022 [90];
- Institute of Air Quality Management (IAQM) – Guidance on the assessment of dust from demolition and construction, 2014 [91].

To determine the potential risks associated with dust emissions during the Construction Phase of the Proposed Development, a dust risk assessment (DRA) was carried out following the methodology provided by the Institute of Air quality Management – *Guidance on the assessment of dust from demolition and Construction* [91]. A screening of potential emissions during the Construction Phase caused by vehicle emissions will follow the guidance provided by the Transport Infrastructure Ireland (TII) *Air Quality Assessment of Specified Infrastructure Projects* [90].

To determine the potential impacts caused by the operation of point sources identified on site, an air dispersion model was constructed to determine potential impacts on nearby sensitive receptors. The building and interpretation of the modelling results follows the Environmental Protection Agency – *Air Dispersion Modelling Guidance Note (AG4*) [87].

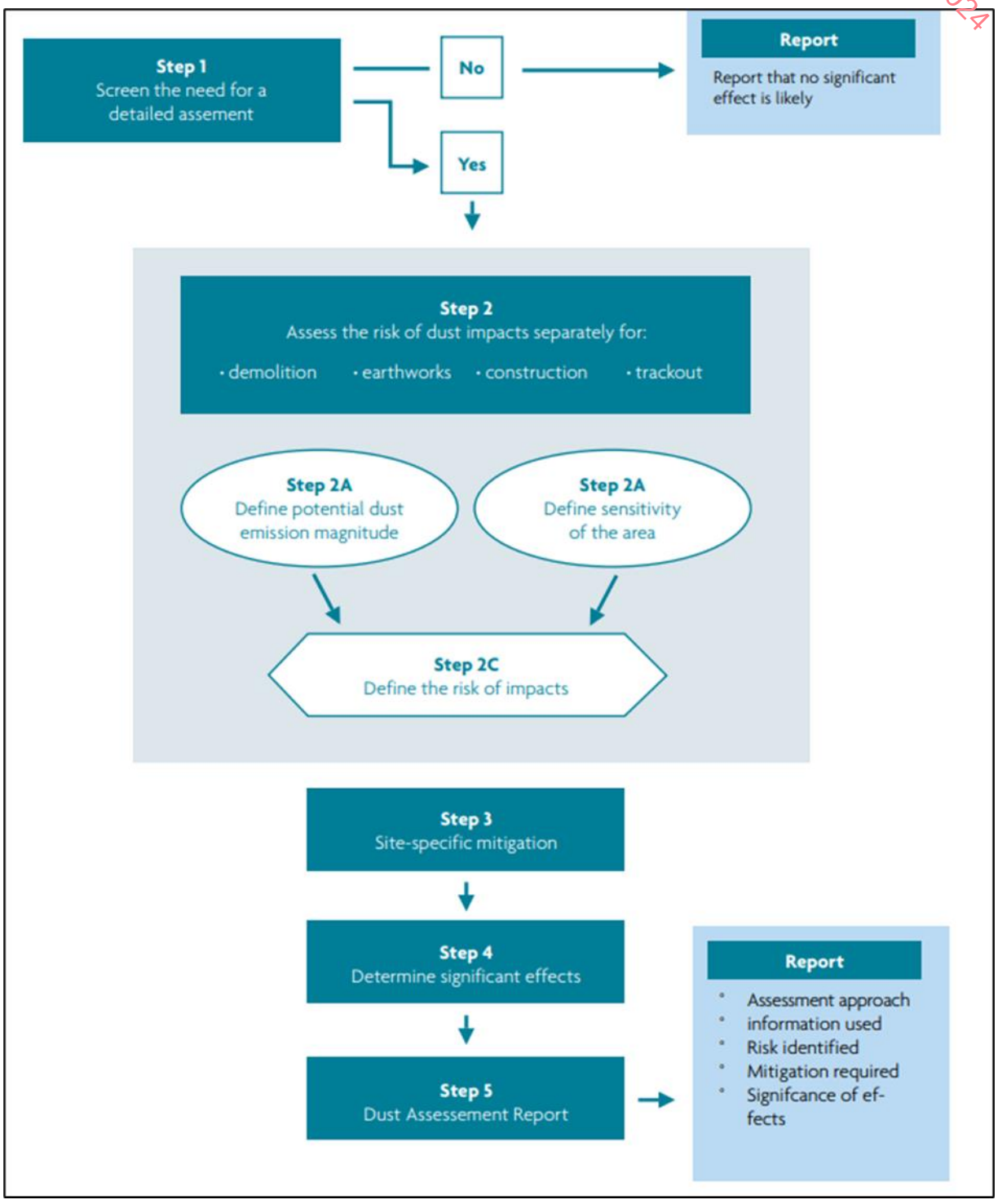
The burners associated with the dyers have the potential to release NO_x, however, NO_x emissions arising from direct drying are exempt from emissions limit values (ELVs) or monitoring, refer to Medium Combustion Plant Directive Part 4 (3). Moreover, given the mixing of flue gas from burners with drying air, these NO_x emissions are very diluted to the point of being negligible. Therefore, these emissions will not be considered any further.

Other sources of Operational Phase emissions include traffic related emissions as a result of vehicle movement. The additional traffic as a result of the Proposed Development has been screened in accordance with the TII guidance specified above.

9.2.1 Construction Dust Risk Assessment

A construction DRA of dust emissions, arising from construction activities, was completed in accordance with the IAQM Guidance [91]. The steps used to perform a DRA are presented in Figure 9-1 below with the detailed methodology presented in Appendix 9-1.

Figure 9-1: Steps to Perform a Dust Risk Assessment [91]



9.2.2 Air Dispersion Modelling

Air dispersion modelling was carried out using the AERMOD View software (version 11.2.0). AERMOD View is a user interface for AERMOD, Gaussian Plume Air Dispersion Model,

created and distributed by Lakes Environmental. AERMOD is developed and maintained by the American Meteorological Society (AMS) in collaboration with the United States Environmental Protection Agency (USEPA) [92]. AERMOD is a steady-state Gaussian plume model that assess pollutant concentrations from a variety of sources associated with industrial complexes. It incorporates building downwash algorithms, advanced depositional parameters, local terrain effects, and advanced meteorological turbulence calculations.

Key features of the model include:

- Setting and dry deposition of particles;
- Building downwash;
- Point, area, line, open pit, flare and volume sources; and,
- Flat and complex terrain.

AERMOD has enhanced plume dispersion coefficients due to building turbulent wake. It incorporates reduced plume rise caused by a combination of descending streamlines in the lee of the building and the increased entrainment in its wake.

AERMOD is recommended for use in the Irish EPA's AG4 Guidance AG4 [87] as well by the USEPA, and commonly used in Ireland for air dispersion modelling of point source emissions from licenced facilities.

9.2.2.1 Model Overview and Assumptions

In this model the following assumptions were made:

- The 1No. Calciner will operate 24/7, year-round;
- The 2No. Dryer stacks will operate 24/7, year-round;
- The 10No. Extraction Fans will operate 24/7, year-round;
- Exit velocity in the model was based on the actual velocity provided by the client;
- Five consecutive years (2019-2023) of met data from the Johnstone Castle (Co. Wexford) Met station represents conditions at the site and each met year was modelled separately. Cloud cover data, as it is not available from Johnstown Castle, was obtained from Casement Aerodrome Co. Dublin;
- Mass emissions were calculated based on normalised volumetric flow and a normalised concentration emission rate;
- Building wake effects were assessed within the model (termed building downwash);
- Terrain data was obtained from AERMODs terrain processor (AERMAP), which uses 30m resolution data from the Shuttle Regional Topographic Mission (SRTM);
- The receptor grid measuring 2.45km x 2.45km (uniform cartesian receptor grid with 50m grid resolution) was utilised for the modelling, AG4 recommends a grid size of no greater than 3km x 3km; and,
- All on-site buildings and significant process structures were mapped into the model to create a three-dimensional visualisation of the Proposed Development and its emission points.

Figure 9-2 shows the location of all point sources used in the model.

Figure 9-2: Points sources for air dispersion modelling

Input data for the point sources is detailed in Table 9-1, with concentration emission limit values (ELV), actual exit velocity, stack exit temperature and diameter and released height provided by engineering drawings, manufacturers specifications and the client. Air emissions abatement systems will be placed on the warehouse emission points (A4 to A13) in the form of bag filters with reverse jets.

Table 9-1: Emission and Stack data for Dryer and Warehouse Filters used in Air Dispersion Modelling

Equipment Type	A1	A2	A3	A4 to A13
Source	Pre-Dryer Zone Stack	Main Dryer Zone Stack	Calciner	Warehouse Filter
Fuel	Natural Gas	Natural Gas	Natural Gas	N.A.
Volumetric Flowrate Normal (Nm^3/hr)	41,728 (a)	157,459 (a)	50,159(a)	10,224
Stack Diameter	1.0	2.0	1.3	0.3
Release Height (m)	14.00	15.10	28.70	13.22

Equipment Type	A1	A2	A3	A4 to A13
Exit Temperature (°C)	60	80	160	Ambient
Actual volumetric flow (m^3/s)	50,894	203,575	79,524	128
ELV (mg/Nm^3)	10	10	10	10
Mass Emissions (g/s)	0.1159	0.4374	0.1393	0.03

(a) Normalised conditions at 273.15K, 101.3kPa.

9.2.2.2 Buildings

When modelling emissions from a facility, considerations need to consider that the sources of emissions may be influenced to additional turbulence by the presence of nearby buildings. Buildings are considered nearby if they are within five times the lesser of the building height or maximum projected building width.

Building downwash contributions are calculated using the Plume Rise Model Enhancement Processor in AERMOD. The model takes into account the position of each source relative to each building and the projected shape of the building for 36 wind directions. The model determines the change in plume centrelines with the location of the downwind distance based on the slope of the mean streamlines and coupled to a numerical plume rise model [87].

All buildings used in the model were reflective of engineering drawings of the future site layout. Buildings were modelled as blocks, with the heights of the tallest edge utilised as the building height. Table 9-2 details the buildings and their respective heights and are shown in Figure 9-3.

Figure 9-3: Buildings used in model

Table 9-2: Building Heights used in Model

Building Description	Model ID	Height above ground level (m)
Board Line	B01	11.60
Canopy (not solid building)	B02	5.30
Offices	B03	10.10
Board Warehouse and Board Line	B04	9.88
Board Warehouse and Board Line	B05	12.50
Board Warehouse and Board Line	B06	7.78
Calciner	B07	26.50
Raw Materials Store	B08	13.22
Rainwater Harvesting Tank 1	B09	6.50
Rainwater Harvesting Tank 2	B010	6.50
Rainwater Harvesting Tank 3	B011	6.50

9.3 Policy Context

The following sections will review and highlight relevant policies relating to the Proposed Development in the context of national, regional and local air quality objectives.

9.3.1.1 Clean Air Strategy

The Department of Communications, Climate Action and Environment (DCCAE) prepared a Clean Air Strategy, which was published in 2023 [93]. This strategy outlines efforts to reduce certain specific sources of emissions that are having the greatest impact, whilst also identifying cost effective approaches to emission reductions.

The Clean Air Strategy outlines key strategic priorities relating to air quality in Ireland, including:

- Ensure continuous improvements in air quality across the country;
- Ensure the integration of clean air considerations into policy development across Government;
- Enhance regulation and enforcement; and,
- Promote and increase awareness of the importance of clean air.

9.3.1.2 Kilkenny City and County Development Plan 2021-2027

The KCCDP promotes the importance to Air Quality, relevant to the Proposed Development:

10.2.1.1 Air Quality

"The Council's role in relation to air quality is mainly to promote a reduction in air pollution, through the implementation of relevant legislation and through the provision of advice and guidance on best practice. The Council also implements the provisions of the Air Pollution Act 1987 and Air Pollution (Licensing of Industrial

Plant) Regulations 1988. The Council will promote the best ambient air quality compatible achievable with sustainable development."

7.5.2 Development Management Requirements

"The Council will seek to minimise environmental and other impacts of mineral extraction through rigorous application of licensing, development control and enforcement requirements for quarry and other associated developments including, but not limited to, consideration of visual impacts, methods of extraction, noise levels, dust prevention, protection of ground and surface waters, impacts on residential and other amenities, impacts on the road network (particularly with regard to making good any damage to roads), road safety, phasing, re-instatement and landscaping of worked sites."

9.4 Receiving Environment

9.4.1 Air Quality Standards

Air Quality Standards within Ireland are laid down by the Clean Air for Europe (CAFE) Directive 2008 (2008/50/EC), which was transposed into Irish law as the Air Quality Standards Regulations 2011 (S.I 180 of 2011).

Air Quality Standards (AQSs) are typically based on the effects of the relevant pollutants on human health, although effects on other receptors such as vegetation are sometimes considered. The relevant limit values for particulate matter are laid out in Table 9-3 below.

Table 9-3: EU and Irish Limit Values for Relevant Pollutants

Pollutant	Objective			
	Concentration	Maximum No. of Exceedances permitted	Exceedance Expressed as Percentile	Measured as
Particulate Matter PM_{10}	50 µg/m^3	35 times per year	90.4th percentile	24-hour mean
Particulate Matter PM_{10}	40 µg/m^3	~	~	Annual mean (calendar year)

9.4.2 Background Air Quality

EU Legislation on air quality requires that all Member States divide their territory into zones for the assessment and management of air quality. The current trends in air quality in Ireland are reported in the EPA publication – Air quality in Ireland – 2022, which is the most up to date report on air quality in Ireland [89].

For ambient air quality management and monitoring in Ireland, the AQS Regulations (S.I. No. 180 of 2011) defines four zones, set out as follows:

- Air zone A – Dublin Conurbation;
- Air Zone B – Cork Conurbation;
- Air Zone C - A total of 24 cities and large towns: Athlone, Balbriggan, Bray, Carlow, Celbridge, Clonmel, Drogheda, Dundalk, Ennis, Galway, Greystones, Kilkenny, Leixlip, Letterkenny, Limerick, Mullingar, Naas, Navan, Newbridge, Portlaoise, Sligo, Tralee, Waterford and Wexford; and,
- Air Zone D – Rural Ireland i.e. the remainder of the country excluding Zones A, B and C.

The location of the Proposed Development is located within the air quality Zone D, therefore representing rural air quality. Table 9-4 below shows the Annual Mean Concentrations of PM_{10} measured at Zone D Stations for the period 2021 to 2022.

Table 9-4: Annual Mean Concentrations of PM_{10} measured at Zone D Stations

Monitoring Stations	Total Particulates PM_{10} Annual Mean (µg/m³)	
	2021 Annual Mean (µg/m³)	2022 Annual Mean (µg/m³)
Castlebar	9.8	11.2
Cobh	12	13.2
Claremorris	9.5	7.9
Kilkitt	7.8	8.5
Roscommon Town	10.3	11.2
Enniscorthy	13.7	15.0
Macroom	14.6	16.1
Tipperary Town	12.7	13.9
Carrick-on-Shannon	9.4	9.4
Birr	12.2	14.5
Askeaton	8.7	9.4
Cavan	10.6	11.0
Edenderry	17.8	17.7
Mallow	14.8	13.5
Longford	13.9	16.0
Cobh Cork Harbour	13.4	14.4
Average Zone D	**11.9**	**12.7**
Average Zone D (2021-2022)	**12.3**	

The maximum concentration recorded in Zone D for PM_{10} was recorded at Edenderry Station in 2021 (17.8µg/m^3). Annual concentrations recorded at Zone D from 2021 to 2022 ranged between 7.8 and 17.8µg/m^3.

As recommended in the AG4 guidance, background concentrations are available from the representative monitoring stations, i.e. Zone D stations, operated by the EPA. The selected background concentration was taken as the most recent two-year average of all the monitoring stations identified in Table 9-4 above (12.3µg/m^3).

9.4.3 Local Sources of Emissions to Air

In accordance with AG4 guidance note [2], a cumulative assessment is necessary if:

- There is a regulated installation nearby in the area where the impact of the modelled facility exceeds 5% of AQS;
- If the nearby installation emits more than 100 tonnes of relevant pollutant per year.

Table 9-5 shows nearby industrial facilities and licenced facilities were identified within proximity of the Proposed Development.

Table 9-5: IEL and Industrial Sites located in close proximity to the Proposed Development

Licence Number/ Name	Major Class of Activity	Distance to Proposed Development (Orientation)	Relevant pollutants monitored
P1015/ Glanway Limited	11.4 (b)(ii) pre-treatment of waste for incineration or co-incineration	1.2km (south)	Total Particulates
P0963/ Tirlán Limited	7.2.1 The treatment and processing of milk	1.1km(southwest)	Particulates
P0001/Smartply Europe Designated Activity Company	8.7 Production of one or more of the defined wood-based panels	530m (east)	Total particulates

For consideration of potential cumulative impacts during the Construction Phase, the IAQM Guidance on construction dust considers that the maximum extent in which potential impacts can occur, relating to construction activities is within 350m of the boundary of the site, which takes into account the exponential decline in both airborne concentrations and the rate of deposition with distance. As no facility is located within the 350m of the site boundary of the Proposed Development, the potential for cumulative impacts during the Construction Phase are considered not likely.

The AG4 Appendix E [87] on cumulative impact assessment states that:

When an existing nearby major air emission point source has been identified near the installation under consideration, a methodology is required to determine whether this nearby source needs to be included in the air dispersion modelling assessment and if so which pollutants should be included".

The potential for cumulative impacts are considered further in Section 9.7 below.

9.4.4 Sensitive Receptors

A human receptor refers to any location where people or property may experience the adverse effects of airborne emissions. An ecological receptor refers to any sensitive habitats which may be affected by emissions (soiling and airborne). To ensure the assessment is presented clearly, proxy locations (for receptors) are presented as they were the most notable and/or closest receptors to the Proposed Development. Receptors that are located further away than the proxy from the Proposed Development will experience either a similar or a reduced impact due to distance attenuation of emissions. When numerating human receptors, exact counting was not required, rather an approximation of human receptors was implemented (i.e., residential dwelling: 1No. human receptor, school: >100 receptors).

9.4.4.1 Construction Dust Risk Assessment

For the construction phase, a total of ten (10No.) human receptors were identified within the appropriate buffer zones in respect of the Site boundary (within 350m from the site boundary) and the primary access routes (50m from the primary access route used by construction vehicles up to 500m from the entrance).

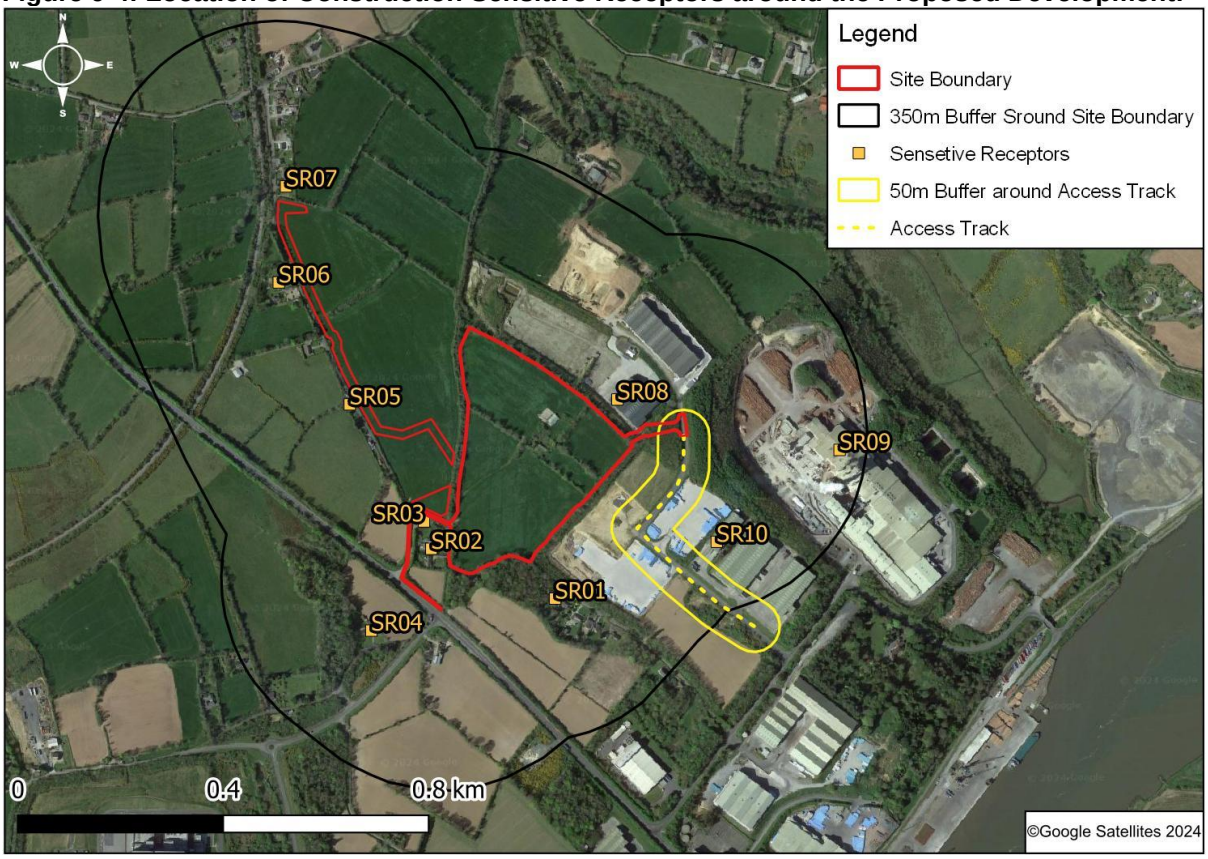
Table 9-6 below details important information regarding the distance of the sensitive receptors identified to the Site Boundary and primary access routes.

Table 9-6: Description of Sensitive Receptors associated with the Construction Phase of the Proposed Development

ID	ITM (Easting, Northings)		Description of Sensitive Receptor	Distance from Emission Source/Construction Route (m)	Terrain between Site and Receptor
	E	N			
SR01	265462	113686	Proxy for residential houses to the southeast of the Site	ca.86m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing vegetation associated with the woodland area and hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR02	265220	113783	Residential house to the southwest of the Site	ca.36m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR03	265206	113836	Residential house to the southwest of the Site	ca.35m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR04	265104	113623	Proxy for Residential houses to the southwest of the Site	ca.144m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing agricultural fields, woodland areas the N29 and hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR05	265062	114064	Proxy for residential houses to the west of the Site	ca.21m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR06	264923	114301	Proxy for residential houses to the west of the Site	ca.46m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR07	264937	114488	Proxy for residential houses to the northwest of the Site	ca.31m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.

ID	ITM (Easting, Northings)		Description of Sensitive Receptor	Distance from Emission Source/Construction Route (m)	Terrain between Site and Receptor
	E	N			
SR08	265583	114073	Industrial Sheds to the northeast of the Site	ca.43m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR09	266016	113975	Smartply Europe Industrial Sheds west of the Site	ca.308m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing woodland area and hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.
SR10	265776	113796	Storage Facilities to the southwest of the Site	ca.217m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing woodland area and hedgerows. These features will provide some level of screening from dust generating activities during the Construction Phase.

Figure 9-4: Location of Construction Sensitive Receptors around the Proposed Development.



As outlined in the IAQM Guidance, an assessment for the potential impacts of dust associated with the Construction Phase is required when there is:

- A receptor within 350m of the boundary of the Site and/or 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s) or;
- An ecological receptor is within 50m of the boundary of the Site and/or 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance.

A total of ten (10No.) receptors were identified for assessment during the Construction Phase.

In accordance with the IAQM Guidance, assessment for potential construction phase impacts on ecological receptors are only considered when such ecosystems are within 50m of the redline boundary or 50m of the primary access route taken by construction vehicles. The Lover River Suir SAC (site code: 002137) is not located within 50m of either of the attributes considered for further assessment. Secondly, no known dust sensitive species are present and considering the short-term nature of construction works, the potential effects from construction related activities are considered not significant.

9.4.4.2 Operational Phase PM_{10} Air Modelling

For the operational phase, a total of 9No. human receptors are identified, with Table 9-7 below detailing important information regarding the sensitive receptors. These receptors were selected to provide a representative sample of sensitive receptors within the vicinity of the Site, based on both proximity and number of receptors in a given direction. Primarily, the closest receptors in a given direction were selected to be modelled due to the distance attenuation of emissions.

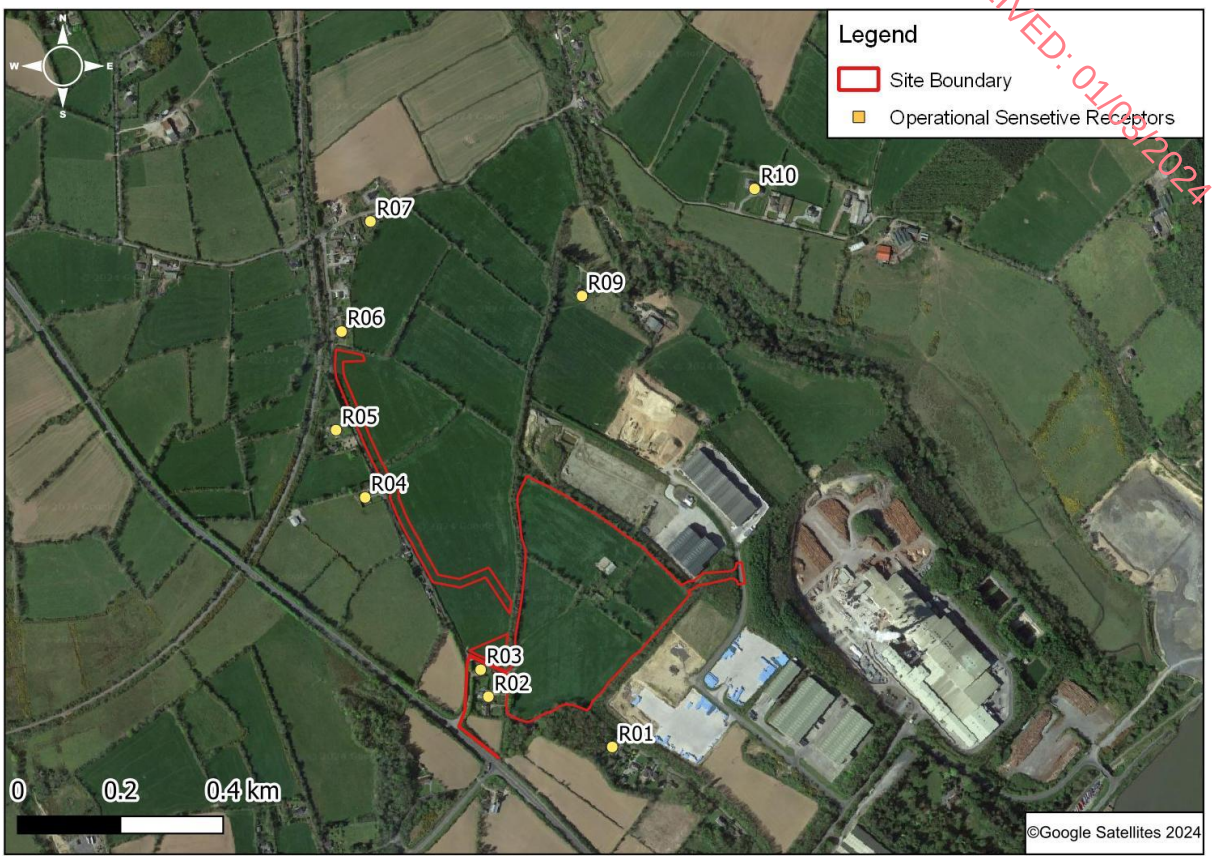
Additionally, as the Proposed Development is not expected required to undertake detailed assessment of nitrogen oxide emissions as a result of the process described in Section 9.1 above, the potential impacts on ecological receptors have been screened out.

Table 9-7: Description of Sensitive Receptors associated with the Operational Phase of the Proposed Development

Receptor ID	ITM (Easting, Northing)		Description of Sensitive Receptor	Distance from Emission Source/ Construction Route (m)	Terrain between Site and Receptor
	E	N			
R01	265462	113686	Proxy for residential houses to the southeast of the Site	ca.86m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing vegetation associated with the woodland area and hedgerows. These features will provide some level of screening from dust generating activities during the Operational Phase.
R02	265220	113783	Residential house to the southwest of the Site	ca.36m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing woodland area and hedgerows. These features will provide some level of screening from dust generating activities during the Operational Phase.

Receptor ID	ITM (Easting, Northing)		Description of Sensitive Receptor	Distance from Emission Source/ Construction Route (m)	Terrain between Site and Receptor
	E	N			
R03	265206	113836	Residential house to the southwest of the Site	ca.35m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are existing vegetation associated with the woodland area hedgerows and berms. These features will provide some level of screening from dust generating activities during the Operational Phase.
R04	264980	114171	Residential house to the west of the Site	ca.47m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows and berms. These features will provide some level of screening from dust generating activities during the Operational Phase.
R05	264923	114301	Proxy for residential houses to the west of the Site	ca.46m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows. These features will provide some level of screening from dust generating activities during the Operational Phase.
R06	264923	114301	Proxy for residential houses to the west of the Site	ca.46m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows and berms. These features will provide some level of screening from dust generating activities during the Operational Phase.
R07	264990	114708	Proxy for residential properties to the NW	ca.257m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows and agricultural fields. These features will provide some level of screening from dust generating activities during the Operational Phase.
R09	265402	114563	Residential properties to the N	ca.366m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are hedgerows and agricultural fields. These features will provide some level of screening from dust generating activities during the Operational Phase.
R10	265738	114772	Proxy for residential properties to the N	ca.701m (Site Boundary)	Terrain between the receptor and the potential dust generating activities are woodland, hedgerows, and agricultural fields. These features will provide some level of screening from dust generating activities during the Operational Phase.

Figure 9-5: Location of Operational Sensitive Receptors around the Proposed Development



9.4.5 Impact of Weather Conditions on Air Quality

Weather conditions, particularly precipitation and wind, significantly impact the dispersion of pollutants and dust.

In the air dispersion modelling study, five consecutive years of hourly meteorological data were used, following the AG4 guidance [87]. Five years from Johnstown Castle/Casement Aerodrome (2019-2023 inclusive) were used as part of the assessment. Johnstown Castle is located ca.36km to the east of the Proposed Development. Figure 9-6 below details the wind rose constructed for each of the meteorological years used in the model, highlighting dominant wind direction.

The wind rose indicated that the prevailing wind direction blows from the southwest. The average wind speed recorded over the record was 8.5m/s. Due to the historic wind direction, sensitive receptors located to the northeast have increased sensitivity to pollutants and dust deposition.

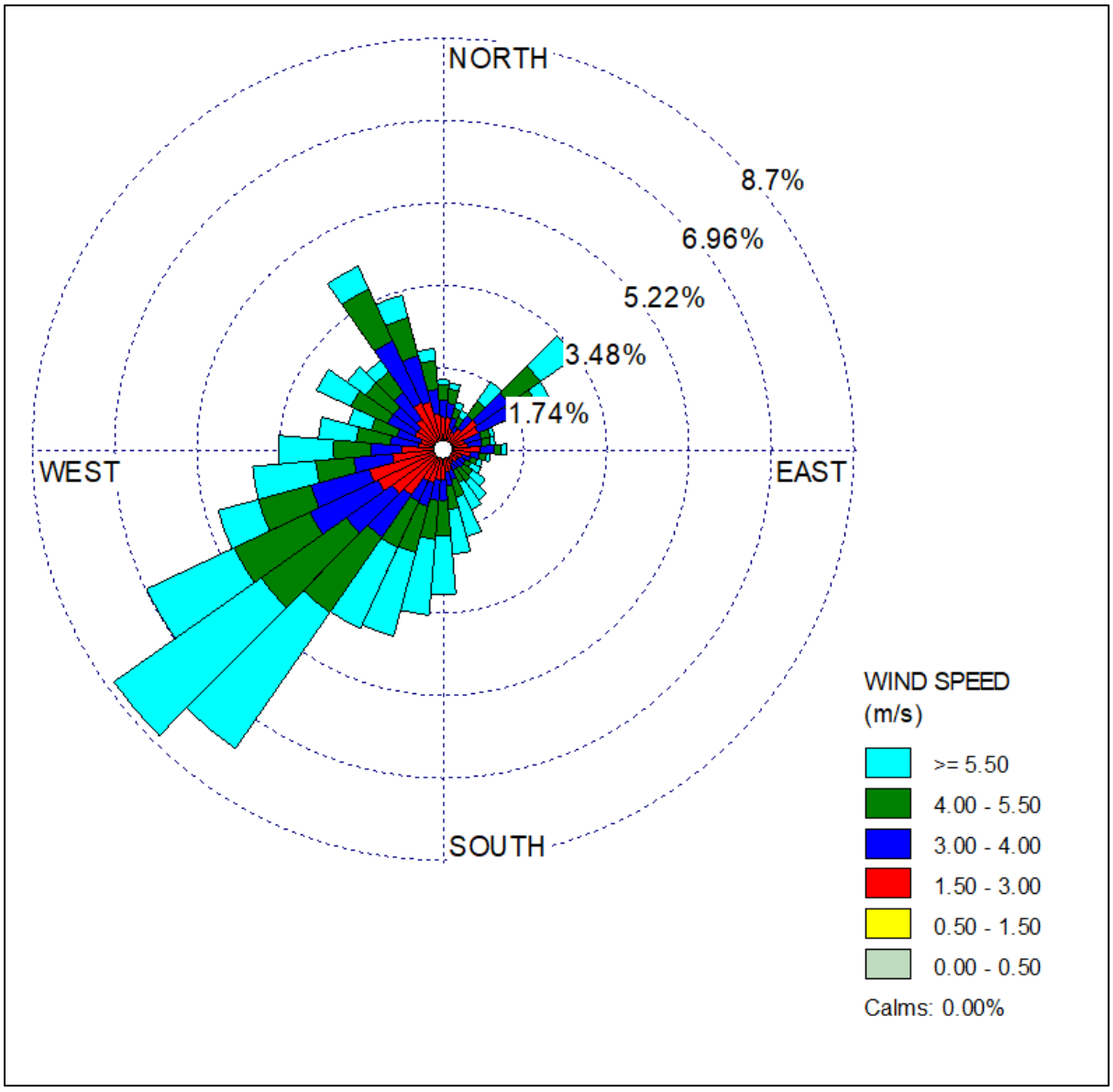
Table 9-8 below summarises the precipitation and wind speed recorded at the weather station.

Table 9-8: Summary of Precipitation Recorded at Johnstown Castle Station (2019-2023)

Year	Mean Wind Speed	Total Precipitation (mm)
2019	8.6	1060.3
2020	9.1	1150.3
2021	8.1	1067.8
2022	8.4	996.6

Year	Mean Wind Speed	Total Precipitation (mm)
2023	8.4	1295.3
Average Johnstown Castle Station (2019-2023)	**8.5**	**114.1**

Figure 9-6: Wind rose for Johnstown Castle Station (2019 – 2023)



9.5 Characteristics and Predicted Effects of the Proposed Development

9.5.1 Construction Phase

The Construction Phase of the Proposed Development is short-term in so far as it will occur over a finite period. The Construction Phase is anticipated to last a period of 14 months. The Construction Phase will have distinct phases of activities (such as earthworks, steel erection, installations of cladding) that have the potential to generate dust as a result of these activities. However, as a conservative estimation, these activities will be considered cumulatively and organised in accordance with the IAQM Guidelines. Following guidance provided by TII and supported by the IAQM, exhaust emissions from Construction Plant operations are considered

to be temporary and unlikely to have a significant impact on air quality and do not require further assessment.

In accordance with the TII Guidance on Air Quality Assessments [90], a detailed assessment on road traffic emissions is considered if any of the following thresholds are considered to be met during the Construction Phase of the Proposed Development:

- Road Alignment will change by 5m or more;
- Annual Average Daily Traffic (AADT) flows will change by 1,000 or more;
- Heavy Duty Vehicles (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more;
- Daily average Speed changes by 10kph or more; or.
- Peak hour speed will change by 20kph or more.

According to the information available, none of the thresholds are anticipated to be met as a result of the Construction Phase and therefore the potential impacts related from Construction Traffic have been screened out.

9.5.2 Operational Phase

The warehouses will have an air extraction system to remove dust generated during the dumping and loading process. The air handling system will consist of multiple bag filters with pressure drop sensors to control the bag cleaning cycle. The filter units will be mounted vertically on the roof at the rear of the raw material store. There will be ten (10No.) such filter units. There will be three (3No.) additional emission points associated with the Pre-Dryer Zone, Main Dryer Zone and Calciner processes.

As with the thresholds identified for the assessment of Construction Traffic associated with the Proposed Development, it is anticipated that during the peak Operational Phase, there will be 75 inward and 75 outward movements of HGVs (150 total HGV movements per day). An additional 138 AADT will occur, which includes the delivery of gypsum on-site and transportation offsite. As none of the attributes of traffic associated with the Operational Phase of the Proposed Development meet any of the thresholds identified by the TII Guidance [90], a detailed assessment of traffic impact on air quality is not required and has therefore been screened out.

9.5.3 Construction Phase Dust Risk Assessment

9.5.3.1 Dust Magnitude

According to the IAQM Guidelines, construction activities should be divided into four types of activities (Demolition, earthworks, construction and track-out) to reflect their potential impacts [91]. Table 9-9 below outlines the definition of these activities for the purpose of the risk assessment.

Table 9-9:Construction Activities Definitions

Activity	Description
Demolition	Any activity involved with the removal of an existing structure (or structures). This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time
Construction	Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retain outlet, road etc
Earthworks	Covers the process of soil stripping, ground levelling, excavation, and landscaping.

Activity	Description
Track-Out	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy good vehicles (HGVs) leave the construction/demolition site with dust materials, which may then spill onto the road, and/or when HGVs transfer dust and dirt onto the road having travelled over muddy ground on-site.

As per IAQM guidance, the construction phase has been divided into four activity types (Demolition, earthworks, construction and track-out). These activities were rated on their potential dust emission magnitude (small, medium, large) [91]. Cut and fill estimates are provided in Appendix 9-1 and are reflected in the dust emission magnitude for earthworks.

Below presents the activities for the Construction Phase and the associated dust emission magnitude in accordance with the methodology presented in Table 1-1 within Appendix 9-1. To summarise:

(1) **Earthworks**: The total amount of material expected to be moved within the Site boundary and the proposed new access track is ca. 25,000m^3 of material (ca. 45,000 tonnes). The total site area is ca.11.57ha with 2m high bunds to be erected. Twelve (12No.) heavy plant will be active during the Construction Phase including a crane, excavators and loading shovels. The estimated dust emission magnitude from these activities is therefore determined as Medium.
(2) **Trackout**: There will be twenty (20No.) HGVs leaving the Site per day. These vehicles will be primarily traversing over a new hardstanding access road, the dust emission magnitude has been determined as Medium.
(3) **Construction**: The entire construction area will be paved. The material used for construction will include structural concrete and steel. The total volume of buildings to be constructed will be ca.300,000m^3. No concrete batching will occur at the Site. The dust emission magnitude for such activities has been classified as Large.
(4) **Demolition**: One farmhouse will be demolished as a result of the Proposed Development. The primary material will be concrete and metal which are potentially dusty materials. The total volume of building to be demolished is ca.<20,000m^3. The dust emission magnitude has been classified as Small.

9.5.3.2 Sensitivity of the Area

The sensitivity of the area during the construction phases (high, medium, low) was determined with the IAQM Guidelines [91]. The following effects are considered when assessing the sensitivity of the area:

- Sensitivity of people to dust soiling; and,
- Sensitivity of human health to the effects of PM_{10} exposure.

When determining the sensitivity of the area, the IAQM gives guidelines for assessing the sensitivity of the individual receptors. All residential properties identified were given a ‘High’ sensitive rating as they would expect enjoyment of a high level of amenity. Due to the nature of activities at Belview Port, the industrial facilities identified (SR08, SR09 and SR10) were classified as being a ‘low’ sensitive rating, as the level of amenity at these facilities would not be anticipated to decrease as a result of construction activities.

These guidelines are show in in Appendix 9-1, Table 2-1. For each individual receptor, the sensitivity is determined through a combination of the number of receptors expected to be impacted and the distance of the receptors to the source of emissions. Section 2.2 and Section 2.2.1 in Appendix 9-1 details the sensitivity of each individual receptor to dust soiling and the rating attributed. To summarise:

- The highest SR sensitivity rating to dust soiling effects was determined as 'Medium' for two (2No.) sensitive receptors (SR02 and SR07). This is due to the residential properties identified sensitivity; number of receptors present and their proximity to dust generating activities. All remaining sensitive receptors were identified as having a 'Low' sensitivity to dust soiling.
- As per the IAQM Guidelines, the highest sensitivity rating considered for all receptors reflects the sensitivity of the area and therefore the rating of the area is determined as 'Medium', for dust soiling effects.

For determining the sensitivity of people to PM_{10} exposure, Table 2-4 and Table 2-5 in Appendix 9-1 shows the appropriate guidelines as per the IAQM [91]. PM_{10} exposure sensitivity incorporates the background concentrations for the area, which has been previously determined as 12.3µg/m^3 (Section 9.4.2 above). Full matrices for the determination of the sensitivity of receptors to PM_{10} exposure from the Proposed Development are shown in Table 2-6 in Appendix 9-1. To summarise:

- Due to the low background concentrations of PM_{10} at Zone D (12.3µg/m^3) the sensitivity of each receptor to PM_{10} exposure as a result of construction activities was classified as 'Low';
- As all sensitive receptors are determined as having a 'Low' sensitivity, the sensitivity of the area to PM_{10} exposure was classified as 'Low'.

9.5.3.3 Risk of Impact

To identify the risk of impacts from dust emissions with no mitigation measures implemented, the dust magnitude (Section 9.5.3.1) will be used to determine the risk of impact for each activity during the construction phase of the Proposed Development. Section 3 in Appendix 9-1 shows the methodology for assessing the risk of impacts associated with each activity. The detailed assessment relating to the Proposed Development is shown in Section 4 of Appendix 9-1. To summarise:

- Risk of dust soiling due to trackout is 'Low' without mitigation in place;
- Risk of dust soiling due to construction is 'Medium' without mitigation in place;
- Risk of dust soiling due to earthworks is 'Medium' without mitigation in place;
- Risk of dust soiling due to demolition is 'Low' without mitigation in place;

Risks associated with dust emissions causing exposure to PM_{10} are calculated in Section 4.2 of Appendix 9-1. To summarise:

- Risk of PM_{10} exposure due to trackout is 'Low' without appropriate mitigation measures in place;
- Risk of PM_{10} exposure due to construction is 'Low' without appropriate mitigation measures in place;
- Risk of PM_{10} exposure due to earthworks is 'Low' without appropriate mitigation measures in place;
- Risk of PM_{10} exposure due to demolition is 'Negligible' without appropriate mitigation measures in place;

The summary of risks associated with the Construction Phase are shown in Table 9-10 below.

Table 9-10: Risks of Impacts from potential fugitive dust During the Construction Phases

Potential Impact	Risk			
	Earthworks	Track out	Construction	Demolition
Dust Soiling	Medium Risk	Low Risk	Medium Risk	Low Risk
Human Health (PM_{10})	Low Risk	Low Risk	Low Risk	Negligible

Based on the risk assessment conducted for the construction phase of the Proposed Development, the activities have been classified into different risk levels based on the IAQM Guidance. The activities of earthworks and construction are identified as 'Medium Risk' activities to dust soiling, and 'Low Risk' for track out and demolition. In terms of PM_{10} exposure. all activities are determined to as having a 'Low Risk' with demolition been classified as 'Negligible' impact.

In order to further reduce the risks associated with the construction phase, proposed mitigation measures are detailed in Section 9.6 below.

9.5.4 Air Dispersion Modelling

The following section details results of air dispersion modelling of the stacks and warehouse vents operating on-site, 24 hours a day, 7 days a week. This represents a conservative scenario.

9.5.4.1 Annual Mean Total Particulates

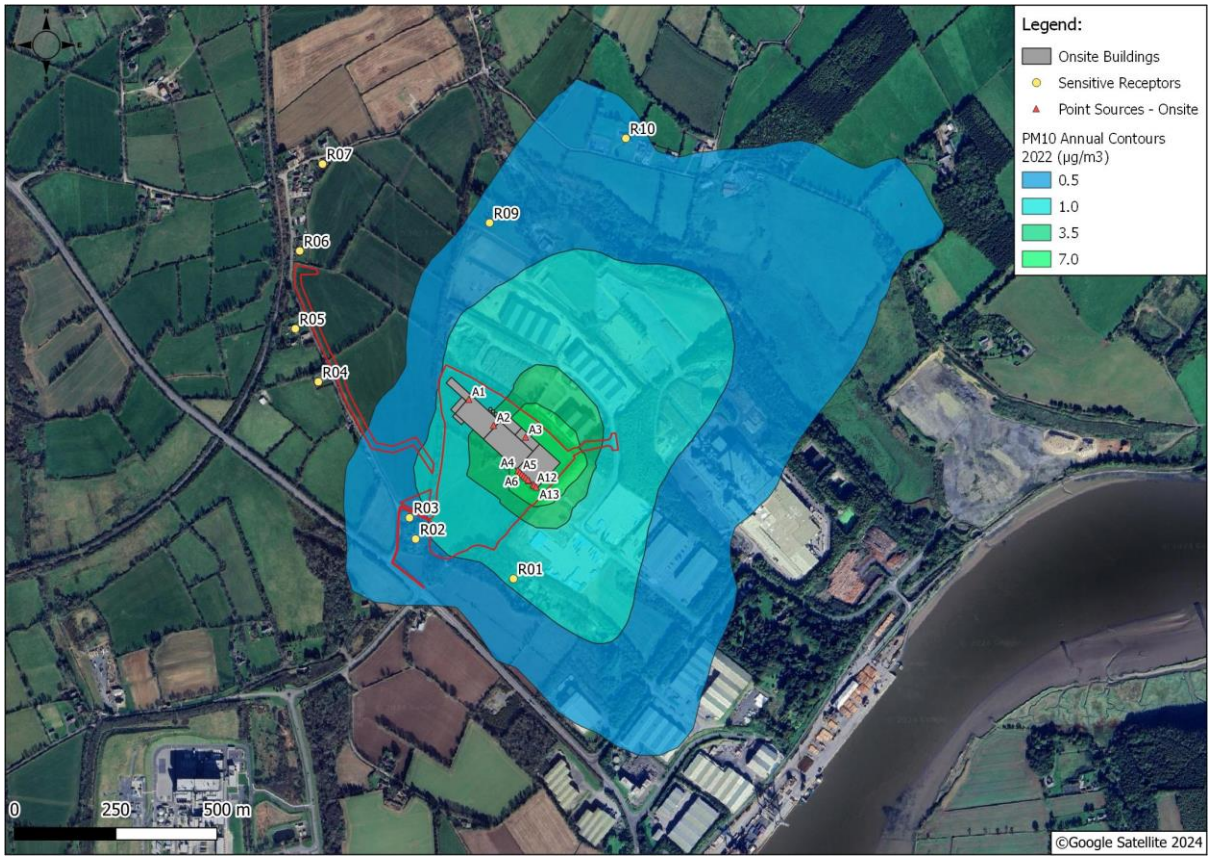
Table 9-11 below details the results of the air dispersion modelling for annual mean total particulates at sensitive receptors, showing process contribution at ground level (emissions from points sources) and predicted environmental concentrations (process contribution plus background concentrations). These concentrations are presented for the meteorological year where concentrations are highest (2022). Please note that although PM_{10} presents a fraction of Total Particulates, as there is no AQS for Total Particulates, then PM_{10} AQS is conservatively applied to Total Particulates. Further concentrations for the remainder of the meteorological years are shown in Appendix 9-2.

Table 9-11: Predicted Annual Mean Total Particulates at SRs for 2022

Receptor ID	Process Contribution (PC) ($\mu g/m^3$)	Background Concentration PM_{10} ($\mu g/m^3$)	Annual AQS for PM_{10} ($\mu g/m^3$)	Predicted Environmental Concentration (PC + background) ($\mu g/m^3$)	PEC as % of Annual AQS
R01	1.14	12.3	40	13.44	33.59
R02	0.87	12.3	40	13.17	32.91
R03	0.83	12.3	40	13.13	32.81
R04	0.32	12.3	40	12.62	31.55
R05	0.22	12.3	40	12.52	31.30
R06	0.20	12.3	40	12.50	31.24
R07	0.20	12.3	40	12.50	31.26

Receptor ID	Process Contribution (PC) (µg/m³)	Background Concentration PM_{10} (µg/m³)	Annual AQS for PM_{10} (µg/m³)	Predicted Environmental Concentration (PC + background) (µg/m³)	PEC as % of Annual AQS
R09	0.61	12.3	40	12.91	32.27
R10	0.56	12.3	40	12.86	32.15

Figure 9-7: Annual Mean Total Particulates Process Contribution (not including background) for 2022



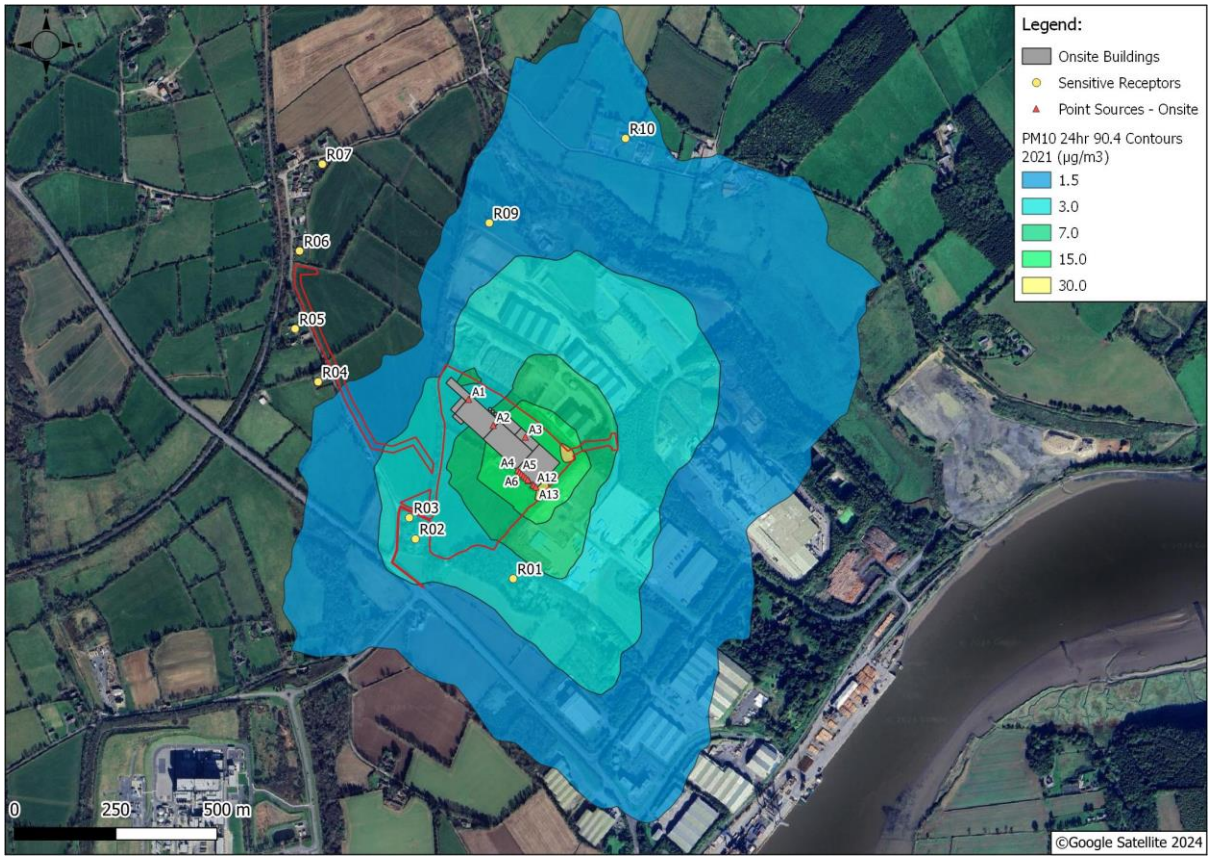
9.5.4.2 24-hour Mean Total Particulates

Table 9-12 below details the results of the air dispersion modelling for short-term (24-hour at 90.4%ile) total particulate concentrations, showing the process contribution and the predicted environmental concentrations at nearby sensitive receptors. Please note that although PM_{10} presents a fraction of Total Particulates, as there is no AQS for Total Particulates, then PM_{10} AQS is conservatively applied to Total Particulates. To assess a conservative estimation of emissions, only the meteorological year where concentrations are highest are displayed below (2021), with the remainder presented in Appendix 9-2. Figure 9-8 below shows the contour plot for this meteorological year.

Table 9-12: Short Term (24-hour, 90.4%ile) Total Particulates Concentrations at SRs for 2021

Receptor ID	Process Contribution (PC) (µg/m^3)	Background Concentration PM_{10} (µg/m^3)	Short-Term AQS for PM_{10} (µg/m^3)	Predicted Environmental Concentration (PC + background) (µg/m^3)	PEC as % of Short-Term AQS
R01	5.09	12.3	50	14.85	29.69
R02	4.32	12.3	50	14.46	28.92
R03	3.89	12.3	50	14.25	28.49
R04	1.33	12.3	50	12.97	25.93
R05	0.73	12.3	50	12.66	25.33
R06	0.53	12.3	50	12.56	25.13
R07	0.33	12.3	50	12.47	24.93
R09	2.15	12.3	50	13.37	26.75
R10	1.85	12.3	50	13.22	26.45

Figure 9-8: Short Term (24 hour – 90.4%ile) Predicted Concentrations at Sensitive Receptors (2021)



The results of air dispersion modelling show that there will no likely and no significant effects on the ambient air quality at sensitive receptors arising from Total Particulates emissions from the point sources at the Proposed Development during the operational phase.

9.5.5 Risk of Unplanned Events

As with all facilities, there is some risk that accidents at the site or disasters outside of the operators control could result in a risk to the environment. Risks specific to air quality are identified in Table 9-13 below.

Table 9-13: Risks of accidents impacting Air Quality

Hazard	Likelihood	Consequence	Reasoning
Malfunctioning of dust abatement equipment	3	1	Regular maintenance of all process on-site will prevent malfunctions. However, if this does occur there would be slight short-term increase in emissions to air from 1 of 13 emission points unlikely to cause a noticeable impact on SRs.

(1) Likelihood rating 1-5, where 1 is very unlikely and 5 is very likely
(2) Consequence rating 1-5 where 1 is Trivial and 5 is massive

9.6 Proposed Mitigation Measures and/ or Factors

9.6.1 Construction Phase

The risk of impact presented in Section 9.5.3.3 above showed that the risks to sensitive receptors to dust emissions, based on the construction phase of the Proposed Development are between 'Medium' and 'Negligible'. Table 9-14 below identifies general mitigation measures for the entire Site and measures to prevent fugitive dust emissions arising from the Construction Phase of the Proposed Development. The highest risk category 'Medium Risk' was applied to the Site and specific mitigation measures (Earthworks, Construction, Track-out and Demolition).

A Dust Management Plan (DMP) will be prepared for the Site and agreed upon by the Local Authority. The DMP will be implemented primarily during the Operational Phase of the Proposed Development but will also incorporate aspects of the Site preparation phases.

Table 9-14 below details the general mitigation measures to be implemented to reduce dust impacts.

Table 9-14: Proposed Mitigation Measures for Construction Phase

General Mitigation Measures
Site Management • The name and contact of person(s) accountable for air quality and dust issues during the Construction Phase will be circulated to receptors in close proximity to the Site; • Make the complaints log available to the local authority when asked; • HGVs leaving the Site must traverse through the wheel wash; • Record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action take to resolve the situation in the logbook; and, • Records of any dust complaints will be made with the appropriate/timely action taken when as required.

Monitoring • Carry out regular inspections in line with the DMP around the boundary of the Site; and. • Increase the frequency of the site inspections when high dust generating activity is undergone and during prolonged dry or windy conditions particularly in the case of earthworks.
Site Preparation: • Avoid site runoff of water or mud as far as practicable; • Dusty materials that are to be used on-site but are temporarily stored should be covered; • Cover, seed or fence stockpiles to prevent wind whipping; • Erect barriers around the Site, where possible; • Keep fencing, barriers and/or scaffolding clean and free of dust; • Remove materials that have the potential to produce dust from Site as soon as possible unless being re-used on site. If being used on site cover or wetted to prevent wind whipping; and, • Plan Site layout so that dust generating activities are located away from receptors, as far as is possible.
Operating vehicles: • The use of diesel- or petrol-powered generators should be avoided, where possible; • Ensure appropriate use of wheel-wash facilities as available; • Traffic to and from the site should be managed to avoid congestion where possible; and, • Vehicle engines will be switched off when stationary- no-idling.
Operations: • Use cutting, grinding, or sawing equipment fitted with suitable dust suppression techniques such as water sprays; • Ensure there is a water supply on-site for the suppression of dust capable of reaching all parts of the Site; • Ensure equipment is available in the event of any dry spillages and clean up as soon as practicable; and, • Minimise drop heights from handling equipment should be implemented across all activities.
Waste Management: • No burning of waste should be permitted on site.

Table 9-15 below details the activity specific measures related to the Proposed Development.

Table 9-15:Activity Specific mitigation measures for the Construction Phase of the Proposed Development

Activity Specific Mitigation Measures
Construction • Ensure sand and other aggregates are stored in enclosed or bunded areas unless required for a particular purpose; • Avoid Scabbing (roughening of concrete surfaces);and, • Ensure bulk cement or other dried powder material are delivered in enclosed trucks.
Earthworks • Stabilise stockpiles as soon as possible;

Track-out

- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Avoid dry sweeping of large areas;
- Implement a wheel wash system that HGVs shall use prior to leaving the Site; and,
- Record all inspections of haul routes any actions taken in a site log book.

Demolition:

- Soft strip inside buildings where applicable before demolition; and,
- Ensure effective water suppression is used during demolition operations.

With the implementation of the proposed mitigation measures, the potential effects on sensitive receptors from the Construction Phase were considered not likely and not significant.

9.6.2 Operational Phase

A Dust Management Plan (DMP) will be prepared for the Site and agreed upon by the Local Authority. The DMP will be implemented primarily during the Operational Phase of the Proposed Development but will also incorporate aspects of the Site preparation phases.

General mitigation measures will include:

- Keeping a record of any potential dust or air quality complaints;
- If such complaints occur, then identify the cause(s) and take appropriate actions;
- Maintain good communication with neighbouring sites; and,
- Record any exceptional circumstances which may give risk to higher than predicted emissions either on-site or offsite.

Mitigation measures for minimising the potential air quality impacts from the stacks will include:

- Design measures:
    - the stacks will be of sufficient height to allow for the dispersion of emissions (specified by the manufacturer and engineering drawings);
    - All dust emission points will have filters;
    - The bag filter on the air emission point from the calciner equipment will have a bag burst detection system which prompts automatic shutdown of the process.
- Ensure regular maintenance of all emission points on-site to ensure efficiency in operation.

Following the implementation of mitigation measures, any potential impacts on ambient air quality in terms of total particulates were considered not likely and not significant.

9.7 Cumulative and In-Combination Effects

As discussed in Section 9.4.3 above a cumulative assessment is required if:

- There is a regulated installation nearby in the area where the impact of the modelled facility exceeds 5% of the AQS; and
- If the nearby installation emits more than 100 tonnes of relevant pollutant per year.

The closest industrial facility to the Proposed Development is Smartply Europe (IE Licence Reg. No. P0001-04) ca.230m to the east of the Proposed Development. The facility is located

within an area where the impact of the modelled facility (i.e. the Proposed Development facility) exceeds 5% of the AQS for PM_{10}. The other licenced facilities are located outside an area where 5% of the AQS for PM_{10} is exceeded.

Therefore, a cumulative assessment was carried out using AERMOD to assess the impact of the combined PM_{10} emissions from Smartply Europe and the Proposed Development on Sensitive Receptors.

9.7.1 Emissions and Stack Input Data

A cumulative assessment of Total Particulates (TP) emissions was completed including all of the Proposed Development major TP emissions to air sources, all SmartPly major TP emissions to air sources and background PM_{10} concentration. Input parameters are presented in Table 9-16 below. All other model characteristics for cumulative assessment are those detailed in Sections 9.2 to 9.4 above.

Input parameters for the sources emitting Total Particulates from SmartPly facility were obtained from IE Licence Reg No. P0001-05 Air Dispersion Modelling Assessment Report prepared in 2022 by MOR, and publicly available on the EPA website. It was conservatively assumed that all sources operate at full load 24/7 and 12 months a year and that TP emissions are from the Smartply facility are solely PM_{10} emissions. The building heights were obtained from previous planning file available on the Kilkenny County Council's e-planning website [15].

Table 9-16: SmartPly IEL Reg. No P00001-05 Emissions and Stack Input Data

Emission Point	A2-1	A2-2	A2-3	A2-4	A2-5	A2-6	A2-7	A2-8	A2-9
Source	Main Stack	Baghouse 1	Baghouse 2	Baghouse 3	Baghouse 4	Baghouse 5	Baghouse 6	Baghouse 7	Cyclofilter
Volumetric Flowrate Normal (Nm^3/hr)	620,000	47,000	88,000	32,000	40,000	4,000	70,000	150,000	4,000
Release Height (m)	90	23	26	35.5	20.5	25	18.9	24	30.2
Exit Velocity (m/s)	10.4	16.6	9.77	36.1	17.5	1.75	15.3	14.7	4.2
Exit temperature (^oC)	50	20	25	33	20	30	20	28	25
ELV (mg/Nm^3)	15	5	5	5	5	5	5	5	5
Mass Emissions (g/s)	2.61	0.065	0.122	0.044	0.056	0.006	0.097	0.208	0.006

9.7.2 Air Modelling Results

Table 9-17 and Table 9-18 below detail the results of the air dispersion modelling, showing maximum process contribution (PC) at ground level (emissions to air from the stacks) and maximum predicted environmental concentration (PEC) (process contribution plus background contribution) outside the Site boundary at ground level. Only the worst MET year for annual and 24-hr averages was considered for this cumulative impact air dispersion modelling. The worst-case MET year for annual PM_{10} as stated in Section 9.5.4 was 2022 and worst-case MET year for 24-hour PM_{10} was 2021.

Table 9-17: Predicted Cumulative Environmental Concentration – 2022 Annual Mean PM_{10} in µg/Nm^3

Receptor ID	Process Contribution (PC) (µg/m^3)	Background Concentration PM_{10} (µg/m^3)	Annual AQS for PM_{10} (µg/m^3)	Predicted Environmental Concentration (PC + background) (µg/m^3)	PEC as % of Annual AQS
2022 Max. at Site Boundary	14.23	12.3	40	26.53	66.32
R01	1.37	12.3	40	13.67	34.18
R02	1.03	12.3	40	13.33	33.32
R03	0.99	12.3	40	13.29	33.22
R04	0.43	12.3	40	12.73	31.82
R05	0.31	12.3	40	12.61	31.52
R06	0.29	12.3	40	12.59	31.48
R07	0.29	12.3	40	12.59	31.48
R09	0.74	12.3	40	13.04	32.60
R10	0.75	12.3	40	13.05	32.62

Table 9-18 details the results of the air dispersion model for the short-term 24-hour PM_{10}, showing 90.4%ile PC and 90.4%ile PEC for sensitive receptors and the maximum outside the Site boundary at ground level.

Table 9-18: Maximum Predicted Cumulative Environmental Concentration – 2021 PM_{10} (24-hr 90.4%ile) (µg/Nm^3)

Receptor ID	Process Contribution (PC) (µg/m^3)	Background Concentration PM_{10} (µg/m^3)	Short-Term AQS for PM_{10} (µg/m^3)	Predicted Environmental Concentration (PC + background) (µg/m^3)	PEC as % of Annual AQS
2021 Max. at Site Boundary	33.02	12.3	50	28.81	57.62
R01	5.59	12.3	50	15.10	30.19
R02	4.83	12.3	50	14.72	29.43
R03	4.45	12.3	50	14.52	29.05
R04	1.71	12.3	50	13.16	26.31
R05	1.08	12.3	50	12.84	25.68
R06	0.97	12.3	50	12.79	25.57
R07	0.88	12.3	50	12.74	25.48
R09	2.36	12.3	50	13.48	26.96
R10	2.15	12.3	50	13.38	26.75

Figures 9-9 and 9-10 below highlight the process contribution for PM_{10} for the maximum PC results for the daily (2021) and annual (2022) rates. Note that background concentration of PM_{10} is not included in the figures below.

From the cumulative assessment, short-term (24hr average) and long-term (annual average) concentrations of PM_{10}, outside the Site boundary and at sensitive receptors were predicted to be significantly below the relevant AQS. Therefore, it can be concluded that emissions to air from the Proposed Development will cumulatively have no likely and no significant effects on the ambient air, human health or any sensitive receptors.

Figure 9-9: Maximum Cumulative Contribution PM_{10}- Long-Term (Annual) for 2022

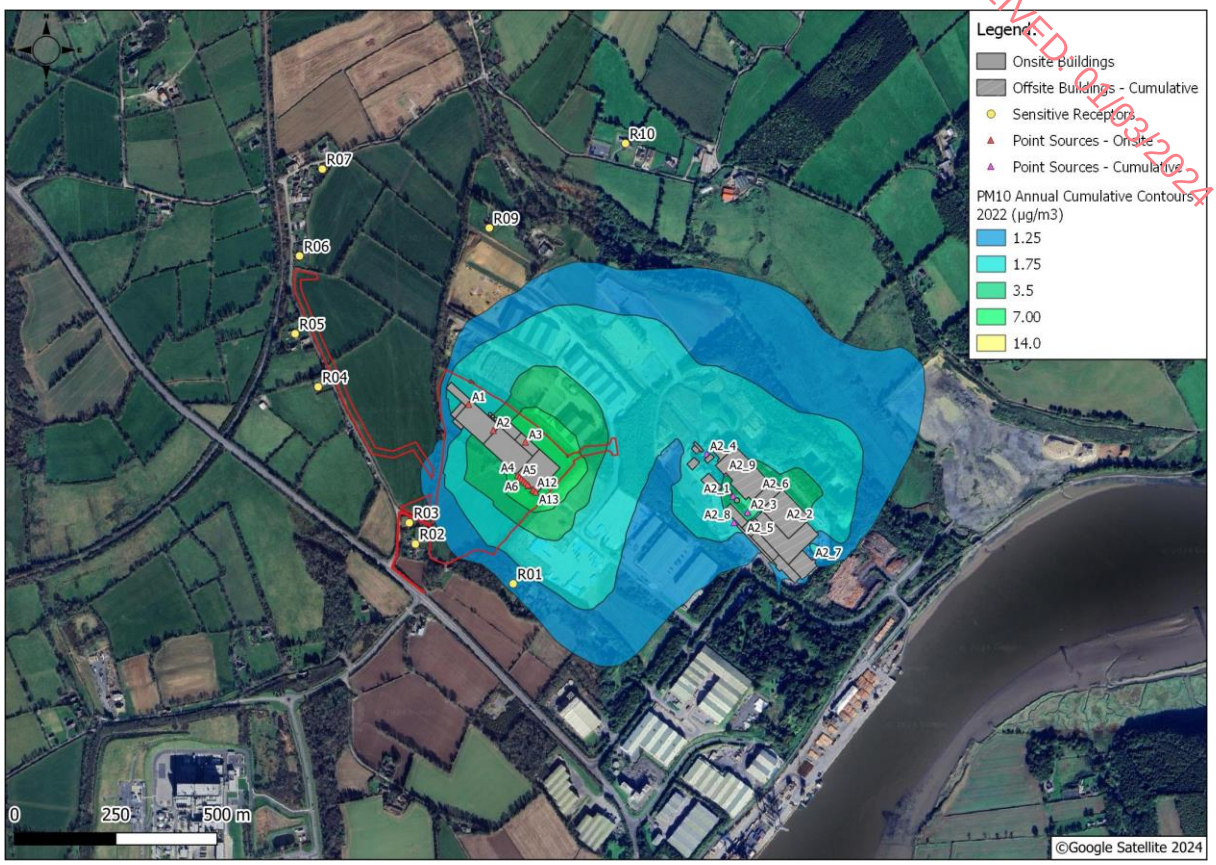
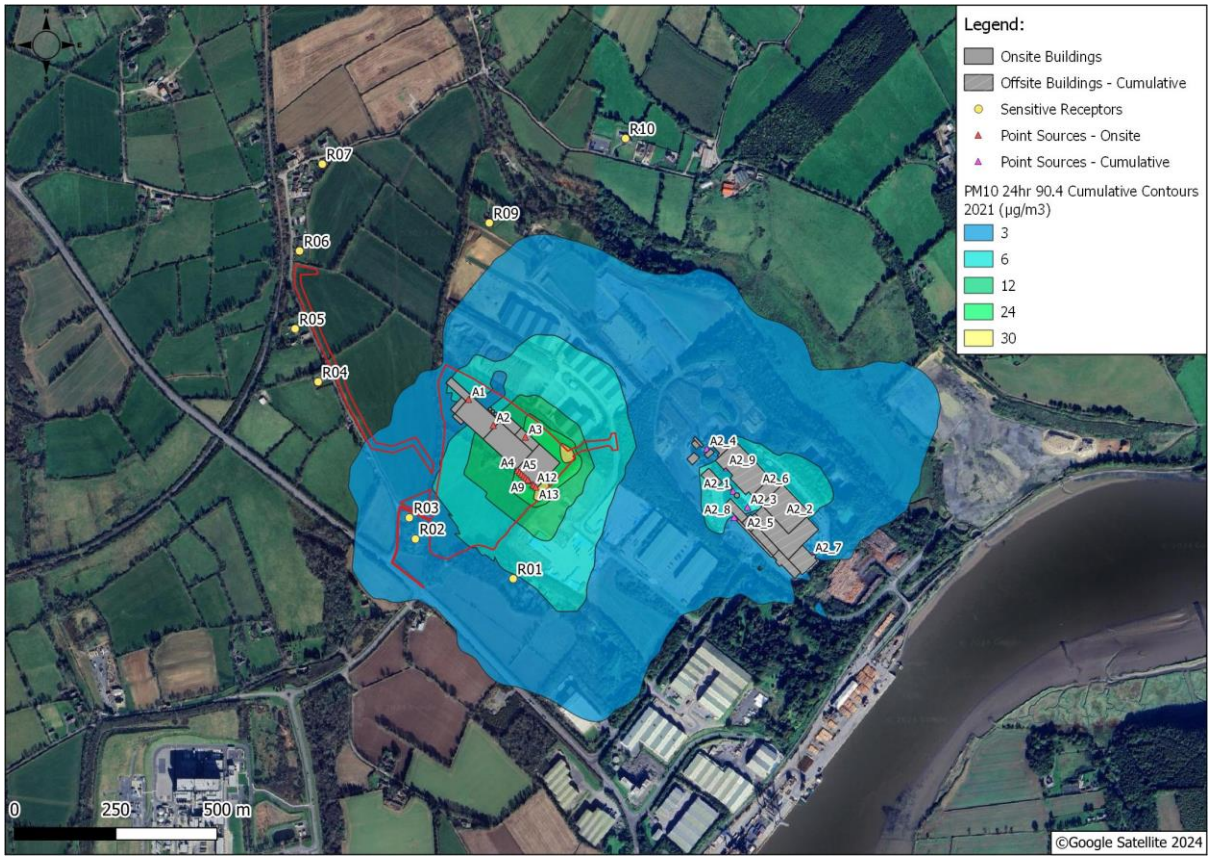


Figure 9-10: Maximum Cumulative Contribution PM_{10} – Short-Term (24hr 90.4th%ile) for 2021



9.8 Interactions with other Environmental Attributes

The other environmental factors with which air quality interacts include:

- Chapter 5 – Population and Human Health:
    - Air quality is an important consideration for human health, as emissions to air, Total Particulates in case of the Proposed Development, have a potential to impact air quality and human health and pose a risk of nuisance to sensitive receptors. However, assessments in this chapter shows that the Proposed Development will not have significant impact on air quality or human health, or cause nuisance.
- Chapter 6 – Biodiversity:
    - A decrease in air quality could negatively impact biodiversity. However, assessment in this chapter shows that air emissions from the Proposed Development will not have significant impact on designated area or other ecological receptors.
- Chapter 14 – Material Assets: Traffic.
    - Air quality can be adversely affected by particulates and gaseous emissions from traffic. This was assessed in this chapter (section 9.5) which concluded that these impacts will be imperceptible.

9.9 Indirect Effects

No indirect effects relating to the Proposed Development and air quality were identified.

9.10 Residual Effects

Following the implementation of mitigation measures, and considering cumulative and indirect effects, residual effects of emissions to air will be:

- In terms of point source emissions of total particulates, effects on human health, air quality standards and sensitive receptors will be not likely and not significant;
- In terms of construction dust, the risk of impact on sensitive receptors following the implementation of mitigation measures was determined to be low. In light of this risk reduction, the residual effect remaining will be not likely, short-term and not significant.

9.11 Monitoring

Dust monitoring to be undertaken during the construction phase will be agreed with the Local Authority as part of the CE&WMP prior to construction works commencing.

It is proposed to carry out dust deposition monitoring quarterly, at the Site boundaries, at minimum three (3No.) representative locations during the operational phase of the Proposed Development.

9.12 Reinstatement

Not Applicable.

9.13 Difficulties Encountered in Compiling this Information

No difficulties were encountered when compiling this information.

10 CLIMATE

10.1 Introduction

This chapter of the EIAR provides a description and assessment of the likely effects of the Proposed Development on climate change in the context of national greenhouse gas (GHG) emissions and relevant sectoral targets. This chapter also assesses the potential effects to the Proposed Development from climate change.

10.2 Methodology

The following standards, methodologies and data sources were used for determining the potential impacts of the Proposed Development on climate and also the potential impacts of climate on the Proposed Development from the context of climate hazards:

- Kilkenny City and County Development Plan 2021-2027 [94];
- Kilkenny County Council Climate Change Adaption Strategy 2019-2024 [95];
- Port of Waterford Masterplan 202-2044 [96];
- Port of Waterford Strategic Flood Risk Assessment [97];
- Department of Communications, Climate Action and Environment – Climate Action Plan 2024 [98];
- Minister for the Environment, Climate and Communication, Climate Action and Low Carbon Development (Amendment) Act 2021 [99];
- Geological Survey of Ireland (GSI) [74];
- Global Facility for Disaster Reduction and Recovery - ThinkHazard [100];
- Environmental Protection Agency – Climate Ireland [101];
- Department of Communications, Climate Action and Environment – National Adaption Framework, Planning for a Climate Resilient Ireland, 2018 [102];
- Environmental Protection Agency – Ireland's Provisional Greenhouse Gas Emissions 1990-2021 [103];
- Ireland's Greenhouse Gas Emission Projections 2021–2040 [104];
- Intergovernmental Panel on Climate Change (IPCC) fifth assessment report [105];
- Environmental Agency, Adapting to Climate Change: Industry sector examples for your risk assessment [106]; and,
- The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009. [107]

The potential effects of the Proposed Development on climate were determined through an assessment of the sources of GHG emissions from the Proposed Development. The assessment of GHG emissions follows IEMA's Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance [108]. These guidelines specify the use of emission factors, which were sourced from the Transport Infrastructure of Ireland (TII) Carbon tool [109]. The TII Carbon Tool is primarily used for lifecycle assessments of national roads and rail projects but provides a comprehensive list of emission factors and methods to calculate GHG emissions that are relative to the Proposed Development.

The potential risks of climate change to the Proposed Development have also been assessed by completing a climate change risk assessment. By utilising available policy and guidance, the vulnerability of assets associated with the Proposed Development to potential climate

hazards was determined. The identification of climate hazards was achieved through a detailed desk-based review of local, regional and continental scale tools.

Due to the size, nature and location of the Proposed Development, there are no potential effects on microclimate in terms of wind tunnelling and shading. As such, the potential effects on microclimate were not assessed.

10.2.1 Assessment Boundary

Anthropogenic GHG emissions have a global effect when they are released in large quantities into the atmosphere over long periods of time – decades, or longer; therefore, assessing the effects of GHG emissions of a Proposed Development at a local level is inconsequential. GHG emissions are not geographically circumscribed. Even at a national scale, the effect of the GHG emissions of an entire country the size of Ireland has no noticeable effect on the global, national or regional climate as stand-alone emissions. It is cumulative, global anthropogenic GHG emissions which cause noticeable changes in global, national and regional climate.

Nonetheless, given the importance of climate change and the fact that any project will contribute to increase or decrease in GHG emissions, an assessment is required. This assessment is a combination of qualitative and quantitative assessment in context of national GHG emissions, as the data required to quantify exact GHG emissions from the Proposed Development is not currently available. Refer to Section 10.11 for further information.

It is not possible in the light of current knowledge and methods of assessment to quantify the contribution of every part of the Proposed Development, but every attempt has been done to do so as far as practicable. There is not yet a regulatory assessment and verification tools for quantifying GHGs from all sources. For the purpose of this assessment, the boundary of which GHG emissions was compared was those associated with the client within the Republic of Ireland.

10.2.2 Policy Context

10.2.2.1 Paris Climate Agreement

The Paris Climate Agreement is a legally binding international treaty on climate change that was adopted by 196 parties at the COP 21 in Paris 2015 [110]. The goal of the agreement is to limit global warming potential by 2°C, preferably 1.5°C, compared to pre-industrial levels. The agreement aims to reach a global peaking of GHG emissions as soon as possible to achieve climate neutrality by 2050. The agreement includes commitments from all countries to reduce their emissions and work together to adapt to the impacts of climate change and calls on countries to strengthen their commitments over time [110]. The agreement provides a pathway for developed nations to assist the developing nations in their climate mitigation and adaption efforts, while creating a framework for the transparent monitoring and reporting of countries' climate goals.

10.2.2.2 National Climate Change Adaption Framework

The National Climate Change Adaption Framework was developed in 2018, under the Climate Action Law and Low Carbon Development Act of 2015 [111]. The aim of the statutory framework was set out as a national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. The strategy also aims at improving the enabling adaption through online engagement and civil society, the private sector and the research community [111].

The key objective of the National Adaption Framework is to support climate action by setting out policy with a view to becoming more resource-efficient and contributing to the low carbon economy.

In relation to the Built Environment the National Adaptive Framework highlights the need to be accommodative of future climate change impacts in developments permitted today, this in turn would eliminate the need of costly future redesign and redevelopments. Innovative building design, new materials and standards will contribute to increased climate resilience in the built environment.

10.2.2.3 Climate Change Action Plan 2024

The Climate Action Plan 2024 is the third annual update to Ireland's Climate Action Plan. The plan is the second to be prepared in accordance with the Climate Action and Low Carbon Development (Amendment) Act 2021 [98].

The Climate Action Plan sets out the roadmap to deliver on Ireland's climate ambitions and aligns with the legally binding economy-wide carbon budgets and sectoral emission ceilings that were agreed by the Government in 2022.

10.2.2.4 Climate Change Risk Assessment

The minister for the Environment, Climate and Communication has launched a set of guidelines to assist local authorities in preparing climate action plans under the Climate Action and Low Carbon Development (Amendment) Act 2021 [99].

These guidelines have been issued under the provisions of the Act and are therefore statutory in nature for the respective local authorities to complete. These are outlined in Technical Annex B – Climate Change Risk Assessment [99]. The annex was prepared for local councils to aid in preparing climate risk assessments for their constitutes and includes the following:

- Identifying the range of climate hazards that have previously affected the local authority and its administrative area; and,
- Assessing the exposures and vulnerabilities of the local authorities and its administrative areas to these hazards.

Whilst the Climate Change Risk Assessment has been adapted at a county level and is therefore a much larger scale than that of the Proposed Development, the basic premise of identification and classification of the frequency and level of impact caused by hazards has been followed using this guidance as far as practicable.

10.2.2.5 Kilkenny County Council County Development Plan 2021 to 2027

The county development plan contains the following policies with respect to climate change [105]:

Strategic Aim: *To provide a policy framework with objectives and actions in this City and County Development Plan to facilitate the transition to a low carbon and climate resilient County with an emphasis on reduction in energy demand and greenhouse gas emissions, through a combination of effective mitigation and adaption responses to climate change.*

Strategic Objective (2A): *To support and encourage sustainable compact growth and settlement patterns, integrate land use and transportation, and maximise opportunities through development form, layout and design to secure climate resilience and reduce carbon emissions.*

Strategic Objective (2D): *To integrate appropriate mitigation and adaptation considerations and measures into all forms of development.*

Strategic Objective (5L): *To promote a diverse and sustainable local economy through the designation of sufficient lands for employment related uses,*

including facilities, to promote SME growth through the local area plans for the District towns.

10.2.2.6 Kilkenny County Council Climate Change Adaption Strategy 2019-2024

The Kilkenny County Council Climate Change Adaption Strategy [95] features a range of actions across the sectors of Energy and Buildings, Flood Resilience Transport, Resource Management and Nature-Based Solutions and Communities that collectively address the targets of the plan.

The consequence of extreme weather events, relating to flooding, storms and snow and ice events, in Co. Kilkenny, have been assessed in the Climate Adaption Strategy and was considered in the assessment of climate risks associated with the Proposed Development (section 10.3.3 below).

10.2.2.7 Belview Port Masterplan 2020-2044

Belview Port has produced a Masterplan Document for 25 years to cover 2020-2044 [96]. Within the Masterplan the port reviewed its strategies in context of a number of headings; current infrastructure, economics and finances; future port projections and projected developments.

Within the Masterplan an assessment of flood risks was undertaken, for which a strategic flood risk assessment was carried out [97]. The perceived risks and consequences that were highlighted in the risk assessment were considered in the assessment of climate risks associated with the Proposed Development (section 10.3.3 below).

10.2.3 Assessing Greenhouse Gas Emissions

Anthropogenic GHG emissions have a global effect when they are released into the atmosphere over time. Therefore, assessing the effects of GHG emissions of the development at a local level are inconsequential to these global emissions.

Currently, there is no set methodology to evaluate significance criteria or a defined threshold. The main sources of GHG emissions associated with the Proposed Development are from the use of vehicles on-site as well as the operation of plant and equipment.

According to the IPCC 2019 refinement of the 2006 publications of Guidelines for National Greenhouse Gas Inventories [112] GHG emissions can be split into three categories (or 'scope').

- Scope 1: Direct emissions from sources owned or controlled by the reporting entity; such as emissions from combustion of fuels used in plant and machinery;
- Scope 2: Indirect emissions associated with the generation of purchase heat, steam and water; and,
- Scope 3: Other indirect emissions that occur in the value chain.

For the purpose of this stage of the assessment, potential GHG emissions have been divided into Scope 1, Scope 2 and Scope 3 emissions, as recognised by the ISO 14064 Part 1 Standard. Table 10-1 below details the scopes that were considered for this assessment.

Table 10-1: Scoped Emissions used in the GHG Assessment

Scope	Source
Scope 1 – Direct Emissions	Anticipated Natural Gas usage during the Proposed Development.

Scope	Source
Scope 2 – Indirect Emissions Associated with the Proposed Development	Anticipated Electricity Usage
Scope 3 – Indirect Emissions	Vehicle movements and Plant assumed to be owned by third parties

To allow us to compare construction and operational phase emissions with the relative sectoral emissions ceilings for Transport, assumptions were made regarding this proportion. Calculations for HGV emissions were performed using the TII Carbon Tool, taking into account the known number of HGVs that will be used on a typical day and an estimation of their typical travel distance. The resulting emissions were considered as the proportion of Scope 3 emissions that could be comparable to Transport sectoral emissions ceilings.

The four (4No.) closest major population centres to the Proposed Development are Dublin City, Cork City, Waterford City and Kilkenny City, 176km,130km, 9.7km and 57km away, respectively. As these are the four (4No.) most likely origins for raw materials, chemicals, and destination of finished manufactured products, their distance from the Proposed Development based on the typical route taken (ca.93.2km average) has been used to estimate the likely travel distances for products arriving at and leaving the Site (or the Proposed Development). Gypsum deliveries (estimated 8 per year) will arrive by ship to Belview Port before being transported by HGV to the Proposed Development, in this case the distance between the port and Proposed Development was used (ca. 2.4km). To ensure consistency in the approach for using the TII Carbon Tools emission factors as part of this assessment, an average laden condition was assumed for vehicles both entering and leaving the Site (Table 10-2).

Table 10-2: GHG Emissions Conversion Factors Transport

HGV Average Laden Load (tonnes CO_2e/km)	LGV Average Laden Load(tonnes CO_2e/km)	Personal Vehicle (tonnes CO_2e/km)	Van Average (tonnes CO_2e/km)
0.00107	0.00030	0.00022	0.00030

10.2.3.1 Construction Phase

Currently it is difficult to quantify construction GHG emissions which is a common issue encountered for projects. A draft report prepared by UCD School of Architecture, Planning and Environmental Policy "Whole Life Carbon in Construction and the Built Environment Ireland" prepared on behalf of the Irish Green Building Council states (Building in a Climate Emergency Research Group, UCD School of Architecture, Planning and Environmental Policy, 2021) states *"… The high-level national climate emissions inventories do not relate data directly to the construction sector…. Undefined construction sectors emissions make it difficult to assess the impact of the Irish construction industry on climate emissions…."*. Nonetheless, these emissions are identified, mitigation measures identified, and potential impact put into context in this section and section 10 and section 11.

Construction of any industrial facility results in GHG emissions for a variety of sources, processes, and operations. GHG emissions during construction typically arise from the following:

- GHG emissions embedded in the materials: This includes materials used for construction of the structures and the base of the site, such as imported aggregates, concrete, steel/metal, glass, wood, and a variety of prefabricated construction elements, etc. Although aggregates, concrete and wood will be sourced and produced in Ireland, it is likely that many materials will be imported into Ireland, especially steel;

- GHG emissions embedded in the process equipment including but not limited to stainless-steel silos/tanks, dryer, mills, elevators electrical and mechanical equipment, pipe bridges, control panels, etc. It is expected that most of this equipment will be imported into Ireland;
- GHG emissions from the construction plant and related traffic such as HGVs utilised during construction. It is expected that all such plant will be standard diesel-powered construction plant; and,
- GHG emissions from all construction workers travelling to and from the Site. As this will not include typical employees, who live near the Site, but staff with specialised skills, including engineers, installers, and process equipment specialists, it is not possible to determine distance travelled, especially as most suppliers and contractors have not been selected yet.

Some of the above emissions related to the construction phase, are outside the boundary of this assessment and cannot be assessed in the light of current knowledge and methods of assessment (refer to section 10.2.1). This applies to GHG emissions arising and accounted for in a country outside Ireland, e.g. for materials and equipment manufactured outside Ireland, as well as travel occurring outside Ireland. Further, some of the above emissions, e.g. those occurring during production of steel or concrete, which are standard construction materials, are so far down the supply chain that these are considered beyond 'Indirect Impacts' as defined in the EPA's Guidance (EPA, 2022) and do not have to be assessed in an EIAR for a specific project (refer to section 10.8).

Based on preliminary design that was available at the undertaking this assessment, estimating materials required to build the facility was not possible. Embedded carbon information was deemed not substantial enough to allow for an assessment with reasonable level of accuracy and was therefore not completed.

The construction phase of the Proposed Development will be short-term as it will have a defined duration, it is anticipated to begin in mid/late 2024 and to last a period of 14 months. This phase is expected to involve entirely scope 3 emissions. Expected completion date is prior to 2026 therefore emissions were compared to their respective first sectorial emissions ceilings only.

During the construction period it is estimated that there will be approximately 20 HGV's accessing the site on a daily basis. During peak periods such as the concrete pouring phase or importing engineering fill materials it is expected that 80 to 100 HGV's will arrive to the Site. These phases will be of short duration over 3 or 4 weeks.

The construction phase is expected to require 1000 employees during its peak, the Central Statistics Office calculated that an average worker would travel 30km (round-trip) each day as they travel to work. Therefore, it is assumed that every vehicle used on-site will travel ca.15km for each movement.

10.2.3.2 Operational Phase

Once operational, the primary GHG emissions directly arising from the Proposed Development will be energy and transport related. The approach taken to calculate the emissions related to the operational phase of the Proposed Development are detailed below, for the purpose of this stage of the assessment, potential GHG emissions have been classified into Scope 1, Scope 2 and Scope 3 emissions.

The calculation of GHG emissions associated with Scope 1, Scope 2 and Scope 3 emissions, follows the methodology outlined by the IEMA Guidance and the use of emission factors provided by the TII Carbon Tool, created and managed by the Transport Infrastructure of

Ireland. The emissions were calculated for a typical year (333 days) and were compared against the relevant sectoral emission ceilings to evaluate significance.

Scope 1 emissions will arise from the operation of plant/equipment operated and owned by the Proposed Development. This is provided in terms of total fuel used during a typical year, refer to section 3.2.1 for details of equipment and on-site processes. It is estimated that the total annual natural gas demand for the Site is ca. 12,480,000 m^3 per annum. Emission factors (kg of CO_2e per m^3 used) were provided by the TII Carbon Tool [109], which has taken these specific emission factors from databases such as the SEAI and the BEIS to convert GHG's into CO_2e.

Scope 2 emissions include the installed instantaneous electrical power which was provided by the Applicant required to operate the Site (1556kW). However, the client has provided projected yearly kWh production of 1,353,679 kWh which will be generated by on-site PV.

Scope 3 emissions are those indirectly influenced by the operations of the Proposed Development and include vehicle movements not owned by the company (contracted HGVs, employee vehicles and delivery vehicles).

It is estimated that 8892 HGV and 1332 LGV inbound truck movements will be required in a typical year and 6660 outbound truck HGV movements within a typical year.

Predicted movements for small commercial vehicles visiting the site have been provided, these include maintenance personnel, couriers, cleaning contractors, etc. equating to ca. 1,825 trips to site a year. It is assumed that these vehicle journeys will originate in depots, warehouses and offices in Waterford City ca. 9.7km from the site.

The construction phase is currently planned to begin in mid to late 2024 and will take approximately 14 months to complete, considering this the operational phase will begin within the Second National Carbon Budget period, thus emissions were only be compared to the ceilings within this period. GABM Limited has no set life-time planned for the Proposed Development, however the operational phase has been evaluated until the year 2030, further emissions were not completed past 2030 as the sectoral emission ceilings outline the difficulties in quantifying emissions from sectors post 2030. The extrapolation of emissions associated with the Proposed Development represents a conservative estimation, as changes in technology will likely reduce emissions in the future.

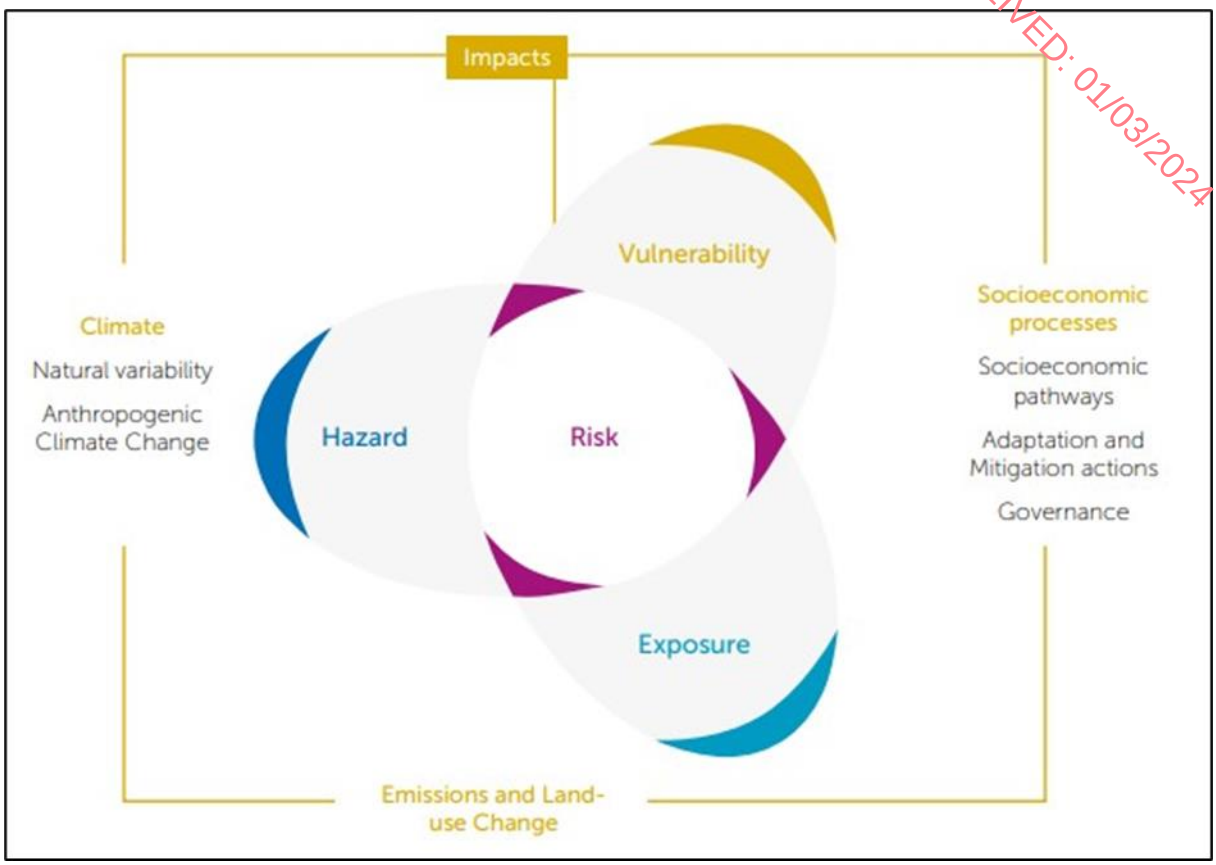
10.2.4 Climate Change Risk Assessment

The IPCC define three key components for identifying climate risk that interact to generate the risk of climate impacts [113]. These include:

- Hazard: The potential occurrence of a natural or a human induced physical event or trend (such as a heatwave, heavy rainfall event, or sea level rise) that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.
- Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (e.g. homes in a flood plain); and,
- Vulnerability: The propensity or predisposition to be adversely affected (e.g. peoples underlying health conditions can be worsened by high temperatures or heatwaves).

Figure 10-1 below displays the framework for identifying potential climate irks associated with a development and in turn the completion of a climate risk assessment.

Figure 10-1: IPCC Sixth Assessment Report 'Risk Propellor'



In adherence to the Annex B Guidelines provided for local councils, the assessment process entails the identification and characteristics of climate hazards. This involves both the frequency and magnitude of impacts across the 'Asset Damage' category.

Given the scale and nature of the Proposed Development, the climate risk assessment will focus exclusively on the physical vulnerabilities of the Proposed Development to climate hazards both present and future. According to Annex B these physical vulnerabilities are described as:

Properties of an asset related to the structure or facilities can exacerbate/reduce the impacts before, during or after a hazard event e.g. poor design and construction of building provision of active cooling.

The impacts of climate risks that will potentially cause disruption to the delivery of services and functions for the Proposed Development are considered as the main focus of this assessment. Descriptions of the level of impacts range from Catastrophic (Widespread service failure with services unable to cope with wide-scale impacts) to Negligible (Appearance of threat but no actual impact on service provision), these are further detailed in Appendix 10-1). The Magnitude of impact, in accordance with the Annex B Guidelines, will only relate to asset damage, due to the nature of activities on the site. The magnitude of impact across the asset damage categories ranges between Negligible (impacts can be absorbed) to catastrophic (Disaster with the potential to lead to shut down or collapse or loss of assets/network). The frequency of these climate hazards range from Rare (<1% occurrence in a year, occurs once in over 100 years) to Very Frequent (>100% occurrence in a year, occurs several times in a single year). Full details on these quantitative/qualitative descriptions are presented in Appendix 10-1.

Future changes in climate hazards were identified as likely to be of significance if the current climate hazards exposed to the Proposed Development are determined to be significant. A detailed desk-based review of available resources (Climate Ireland, ThinkHazard, Climate-Adapt etc.) were used to determine potential climate hazards exposed to the Proposed Development and their projected changes in the future.

10.3 Existing Receiving Environment

10.3.1 Baseline Climate

The climate of Ireland is primarily driven by ocean influences, mainly the Atlantic, resulting in maritime climate conditions. This results in relative warm summers and mild winters. The wettest months of the year typically occur between November to January. The prevailing wind direction is from the southwest, contributing heavily to the wet weather experienced in the spring and warmer temperatures in the summer.

Typically, climate is averaged weather data over a 30-year period to determine long-term trends in important variables such as temperature, precipitation and windspeed. The period of 30-years is considered long enough to smooth out year to year variations. Recently, Met Eireann has compiled a set of climate averages for the period 1991 to 2020.

The closest station to the Proposed Development that has available 30-year averages is located in Rosslare, Co. Wexford. However, this station closed in 2007/2008, meaning that over a decade of recent climate variability is not available. The closest station that has the available 30-year data for the 1991-2020 period is Cork Airport, located ca. 110km to the southwest. Due to the lack of available information, this station was chosen as the best representation of recent climate data. (Table 10-3 below).

Table 10-3:Climate Averaged Data from Cork Airport (1991 to 2020)

Variable	1991 to 2020 Averages
Mean Temperature (°C)	10
Precipitation (sum of monthly mean in mm)	1239
Mean of wind speed (knots)	9.8
Mean number of days with gale force winds	5.1

According to Met Eireann's Climate Average Report, which compares the 1961 to 1990 averages to the 1991 to 2020 averages the following is noted:

- Annual mean air temperature for Ireland has increased by approximately 0.7°CA. Spring showed the highest increase (0.8°C), whilst winter showed the smallest increase (0.6°C);
- Annual average rainfall has increased by approximately 7% between the two periods. The greatest increase was seen in the west and north of the country;
- The 30-year average annual distribution of rainfall shows a typical west to east decline in the number of rain days and wet days, with east and southeast regions experiencing the lowest number of wet days; and,
- The average annual number of very wet days observed over the period 1991 to 2020 shows that these events are more frequent in the west of the country than in the eastern and midland regions.

10.3.2 Projected Future Climate Change

Observed changes in Ireland's climate over the last century are in line with global and regional trends associated with human induced climate change. Climate projections in Ireland are based on global GHG emission scenarios, predicting the future usage of fossil fuels globally and the corresponding release of GHG gases. The Representative Concentration Pathway (RCP) is a trajectory adopted by the IPCC [114]. RCP scenario 4.5 (RCP4.5) represents an intermediate scenario with emissions expected to peak in 2040 and then decline [114]. RCP scenario 8.5 (RCP8.5) is the worst-case scenario approach based on an overestimation of projected coal outputs [114]. The range of these scenarios provide an intermediate and worst-case estimation of potential changes in the environment in response to climate change. Based on this range, the following projections were made regarding Ireland's climate:

- Projected seasonal changes in temperature range from 0.9°C to 1.9°C (RCP8.5), with an increase in the duration and intensity of heatwaves expected; and,
- Projected changes in the frequency of very wet days (>30mm of precipitation) range between a 21% increase (RCP4.5) and a 31% increase (RCP8.5).

Projections regarding regional scale sea-level risk and changes in wind speed require more comprehensive research to determine the long-term trends.

10.3.3 Climate Hazards

According to the IPCC's Sixth Assessment Report, climate impacts are becoming more severe and are manifesting at an accelerated pace [115]. These impacts can have cascading effects on both natural and human systems, often interacting with other human activities. The IPCC defines climate risk as the potential for adverse consequences to human and ecological systems, recognising the diverse values and objectives associated with these systems [115].

Section 2 of Appendix 10-1 highlights the scales used to identify the climate hazards that have the potential to impact the Proposed Development from a desk-based review of available resources. Following this review, the following hazards identified as relevant to the Proposed Development are as followed:

- Wildfires;
- Heatwaves/ Droughts;
- Cold Snaps:
- Extreme Rainfall;
- Flooding;
- Landslides; and,
- Sea Level Rise.

Aspects of some hazard categories, such as ocean acidification will not have a direct impact on the Proposed Development, due to the nature of activities and its location. As a result, these hazards have been screened out of consideration when identifying the level of risk associated with the Proposed Development.

Sea Level Rise was considered as a potential climate hazard in particular due to its proximity to the Port/Sea, however the Proposed Development location is at an elevation of ca. 51m AOD. According to the IPCC, [116] global sea level is expected to increase will rise between 0.43 m (0.29–0.59 m, likely range; RCP2.6) and 0.84 m (0.61–1.10 m, likely range; RCP8.5) by 2100. As a result, Sea Level Rise has been screened out of consideration as projected Sea Level Rise would not pose a level of risk that would require further consideration.

The Kilkenny County Development Plan [94] highlighted flood risk as the most pressing climate hazard in the county and have established mitigation measures against these risks.

The Port of Waterford Masterplan [96] has also highlighted flooding as the most significant climate hazard within the ports Strategic Flood Risk Assessment [97] considering 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009. [107] Fluvial and Tidal/Coastal flooding mechanisms are the most significant due to the port's proximity to a number of rivers which are tidally influenced while Pluvial flooding is possible due to the port boundary being bounded lands to the north.

The Port of Waterford Masterplan [96] has also highlighted flooding as the most significant climate hazard within the ports Strategic Flood Risk Assessment [97] considering 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009. [107] Fluvial and Tidal/Coastal flooding mechanisms are the most significant due to the port's proximity to a number of rivers which are tidally influenced while Pluvial flooding is possible due to the port boundary being bounded lands to the north.

10.3.4 National Carbon Budget and Sectoral Emission Ceilings

The National Sectoral Emission Ceilings refer to the total amount of permitted GHG emissions that each sector of the economy can produce during a specific period of time.

Under Section 6C of the Climate Action and Low Carbon Development Act (as amended) sectoral emission ceilings are set out to outline the maximum amount of GHG emissions that are permitted in different sectors of the Irish economy.

This Act commits Ireland to achieve climate neutrality by no later than 2050. The carbon budget programme, which includes three successive 5-year periods of national emission ceilings, are measured in tonnes of CO_2e (tCO_2e).

Table 10-4: Irelands National Carbon Budget

National Climate Budget	Emission Ceiling for Assessment Period
First Carbon Budget (2021 to 2025)	295,000,000
Second Carbon Budget (2026 to 2030)	200,000,000
Third Carbon Budget (2031 to 2035)	151,000,000

It is outlined that considerations need to be made with regards to how emissions may develop post 2030, to establish a basis for proposals for the provisional third carbon (2031 to 2035).

Within the national carbon budgets, sectoral emission ceilings have been created to reflect the EPA's Emission Inventory. Currently, the sectoral emission ceilings are only presented for the first two carbon budget periods (2021 to 2025 and 2026 to 2030). For GHG emissions associated with the Proposed Development, sectoral emissions for the Transport Sector (Table 10-2) will be used to account for emissions associated with vehicle movements. Emissions associated with the electricity generation will be compared against the Electricity Sector emission ceiling for the respective period (Table 10-5 below).

Table 10-5:Sectoral Emission Ceilings relative to the Proposed Development

Sectors	First Sectoral Emission Ceiling (2021 to 2025) (tCO_2e)	Second Sectoral Emission Ceiling (2026 to 2030) (tCO_2e)
Transport	54,000,000	37,000,000
Electricity	40,000,000	20,000,000

10.4 Characteristics of the Proposed Development

The potential impacts from the Proposed Development were assessed under the following stages:

- Construction Phase; and,
- Operational Phase.

10.4.1 Construction Phase

The construction phase is anticipated to span 65 weeks, this phase was entirely assessed under scope 3 emissions, discussed in section 10.2.3 above. GHG emissions from the construction phase will originate from plant equipment and transport.

10.4.1.1 Plant Machinery

Throughout the process of the constructing phase the equipment expected to be operating on-site within the Proposed Development boundary as outlined in Section 3.4 includes:

- 1no. Bulldozer;
- 2no. Dump Trucks;
- 2no. Excavators;
- 1no Generator;
- 1no. Roller;
- 1no Telescopic Handler;
- 1 no. Crane; and,
- 4no Concrete Mixer.

Table 10-6:Plant Machinery used on-site during Construction Phase

Plant Type	Total Operating Months per Construction Phase	Operating Hours during Construction Phase	Fuel use per hour per vehicle	Emission Factor (kg of CO_2e per litre)	Fuel Consumption for Entire Construction Phase	tCO_2e Entire Construction Phase
Bull Dozer (x1)	3	796	15	2.667	11,941	31.85
Dump Trucks (x2)	8	2,123	40	2.667	84,912	226.50
Excavator (x2)	4	1,061	20	2.667	21,228	56.62
Generator (x1)	12	3,184	15	2.667	47,763	127.40
Roller (x2)	8	2,123	10	2.667	21,228	56.62
Telescopic Handler	14	4,246	15	2.667	63,684	169.87
Crane	8	2,123	40	2.667	84,912	226.50
Concrete Mixers (x4)	8	2,123	15	2.667	31,842	84.94
Total					**367,510**	**980.30**

10.4.1.2 Transport

During the construction phase it is estimated that there will be approximately 20 HGV's accessing the site on a daily basis. During the concrete pouring phase, it is expected that 80 to 100 HGV's will arrive to the site over a period of 3 or 4 weeks, (Table 10-7 below) demonstrates GHG associated with each. Distance travelled for each type of goods has been calculated from the following information and based on the following conservative assumptions:

- Delivery construction vehicle and employee vehicle information obtained from GABM Limited relating to the Proposed Development; and,
- Inbound and Outbound data provided by GABM Limited for HGV's estimating their distance travelled to and from the Proposed Development based on the typical route taken (ca.93.2km average).

Table 10-7: Construction Phase Freight Transport GHG Emissions

HGV per phase of construction	Distance Travelled km/construction phase (includes return trip)	Total Tonnes CO_2e/construction phase
Construction phase typical movement 20 HGVs per day	1,137,040	1,220
Concrete pouring 100 HGVs per day	372,800	400
Total	**1,509,840**	**1,620**

The construction phase is expected to require up to100 employees during its peak, Staff are anticipated to arrive at the site in the 30-minute period preceding the start of the operating day (i.e., 07:30 to 08:00hrs) and depart in the 30-minute period following the end of the operating day (i.e., 18:00 to 18:30hrs).

It is expected that construction workers will arrive together in shared transport. It is assumed that no construction workers will arrive by walking, cycling or use of public transport. On that basis a vehicle occupancy rate of 2 persons per vehicle is predicted, giving an expected 50 vehicular staff trips per day during the peak construction period.

Table 10-8: Construction Phase Employee Vehicle Movements

Construction Phase	Employee Numbers	Distance Travelled km/construction phase (includes return trip)	Total Tonnes CO_2e/construction phase
Site Setup	10	90,00	1.95
Groundworks Cut and Fill	30	27,000	5.85
Foundations	50	91,500	19.82
Structural Framing	80	146,400	31.70
Building Envelope	10	276,000	59.77
Process and Fit Out	100	276,000	59.77
Commissioning and Completion	100	183,000	39.63
Total	**470**	**1,008,900**	**218.49**

10.4.2 Operational Phase

The Operational Phase of the Proposed Development is expected to span over an indefinite number of years.

10.4.2.1 Natural Gas

During the operational phase it is estimated that the facilities total annual natural gas demand for the site will be ca. 12,480,000 m^3 per annum.

10.4.2.2 Electricity

The average electricity demand will be 1,556 kW. Taking a conservative approach to this assessment, it has been assumed that the facility will operate 24/7/365 at this peak demand, resulting in 13,630,560 kWh per year. This is a significant overestimate, as the facility will likely operate significantly less than 24/7/365, and also the average demand will likely be significantly less than the demand of 1,556kW.

Photovoltaic (PV) solar panel arrays have been proposed on the roof of the Proposed Development. It is estimated that these panels will generate up to ca. 1,353,679 kWh per year.

10.4.2.3 Transport

This section quantifies the GHG emissions associated with all transport during the operational phase of the Proposed Development.

The natural resources used by the Proposed Development will be:

- Gypsum rock; and,
- Water.

Gypsum rock will be imported into Belview Port from either Southern Spain or Northern Africa. The source of the gypsum will be from currently operating quarries in these countries. Emissions relating to the importing of these materials have been screened out as the geographic boundary of this assessment has been set as Republic of Ireland (refer to section 10.2 above).

Scope 3 (vehicle movements), which have been identified and discussed in section 10.2.3.2 above, will be assessed below. These emissions encompass direct activities from on-site processing and other emissions associated with the project supply chain. Table 10-9 below displays the diesel HGV movements which will occur during the operational phase of the Proposed Development categorised by type of goods. The corresponding GHG emissions associated with each type of material transported has been calculated based on the distance travelled and the conversion factors stated in Table 10-2 above. Distance travelled for each type of good has been calculated from the following information and based on the following conservative assumptions:

- Delivery data obtained from GABM Limited relating to the Proposed Development;
- Inbound and Outbound data provided by GABM Limited for HGV's. LGV's and commercial vehicles estimating their distance travelled to and from the Proposed Development based on the typical route taken (ca.93.2km average for HGVs and LVGs and 9.7km for commercial vehicles); and,
- Gypsum deliveries (estimated 8 a year) will arrive by ship to Belview Port before being transported by HGV between the Proposed Development and the Port were used (ca. 2.4km).

Table 10-9: Operational Freight Transport GHG Emissions per year

Type of Product	Distance Travelled km/yr (includes return trip)	Total Tonnes CO_2e/yr
Gypsum Deliveries	31,219	33.5
Paper Liner	52,192	56
Chemical Delivery	9,693	10.4
Recycled Plaster Board	434,498	466.2
Chopped Fibre Glass	932	1.0
Outbound HGV	1,241,424	1,332.0
Total HGV	**1,717,953**	**1,899.1**
4 daily LGV's	248,285	74.3
Total HGV and LGV	**1,966,238**	**1,973.4**

The total GHG emissions associated with raw material products inbound and finished product outbound transport to and from the Proposed Development will be ca. 1,973.36 tonnes of CO_2e/yr.

Table 10-10: Small Commercial Vehicles GHG Emissions per year

Type of Small Commercial Vehicle	Distance Travelled km/yr (includes return trip)	Total Tonnes CO_2e/yr
Maintenance Personnel	20,231	6.05
Couriers	5,058	1.51
Cleaning	5,058	1.51
Post	5,058	15.51
Total	**34,405**	**10.6**

The total GHG emissions associated with commercial vehicles transport relating to the Proposed Development will be ca. 10.6 tonnes of CO_2e/yr.

The following conservative approach was taken in calculating Scope 3 baseline for employee travel to work, excluding any walking, cycling, electrical vehicles or car-pooling:

The Site will operate 333 days per year, 24-hours per day, 7-days per week. The Facility will employ a total of 45 staff, with 10-15 staff per shift and three shift changeovers per day. Assuming that the shift changeover occurs in 8-hour periods and that the staff will arrive in single vehicle occupancy there will be 15 staff trips arriving / departing the Facility during the 8-hour periods. This totals 60 vehicle movements per day to and from the Proposed Development.

Therefore, the following calculation was employed:

No. employee vehicles per day x days of work x total distance travelled per day (km) =

Total annual employee transport distance (km)

Table 10-11 below shows annual employee transport and the associated GHG emissions.

Table 10-11: Operational Employee Traffic GHG Emissions per year

Distance Travelled km/yr	Total tonnes of CO_2e/yr
299,700	64.90

10.5 Potential Effects of/to the Proposed Development

10.5.1 Climate Change Risk Assessment

The Climate Change Risk Assessment determines the potential impacts to the Proposed Development from climate hazards and the frequency of these events. To determine the level of risk associated to the Proposed Development, receptors have been divided into the following:

- On-site Assets (e.g. plant, equipment and building);
- Inputs (Electricity and Water);
- Outputs (Mineral Processing, Operating Capacity), and,
- Transport Links.

Table 10-12 below identifies the potential impacts to the identified receptors using UK Guidance on Adapting to Climate Change: Industry sector examples for your risk assessment [106]

Table 10-12:Potential Impacts to the Identified Receptors from Climate Hazards

Climate Hazard	Potential Impacts on Gypsum Plant Receptors
Temperature related (cold snaps, heatwaves, droughts)	• Pressures on cooling systems, such as bearing or belts; • Chemical storage requires appropriate climate control as different temperatures can have deteriorating effects on individual chemicals; • Increased risk of fire within storage yard; • Moisture changes can lead to difficulties with the production process, effecting classification, mixing and drying of finished products; • Increased heat or sun exposure can cause the expansion of metallic infrastructure in building elements or tracks, or rapid degradation of materials such as rubbers or plastics; • Increased moisture exposure can damage finished product leading to increased production costs financially and energy; • Freezing temperatures result in an increased risk of pipework freezing; • Cold temperatures impacting raw materials on site would in turn demand increased energy consumption to heat the materials to appropriate temperature for drying; • Droughts may affect availability of water leading to reduced water for processing use and dust control; and, • Severe cold can lead to contraction of metals and embrittlement of materials such as plastic, rubber and metals.
Wildfires	• Wildfires can cause extensive damage to manufacturing infrastructure; • Working activities may have to be suspended during a wildfire to ensure safety of their employees and equipment; and, • Wildfires can cause damage to access roads and transportation routes.
Flooding	• Impacts on the wider supply chain infrastructure for critical emissions control plant by docks and road access flooding;

Climate Hazard	Potential Impacts on Gypsum Plant Receptors
	• Impact on supply of raw materials; • Increased in flow may cause damage caused from flooding; • Bunded areas could get flooded reducing their capacity; • Potential for increased site surface water and flooding; • Increased rainfall can result in the washing of suspended solids from all areas, including stockpiles and roadways causing blocked drainage infrastructure and offsite pollution; and, • Increases in groundwater levels may affect material storage at the facility.
Landslides	• Landslides and erosion can damage infrastructure particularly during construction phases when embankments are unconsolidated; • Landslides can endanger the safety of workers and equipment; and, • Landslides and soil erosion can disrupt factory operations by blocking access roads and damaging equipment.
Sea Level Rise	• If site is located near the coast there is potential increased risk of flooding; • Flooding to site leads to increased risk to transformers; • Sea Level Rise can impact access to raw materials, damage to docks or ports; • Sea Level Rise can damage transport infrastructure in Costal/Estuary areas; • Sea Level Rise will result in port areas being increasingly vulnerable to storm surges and coastal flooding; and, • Sea Level Rise increases likely hood of damage to on-site infrastructure, equipment and raw materials as a result of coastal flooding.

10.5.1.1 Frequency of the Climate Hazards

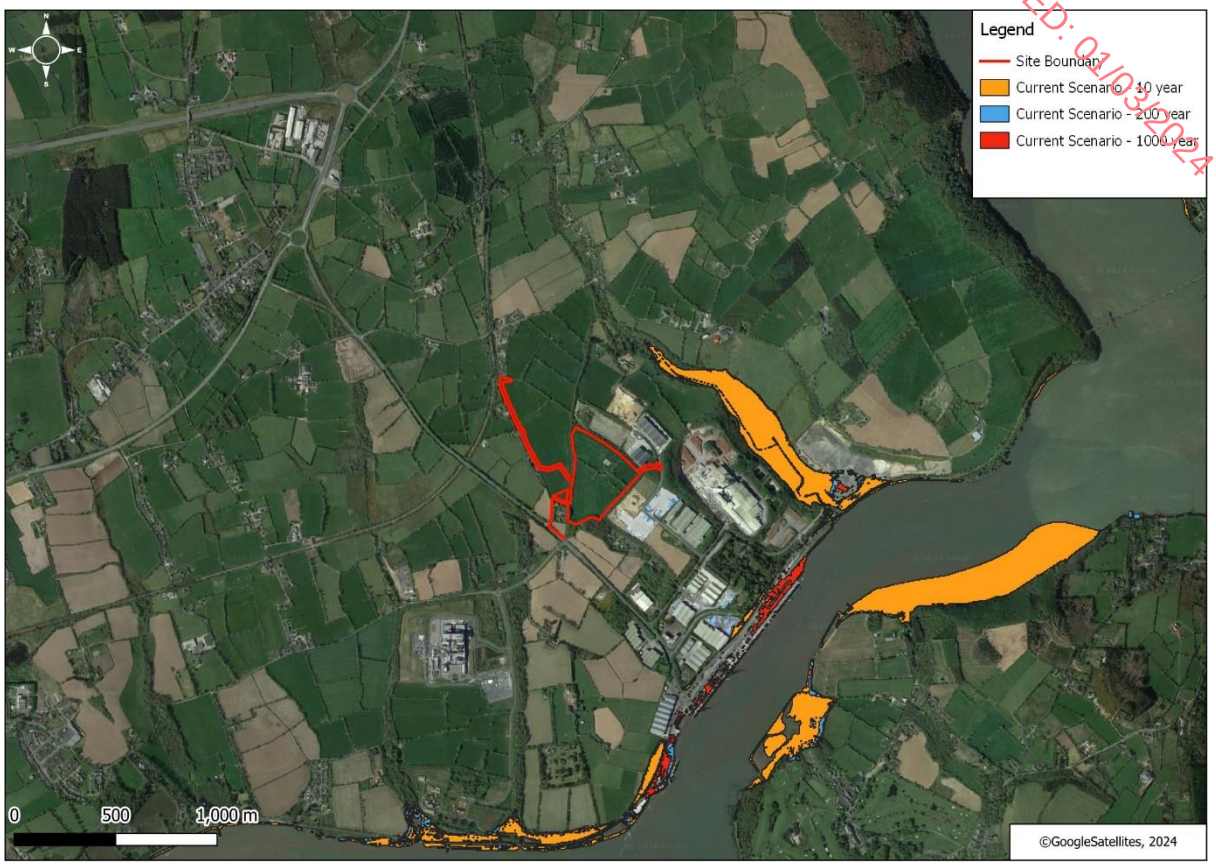
Based on the Annex B Guidance on current climate hazards, the frequency of the climate hazards was quantified through an analysis of available information. The frequency scores assigned, rated between 1-5 for each hazard, are justified below.

Table 10-13: Frequency of Climate Hazards

Climate Hazard	Frequency Score	Frequency Description	Justification
Wildfires	1	Rare	According to the Global Wildfire Information Service there is no evidence for wildfire activity within 5km of the Proposed Development between 2002 and 2022.
Heatwaves / Droughts	2	Occasional	According to the KCC Climate Action Plan a heatwave is indicated by 5 consecutive days of temperatures over ca.24°CA. According to temperature data from a local weather station (Johnstown Castle – ca.37km to the east) there was no occurrence of classified heatwaves since 2008.
Cold Snaps	2	Occasional	According to Met Eireann a yellow weather warning occurs when low temperatures are expected to be below -3°CA. The minimum temperature values from the local Johnstown Castle weather station indicated that the following was identified:

Climate Hazard	Frequency Score	Frequency Description	Justification
			• Between 2009 to 2024 the number of times minimum temperatures fell below -3°C was 27 times, including 20 times between 2010 and 2011; and, • Between 2018 and 2023 There were 4 occurrences.
Extreme Rainfall	2	Occasional	According to Met Eireann, a yellow weather warning for rainfall occurs when daily precipitation exceeds 30mm in a single day. The daily precipitation values from a local weather station (Duncannon – 10km southeast of the Proposed Development) indicates the following: • Since 1995 the number of times daily precipitation exceeded 30mm was 45 times; and, • The occurrence of an orange rain weather warning (>50mm) has only occurred three times since 1995 (August 1997, October 2002 & March 2013).
Flooding	1	Rare	The Port of Waterford Strategic Flood Risk Assessment [97] identified areas within the Ports boundaries of being indicative of fluvial flooding, the boundary also contains some small areas at risk of pluvial flooding. None of which intersect the Proposed Development. According to flood maps available, the Proposed Development is not located within the bounds of the Catchment-based Flood Risk Assessment and Management (CFRAM) Programme for National Indicative Fluvial mapping – Present Day. There is no record of a reoccurring flood event within 2.5km of the Proposed Development. Appendix 10-2 for further details.
Sea Level Rise	1	Rare	The Port of Waterford has identified the Port to be tidally influenced by the river Suir. Current scenario tidal flood mapping (Figure 10-2) identified areas of the Port itself to be vulnerable to Tidal flooding and areas next to the river Luffany, however the assessment carried out did not identify any areas for the Proposed Development at risk of coastal flooding. According to flood maps available, the Proposed Development is not located within the bounds of the coastal flood extent mapping – Present Day. Furthermore, the Proposed Development location is at an elevation of ca. 51m AOD. According to the IPCC, [25] global sea level is expected to increase between 0.43 m (0.29–0.59 m, likely range; RCP2.6) and 0.84 m (0.61–1.10 m, likely range; RCP8.5) by 2100. As a result, Sea Level Rise does not pose a risk to the Proposed Development itself, however potential impacts on access to raw materials were examined below in Table 10-13.
Landslides	1	Rare	According to the Geological Survey of Ireland (Landslide Susceptibility Map), there are no recorded landslides within 5km of the Proposed Development. The susceptibility of the Proposed Development to landslides has been classified as “Low (inferred”).

Figure 10-2:Current Scenario Tidal Flood Mapping, Port of Waterford Strategic Flood Risk Assessment [97]



It is important to recognise that there can be co-occurrences of multiple hazards (such as prolonged dry temperatures increasing the risk of wildfires). However, given the small spatial nature of the Proposed Development and the rarity of associated hazards, these impacts are not considered further.

10.5.1.2 Potential Impacts of the Current Climate Risks

The impacts of current climate risks will result in the disruption to the delivery of service and function expected to be performed by the Proposed Development. For each of the climate hazards identified, the potential impacts as categorised as “Asset Damage” were determined in accordance with the Annex B Guidelines (Appendix 10-1). This quantification of potential impacts was determined for each of the receptors identified.

Table 10-14: Potential Impacts of Receptors to "Asset Damage" as a result of climate change

Receptors	Climate Hazard	Impact Score	Classified Asset Impact	Justification
On-site Assets	Wildfires	2	Minor	The highest impacts associated with on-site assets would be from extreme rainfall and flooding. Due to the nature of activities, assets would be particularly vulnerable to water, as equipment used on Site are immobile it would be difficult to move in the event of a flash occurrence of such hazards. Flooding events would impact access to and from the Proposed Development. The asset damage category of moderate is defined as "a serious event that requires additional emergency business continuity".
	Heatwaves/ Droughts	1	Negligible	
	Cold Snaps	2	Minor	
	Extreme Rainfall	3	Moderate	
	Flooding	3	Moderate	
	Landslides	2	Minor	
	Sea Level Rise	1	Negligible	
Inputs (Electricity and Water)	Wildfires	2	Minor	According to the KCC Climate Adaption strategy, cold snaps and extreme rainfall have the highest consequence to impact areas within the Critical Infrastructure & the Built Environment and Water Resources. The asset damage category of moderate is defined as "a serious event that requires additional emergency business continuity".
	Heatwaves/ Droughts	2	Minor	
	Cold Snaps	3	Moderate	
	Extreme Rainfall	3	Moderate	
	Flooding	3	Moderate	
	Landslides	2	Minor	
	Sea Level Rise	1	Negligible	
Outputs	Wildfires	2	Minor	Due to the nature of activities associated with the Proposed Development (fabrication of material) the highest level of impact for a hazard was for a flood event.
	Heatwaves/ Droughts	1	Negligible	

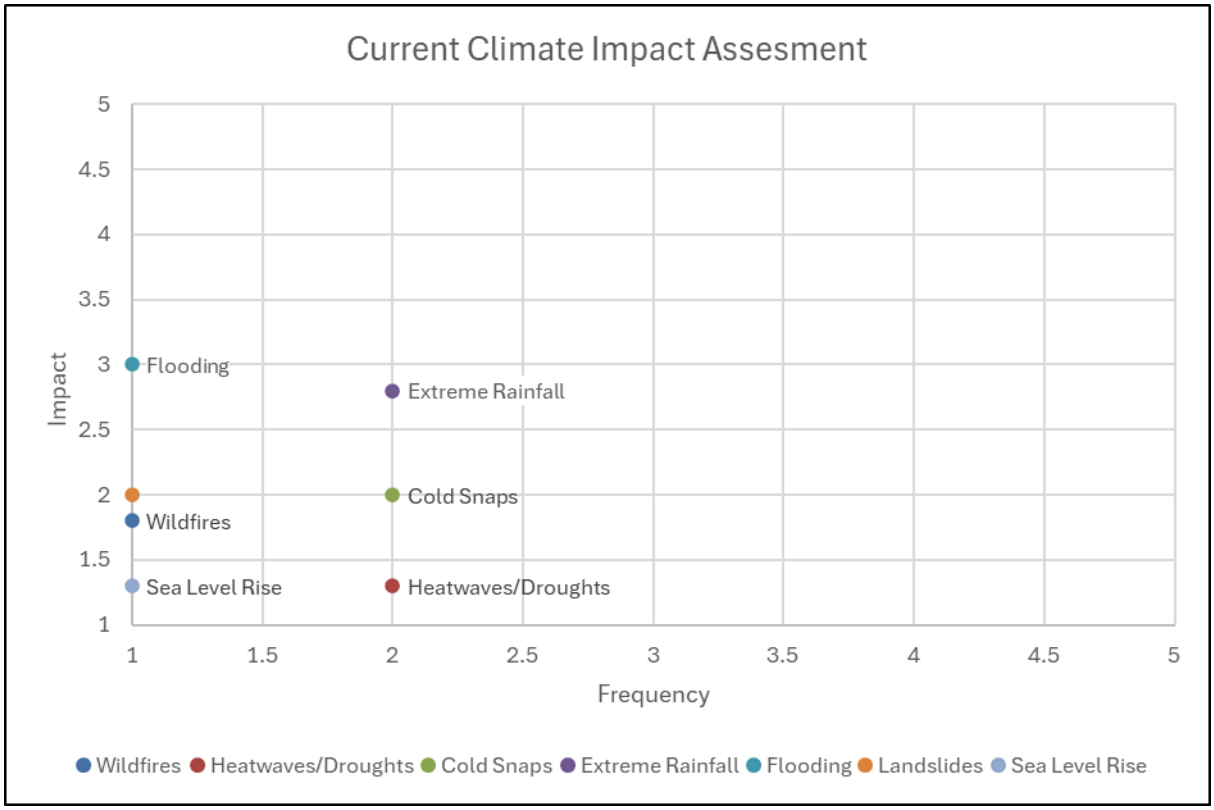
Receptors	Climate Hazard	Impact Score	Classified Asset Impact	Justification
	Cold Snaps	2	Minor	The asset damage category of moderate is defined as "a serious event that requires additional emergency business continuity".
	Extreme Rainfall	3	Moderate	
	Flooding	3	Moderate	
	Landslides	2	Minor	
	Sea Level Rise	1	Negligible	
Transport Links	Wildfires	1	Negligible	The highest level of impact that could affect the transport links associated with the Proposed Development would be a flood event, classified as moderate. This would be due to the nature of infrastructure, transport routes and access to shipping networks, have the potential to be impacted if they do not adequate capacity to respond to a flood event compared to more complex road networks. Future tidal flood mapping (Figure 10-4 and Figure 10-5 below), show that the Port itself is considered vulnerable to potential flooding as sea levels rise. The assessment considers Current (Present day sea levels), Mid- Range (0.5m sea level rise) and High Range (1.0m sea level rise) for 10-, 200- and 1000-year flood events. As sea level increase between 0.43 m (0.29–0.59 m, likely range; RCP2.6) and 0.84 m (0.61–1.10 m, likely range; RCP8.5) by 2100 the impact on the delivery of raw material to the port is considered Minor.
	Heatwaves/ Droughts	1	Negligible	
	Cold Snaps	2	Minor	
	Extreme Rainfall	2	Minor	
	Flooding	3	Moderate	
	Landslides	2	Minor	
	Sea Level Rise	2	Minor	

Based on a qualitative judgement of impacts on assets across all the receptors identified, the frequency and impact score for each hazard was identified and classified for the Proposed Development (Table 10-15 below) with an illustrated graph presented in Figure 10-3.

Table 10-15: Summary of Current Climate Impacts for the Hazards Identified

Hazard Type	Current Frequency	Current Frequency Score	Average Impact Score (Across all Receptors)
Wildfires	Rare	1	1.8
Heatwaves/Droughts	Occasional	2	1.3
Cold Snaps	Occasional	2	2.0
Extreme Rainfall	Occasional	2	2.8
Flooding	Rare	1	3.0
Landslides	Rare	1	2.0
Sea Level Rise	Rare	1	1.3

Figure 10-3: Classification of current climate hazards



**Frequency is measured between 1(Rare) to 5 (Very Frequent). Impact is measured between 1 (Negligible) to 5 (Catastrophic). Further details are presented in Appendix 10-1.*

Based on the availability of information, it is not possible to quantify the potential for future climate risks associated with wildfires and landslide susceptibility. Based on this, and their current frequency, the potential effects of these hazards on the Proposed Development are considered not likely and not significant.

10.5.1.3 Potential Future Climate Risks

Understanding how climate change risks may evolve in the future is fundamental to identifying how existing risks may change as a result of climate change.

Table 10-16 below presents the future changes in climate hazards expected due to climate change, based on a desk-based review of the Climate Ireland platform. As assets are expected to remain similar throughout the operational phase of the Proposed Development, the level of impacts from these hazards will remain the same. For a complete understanding of future climate risks, the CMIP climate scenarios outlined by Climate Ireland (RCP4.5 and RCP8.5) for the future period 2021-2050 is discussed.

The Climate Ireland platform was used to determine the potential changes in frequency of these hazards. All climate hazards were assessed relative to the Proposed Development area as far as practicable.

Table 10-16:Future Changes in Climate Hazards Expected due to Climate Change

Climate Hazard	Current Frequency Description	Future Frequency Description	Justification
Flooding	Rare	Rare	The Port of Waterford Strategic Flood Risk Assessment [4] completed a screening and scoping assessment was carried for current scenario and future scenario flood events with areas of Mid-Range 1 in 200 and High Range 1 in 1000-year flood events being identified for each scenario none of which intersect the Proposed Development. According to flood maps available, the Proposed Development is not located within the bounds of the Catchment-based Flood Risk Assessment and Management (CFRAM) Programme for Low, Medium or High Probability flood events. Given there is no potential future change in frequency of flood events associated with the Proposed Development, the projected frequency of future flooding will remain rare.
Sea Level Rise	Rare	Rare	The Port of Waterford has identified the Port to be tidally influenced by the river Suir. Future scenario tidal flood mapping identified an area 1545m east of the Masterplan area where the river Suir and Barrow converge to be sensitive to extreme coastal flooding levels, however the assessment carried out did not identify any areas for the Proposed Development at risk of coastal flooding. According to flood maps available, the Proposed Development is not located within the bounds of the Catchment-based Flood Risk Assessment and Management (CFRAM) Programme for Current range, Medium range (0.5m sea level rise) or High range (1.0m sea level rise) coastal flood events (Figure 10-4 and Figure 10-5).
Heatwaves/Droughts	Common	Frequent	According to the Climate Ireland platform under RCP4.5 and RCP8.5, the number of heatwaves impacting the area associated with the Proposed Development are expected to increase by 0.2 and 0.27 heatwaves. Given the area associated with the Proposed Development shows higher levels of projected drought occurrences (Figure 10-6), compared to the rest of the country, the frequency of the hazard has been upgraded to Frequent.
Cold Snap	Frequent	Frequent	According to the Climate Ireland platform, under RCP4.5 the number of ice days (where the number of days when maximum temperature is <0°C) are expected to increase by 0.2 days between 2021-2050 associated with the Proposed Development. Under RCP8.5, the number of ice days are expected to increase by 0.17 days over the same period. Due to the low change in frequency expected for ice days, the frequency of cold snaps hazards will remain as Frequent (Figure 10-7 below).
Extreme Rainfall	Common	Common	According to the Climate Ireland platform, under RCP4.5 the number of days where precipitation will exceed 20mm (classified as a “Wet Day”) is expected to be ca. 2.5 days. The number of wet days is modelled as 2.5 days under RCP8.5 also (Figure 10-8). Given the existing frequency of current rainfall events, under future climate change, the frequency of extreme rainfall is also classified as Common.

Figure 10-4: Mid-range future scenario to tidal flood mapping, Port of Waterford Strategic Flood Risk Assessment [4].

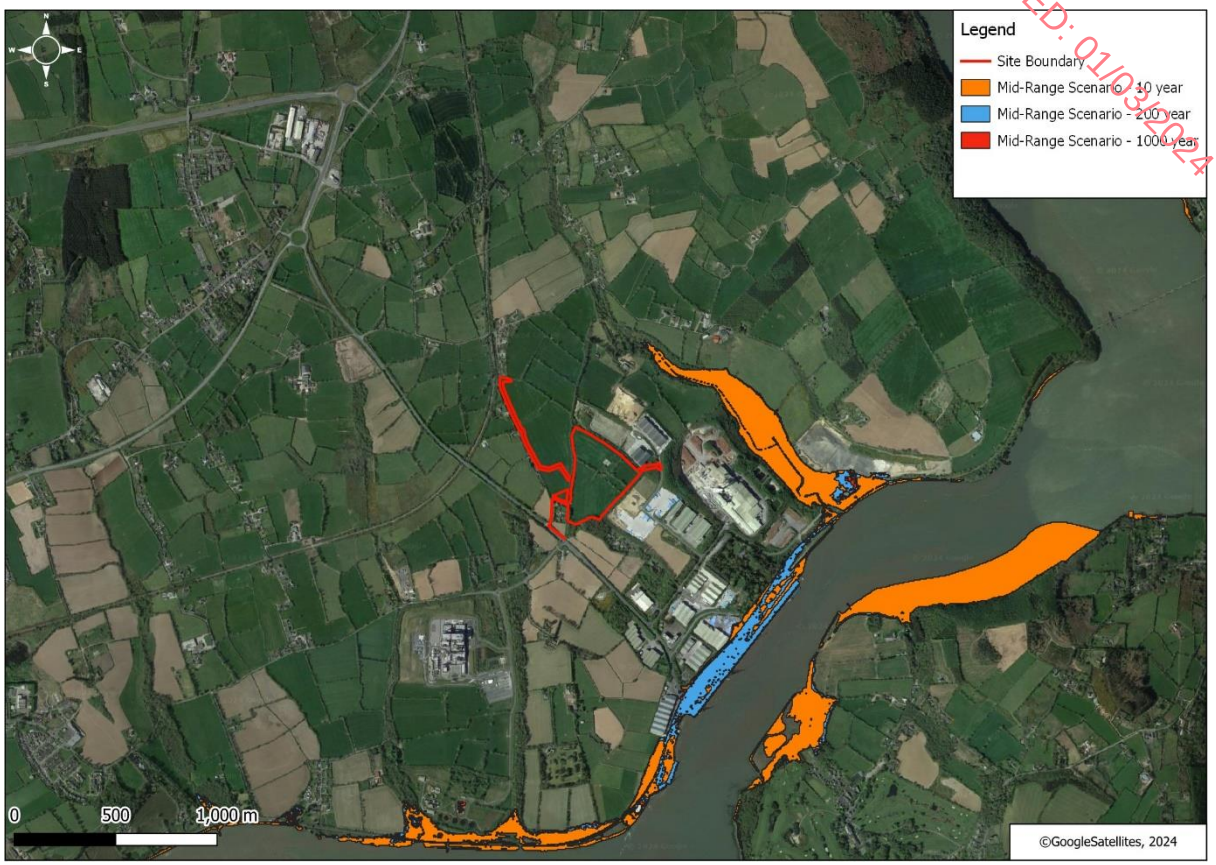


Figure 10-5: High-range future scenario tidal flood mapping, Port of Waterford Strategic Flood Risk Assessment [4]

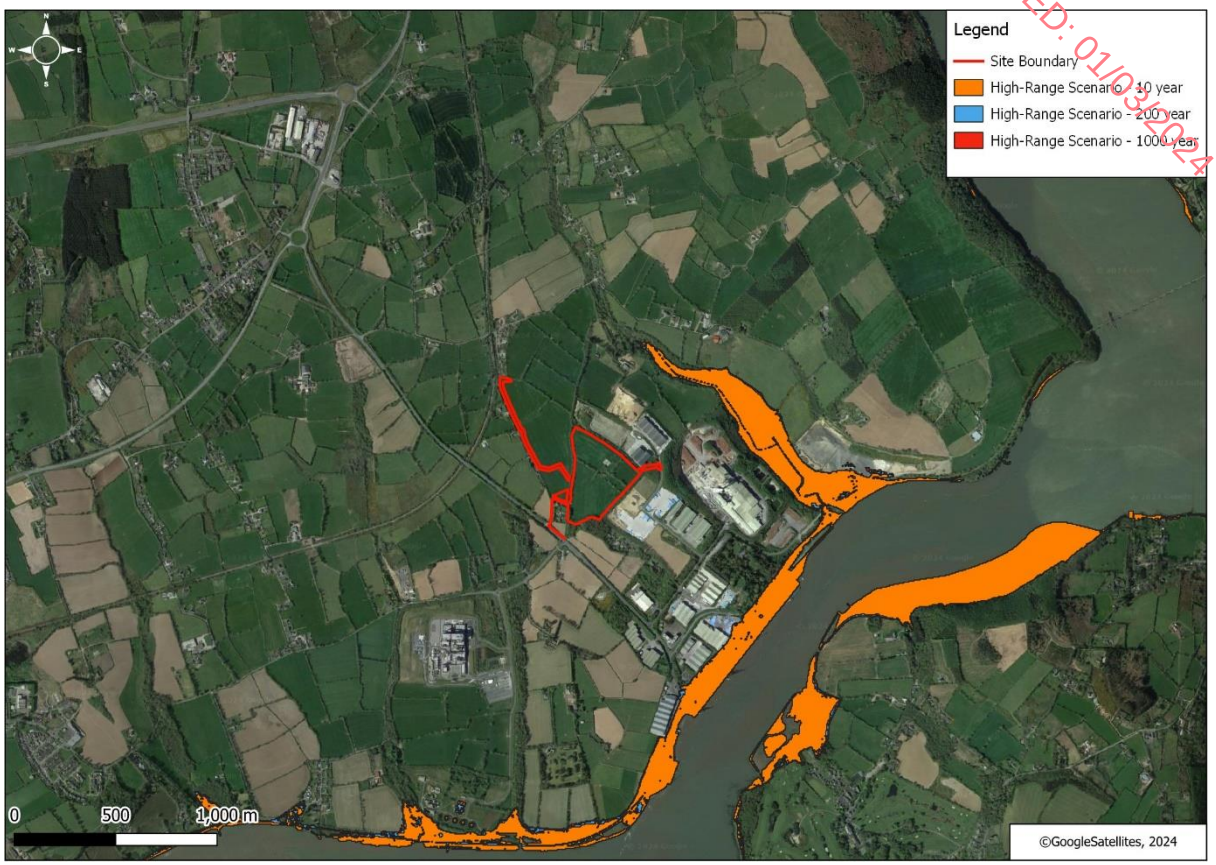


Figure 10-6: RCP4.5 and RCP8.5 Projected changes in number of heatwaves (2021-2050)

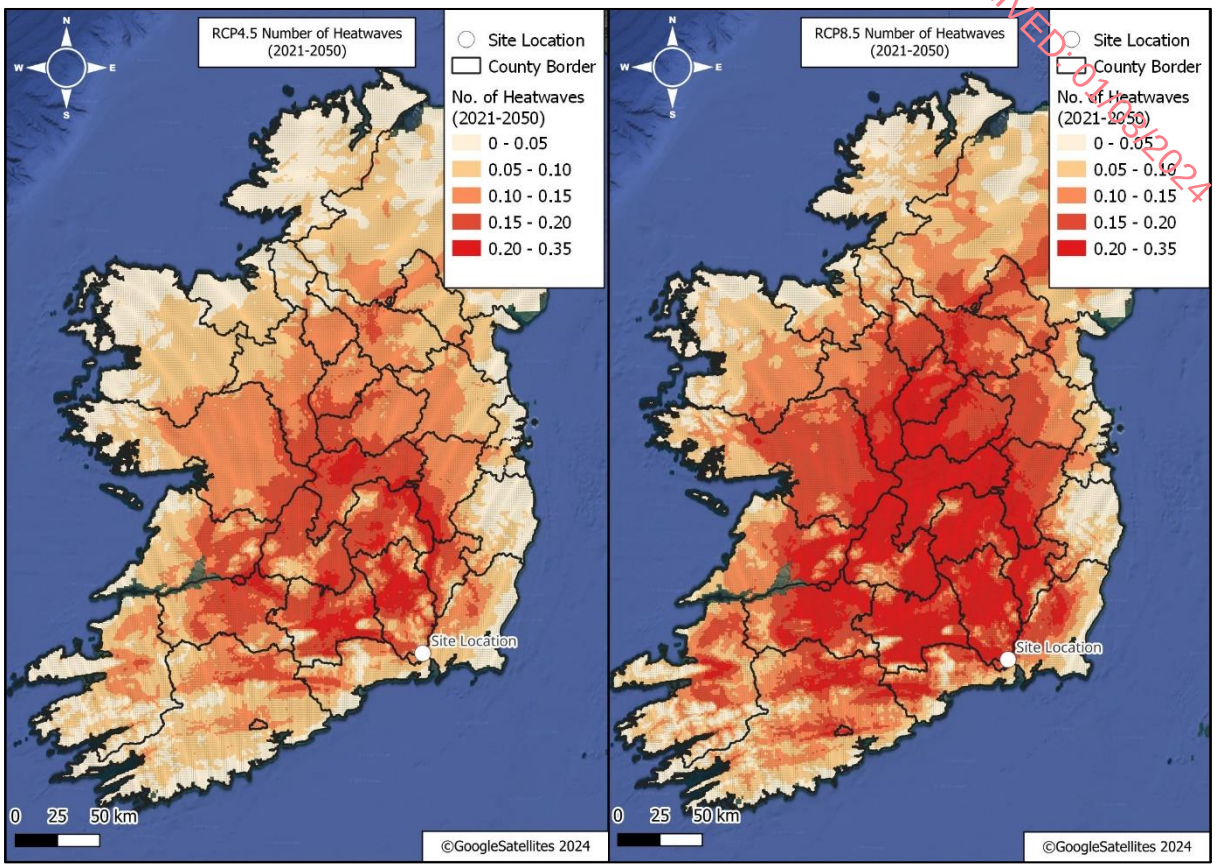


Figure 10-7: RCP4.5 and RCP8.5 Projected Changes in number of ice days (2021-2050)

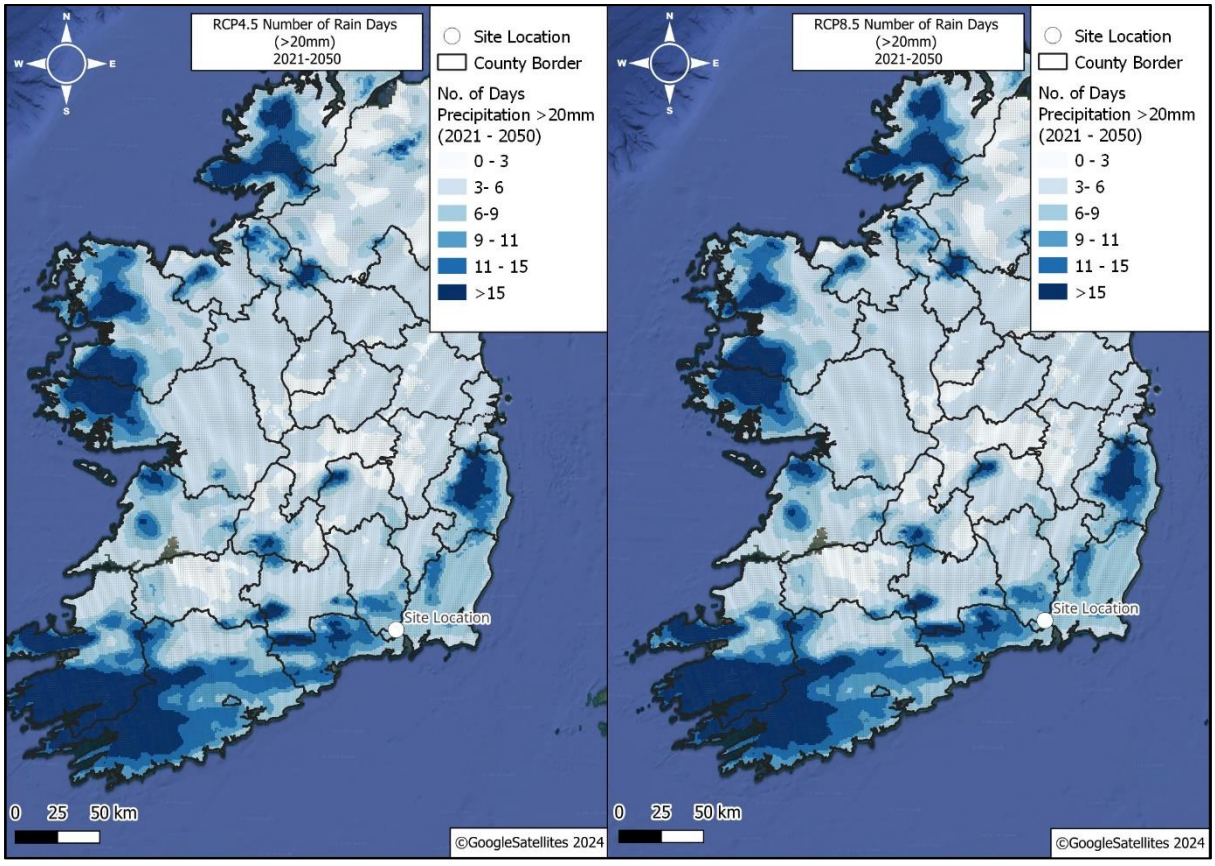
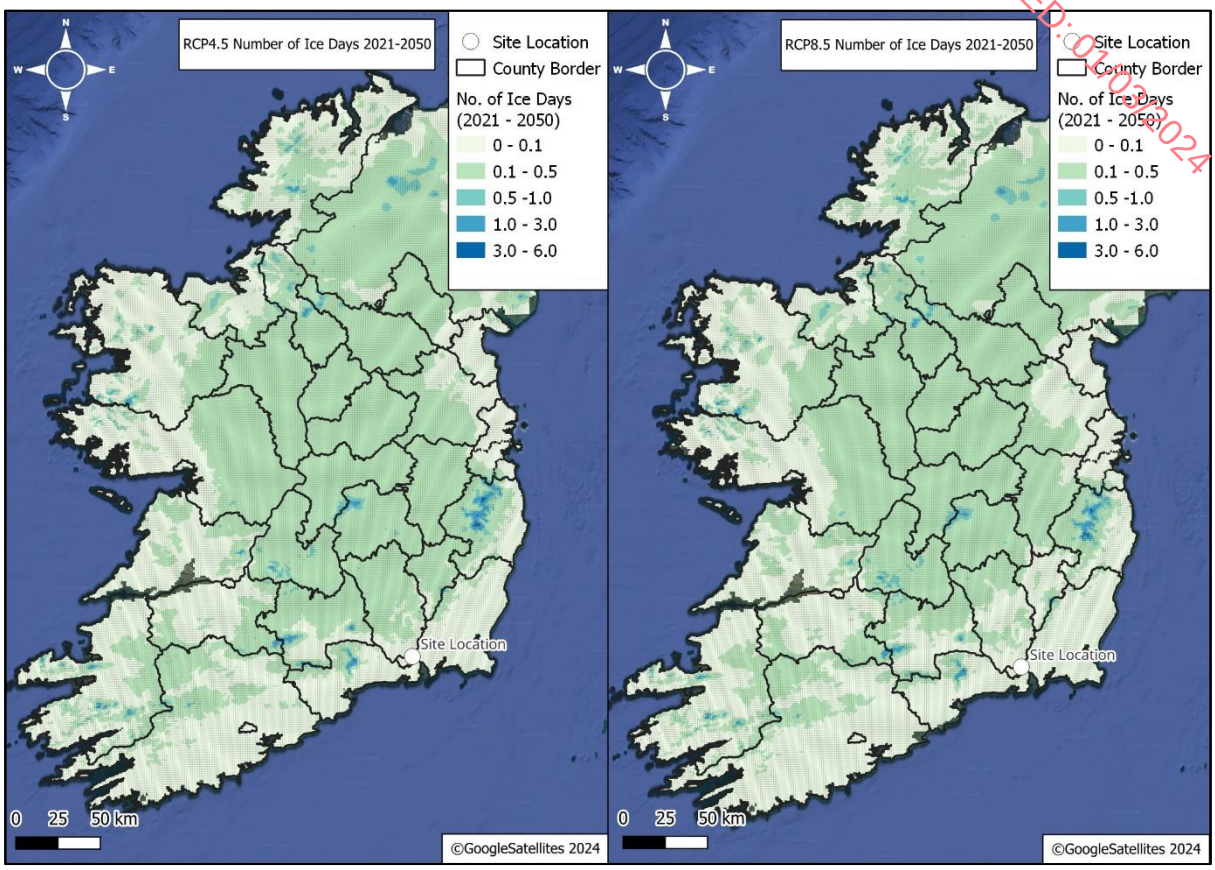


Figure 10-8: RCP4.5 and RCP8.5 Projected Changes in number of rain days (>20mm) (2021-2050)



10.5.2 Greenhouse Gas Assessment

10.5.2.1 Construction Phase

Table 10-16Table 10-17 below details the construction plant CO_2e emissions in the context of the National Emission Ceiling.

Table 10-17: Plant Emissions in the context of National Carbon Budgets

GHG Emission Source	Tonnes of CO_2e for Construction Phase
Scope 3 emissions (Plant)	980.37
Ireland's Total Sectoral Emission Ceiling (2021 to 2025)	295,000,000
Contribution to the Total Sectoral Emission Ceiling (2021 to 2025)	0.0003%

In terms of projected First Total Sectoral Emission Ceiling (2021 to 2025) this is 0.0003%. GHG emissions from plan used during the Construction Phase of the Proposed Development can be considered not likely and not significant, moreover, these emissions are negligible.

To compare HGV emissions with the relative sectoral emissions ceilings for Transport, assumptions were outlined in section 10.2.3.2. Calculations for HGV emissions were performed using the TII Carbon Tool the resulting emissions were considered as the proportion of Scope 3 emissions that could be comparable to Transport sectoral emissions ceilings.

Table 10-18: Details of Construction Phase HGV Emissions

Transport	Distance Travelled per Movement (km)	Total Distance Travelled (km)	Emission Factor (kg of CO_2e per km)
8100 No. of HGV Movements	93.2	1,509,840	1.073

Construction Employee vehicle movements have been estimated considering the total number of employees that will be travelling to and from the Facility per each stage of the construction phase. According to the Central Statistics Office the average Irish person travels a distance of 15km to work each day. That results in a round trip of 30km per day which has been applied in this assessment (Central Statistics Office, 2016).

Therefore, the following calculation was employed:

No. employee vehicles per day x days of work x total distance travelled per day (km) =

Total annual employee transport distance (km)

Table 10-19 shows construction phase employee transport distance and the associated GHG emissions.

Table 10-19: Construction Phase Employee Traffic GHG Emissions

Distance Travelled (km)	Total tonnes of CO_2e
1,008,900	218.49

Total annual GHG emissions for construction phase transport for the Proposed Development are shown in Table 10-20 below.

Table 10-20: Construction Phase Total Transport GHG Emissions

Transport Type	Total Distance Travelled (km)	Emission Factor (kg of CO_2e per km)	Total tCO_2e
Employee Transport	1,008,900	0.217	218.49
All Goods Transport	1,509,840	1.073	1,620
All Transport	2,518,740		**1,838.49**

GHG emissions from the Proposed Development during construction were conservatively predicted at 1,838.49 tonnes of CO_2e.

Table 10-21: Construction Phase Transport Emissions in context of Sectoral Emissions Ceiling

GHG Emission Source	Tonnes of CO_2e
Scope 3 emissions (Transportation)	1838.49
Transport Sectoral Emission Ceiling (2021 to 2025)	54,000,000
Contribution to the Transport Sectoral Emission Ceilings (2021 to 2025)	0.003%

Across the period associated with the First Total Sectoral Emission Ceiling for the Transport sector (2021 to 2025), transport emissions associated with the construction phase of the Proposed Development will be ca. 0.003%. This is very conservative prediction, as no expected electrification of transport associated with the Proposed Development was taken into account (refer to section 10.12).

The effect of Transport GHG emissions arising from the construction phase of the Proposed Development in the context of the First Emission Ceiling for Transport will be not likely and not significant.

Total GHG emissions from the construction phase of the Proposed Development were predicted to be 2818.79 tonnes of CO_2e, refer to Table 10-22.

Table 10-22: Construction Phase Total Emissions in context of Sectoral Emissions Ceiling

GHG Emission Source	Tonnes of CO_2e
Total Construction Phase Emissions	2,818.79
Total Sectoral Emission Ceiling (2021 to 2025)	295,000,000
Contribution to the Total Sectoral Emission Ceilings (2021 to 2025)	0.001%

Across the period associated with the First Total Sectoral Emission Ceilings (2021 to 2025), the total construction phase emissions associated the Proposed Development are expected to contribute ca. 0.001%. This is considered not likely and not significant effect.

10.5.2.2 Operational Phase

As discussed in section 10.2.3 above, the Proposed Development is predicted to use 12,480,000 m^3 of natural gas per annum in burners.

Table 10-23: Details of Operational Phase Natural Gas GHG Emissions

Fuel Type	Consumption per year (m^3)	Emission Factor (kg of CO_2e per m^3)	Total tCO_2e/year
Natural Gas	12,480,000	2.007	25,047.36

Annual natural gas consumption will result in approximately 25,047.36 tCO_2e being released as a result of this process. Thus, for the purpose of comparing emissions against the Industry Sectoral Ceiling this figure is considered representative for a typical year of the Proposed Developments activities (Table 10-24 below).

Table 10-24:Scope 1 Emissions in the context of National Carbon Budgets

GHG Emission Source	Tonnes of CO_2e per year
Scope 1 emissions (fuel usage)	25,047.36
Cumulative Scope 1 emissions for period 2026 to 2030	125,236.8
Ireland's Second Industry Sectoral Emission Ceiling (2026 to 2030)	24,000,000
Contribution to the Industry Sectoral Emission Ceilings (2026 to 2030)	0.52%

Based on the calculation of Scope 1 emissions, the assessment boundary would contribute to 0.52% to Second Industry Emissions Ceiling; this was considered not likely and not significant effect in context of sectoral emissions ceilings.

Regarding Scope 2 emissions, electricity consumption as outlined in section 3.3.2 related to the Proposed Development stated the average electrical demand is 1,556kW and considering the yearly projected electricity generated by the solar PV, the following GHG emissions from purchased electricity is estimated.

Table 10-25: Details of Operational Phase Electricity Consumption GHG Emissions

Fuel Type	Consumption per year (kWh)	Emission Factor (g of CO_2e per kWh)	Total tCO_2e/year
Electricity	12,276,881	332	4,075.92

Annual electricity consumption is anticipated to result in 4,525.36 tCO_2e released across a typical year.

Table 10-26: Cumulative Scope 2 Emissions in the context of National Carbon Budgets

GHG Emission Source	Tonnes of CO_2e per year
Scope 2 emissions (electricity)	4,075.92
Cumulative emissions for period 2026 to 2030	20,379.62
Ireland's Second Electricity Sectoral Emission Ceiling (2026 to 2030)	20,000,000
Contribution to the Electricity Sectoral Emission Ceiling (2026 to 2030)	0.10%

The electricity used by the Proposed Development will result in ca. 0.10% contribution to second period for Electricity Sectoral Emissions Ceiling. Although this represents a significant overestimate as detailed in section 10.4.2.2., 0.1% is considered as not likely and not significant effect, and therefore further refinement of this figure is not necessary.

Scope 3 (vehicle movements) were assessed based on the annual operational hours of the Proposed Development and information provided by GAMB Limited.

To compare HGV emissions with the relative sectoral emissions ceilings for Transport, assumptions were made outlined in section 10.2.3.2. Calculations for HGV emissions were performed using the TII Carbon Tool the resulting emissions were considered as the proportion of Scope 3 emissions that could be comparable to Transport sectoral emissions ceilings.

Table 10-27: Details of Vehicle Emissions

Transport Type	Distance travelled per movement (km)	Total Distance Travelled Per Year (km)	Emission Factor (kg of CO_2e per km)
8892 No. Yearly HGV Movements	93.2	1,769.958.4	1.07296
1332 No. Yearly LGV Movements	93.2	248,285	0.29913

Total annual GHG emissions for operational phase transport for the Proposed Development are shown in Table 10-28 below.

Table 10-28:Total Transport GHG Emissions

Transport Type	Distance Travelled km/yr	Total tCO_2e/yr
Employee Transport	299,700	64.90
All Goods Transport (HGV and LGV)	2,018,243.2	1,973.36
Commercial Vehicles	35,405	10.6
All Transport	**335,105**	**2048.86**

Annual transport GHG emissions from the Proposed Development were conservatively predicted at 2,048.86 tonnes of CO_2e/yr.

Table 10-29:Cumulative Operational Phase Transport Emissions Associated with the Proposed Development

GHG Emission Source	Tonnes of CO_2e per year
Scope 3 emissions (Transportation)	2,048.86
Cumulative transport emissions for period 2026 to 2030	10,244.29
Transport Sectoral Emission Ceiling (2026 to 2030)	37,000,000
Contribution to the second Transport Emission Ceiling (2026 to 2030)	0.028%

Transport arising from the Proposed Development will contribute 0.028% to the Second Sectoral Emission Ceiling for the Transport sector (2026 to 2030). This was a conservative prediction, as no electrification of transport associated with the Proposed Development was considered (refer to section 10.12). In context of the Transport Sectoral Ceiling, this was assessed as not likely and not significant effect.

Total GHG cumulative emissions from the operational phase of the Proposed Development 2026 to 2030 were predicted to be 155,860.7 tonnes of CO_2e.

Table 10-30: Operational Phase GHG emissions in context of National Carbon Budget

GHG Emission Source	Tonnes of CO_2e
Total Cumulative Operational Phase Emissions	155,860.7
Second National Carbon Budget (2026 to 2030)	200,000,000
Contribution to the National Carbon Budget (2026 to 2030)	0.078%

Across the period associated with the Second National Carbon Budget (2026 to 2030), the total operational phase emissions associated with the Proposed Development was predicted to contribute ca. 0.078%. This was considered to be not likely and not significant effect.

10.6 Unplanned Events

No unplanned events that would have a major impact on GHG emissions associated with the Proposed Development could occur.

10.7 Proposed Mitigation Measures

10.7.1 Construction Phase

Selection process for a construction contractor will include a questionnaire on carbon emissions and mitigation measures. The response will be assessed as part of Construction Tender Response evaluation process.

The selected construction contractor will have to prepare a GHG Emissions Reduction Plan.

In order to minimise transport GHG emissions during the construction phase the following mitigation measures will be put in place:

- Where possible, materials for construction will be sourced locally;
- All excavated soil will be reused on site;
- Transport service where practicable will be provided for construction workers arriving to the Site during the construction phase of the Proposed Development;
- Reducing idling engines for on-site plant;
- Where possible surplus materials generated during the construction phase will be reused or recycled; and,
- Where continuous site lighting is required, it will be low-energy.

10.7.2 Operational Phase

Once operational, the primary GHG emissions directly arising from the Proposed Development will be energy related emissions. Although these emissions will be not significant, there will be a number of design mitigation measures in place to further reduce GHG emissions related to the Proposed Development, detailed below.

Design measures include installation of roof mounted solar panels. The proposed array of solar panels will consist of 3,432 No. 460W panels. The proposed set will generate up to 1,353,679 kWh per year equating to 10% of yearly electricity requirements. Therefore, calculated GHG emissions from electricity (refer to section 10.4.2) will be reduced by on-site generation by 10% annually.

Other design measures will include:

- LED lighting is proposed for the lighting of the Proposed Development, LED lighting reduces energy consumption compared to alternatives in turn reducing GHG emissions.
- Process heat produced from operational activities (calciner) at the Proposed Development will be recovered and used to heat the Proposed Developments buildings and offices thus reducing energy consumption and GHG emissions.
- A heat recovery system on the final gypsum board Dryer will be installed, where heat will be re-circulated into the Dryer.

10.8 Residual Effects

Taking into consideration construction and operational phases of the Proposed Development, the effects of GHG emissions in context of the National Carbon Budget and relevant sectoral Emission Ceilings, will be not likely and not significant.

The effects of climate on the Proposed Development will be not likely and not significant based on the results of the climate change risk assessment.

10.9 Interactions

- Chapter 6 – Biodiversity:
  - Climate Change has the potential to impact ecosystems. However, the effects of GHG emissions associated with the Proposed Development was determined as not significant.
- Chapter 8: Water:
  - Climate Change can have a direct impact on water shown to be influencing the Proposed Development. The frequency of extreme rainfall events are expected to increase under changing climate conditions. The impact of Climate Change on the Proposed Development, with respects to flooding, was considered to be not significant.
- Chapter 14: Material Assets – Traffic and Transport:
  - Climate Change is directly linked to GHG emissions, with road traffic considered one of the highest contributors to national emissions. The assessment on GHG emissions from vehicle movements associated with the Proposed Development has shown effects to be not significant.

10.10 Monitoring Required

No monitoring of GHG emissions will be required, however as with any industrial facility, consumption of natural gas and electricity will be monitored to ensure energy efficiency.

10.11 Difficulties Encountered in Compiling this Information

The level of information required to accurately quantify construction phase GHG emissions was not available at this time and suppliers and contractors have not been selected at this point; therefore, specific information listed below was estimated:

- Exact type and number of construction plant, and for each type of plant estimated number of operating hours and fuel consumption during the construction phase – all this information was estimated;
- Exact number of construction workers and for each worker the type of vehicle travelled to the Site, distance travelled, number of days at the Site – all this information was estimated;
- Carbon embedded into process equipment. For this, for each piece of equipment; supplier would have to provide CO_2e footprint of such equipment. However, specific suppliers have not been selected yet, and most suppliers of industrial equipment do not have such information; and,
- Based on preliminary design that was available at the time of writing the report, estimating materials required to build the facility was not possible. Embedded carbon information was deemed not substantial enough to allow for an assessment with reasonable level of accuracy.

11 ACOUSTICS (NOISE & VIBRATION)

11.1 Introduction

This Chapter of the EIAR was prepared by the MOR team and provides a description and assessment of the likely impact of the Proposed Development on noise and vibration.

In this Chapter the following is presented:

- Quantification of the existing ambient and background acoustic / sound environment;
- Quantification of the likely construction and operational noise associated with the Proposed Development;
- Assessment of the likely significance of impacts arising from the Proposed Development; and,
- Outline any relevant and proportional mitigation measures to the project design.

11.2 Methodology

A glossary of acoustic terms is presented in Appendix 11-1.

The following acoustic standards and guidance documents were utilised to characterise the baseline conditions and in the assessment of potential acoustic impacts:

- BS5228-1+A1:2014, Code of practice for noise and vibration control on construction and open sites, Noise [117];
- BS5228-2:2009, Code of practice for noise and vibration control on construction and open sites, Vibration [118];
- S.I. No. 549/2018 European Communities (Environmental Noise) Regulations 2018 [119];
- S.I. No. 663/2021 – European Communities (Environmental Noise) (Amendment) Regulations 2021 [120] ;
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings [121];
- ANC Guidelines (Greenbook) Environmental noise measurement guide 2013 [122];
- AACI Environmental Noise Guidelines for Local Authority Enforcement and Planning Sections (Release 2), 2021 [123];
- ISO 1996-1:2016 Acoustics - Description, measurements and assessment of environmental noise - Part 1: Basic quantities and assessment procedures 2003 [124];
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels [125];
- ISO 9613-1:1993 Acoustics — Attenuation of sound during propagation outdoors — Part 1: Calculation of the absorption of sound by the atmosphere [126];
- ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation [127];
- ISO 9613-2:2024 Acoustics — Attenuation of sound during propagation outdoors — Part 2: Engineering method for the prediction of sound pressure levels outdoors [128];
- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) [129];

- NRA Guidelines for the treatment of noise and vibration in National Road Schemes, 2004 [130];
- NRA Good practice guidance for the treatment of noise during the planning of National Road schemes, March 2014 [131];
- World Health Organization's (WHO) Night noise guidelines for Europe [132];
- World Health Organization's (WHO) Environmental Noise Guidelines for the European Region 2018 [133];
- Kilkenny City and County Development Plan 2021 – 2027 [16] and,
- Kilkenny Noise Action Plan 2019 – 2023 [134]

The following policies relating to the assessment of noise for new developments are also contained within the Kilkenny City and County Development Plan 2021 – 2027 (KCCDP):

Section 10.2.2.1 Noise Control

> *'The Council will seek to minimise noise through the planning process by ensuring that the design of future developments incorporate measures to prevent or mitigate the transmission of noise and vibration, where appropriate.'*

Section 10.2.5 Pollution Control Development Management Requirements

- *'To seek to minimise noise and dust through the planning process by ensuring that the design of developments incorporate measures to prevent or mitigate the transmission of dust, noise and vibration, where appropriate.*
- *To ensure that that appropriate mitigation measures to counter noise impact are implemented at all new developments to limit exposure to high noise areas.*
- *Ensure that traffic noise levels are considered as part of all new developments along National routes, major roads (as identified in the Noise Action Plan) and rail lines. This includes, but is not limited to, consulting with the current Noise Action Plan and strategic noise maps as identification of areas that are within the subject criteria of the Regulations for noise exposure. Future developments are required to take account of designated quiet areas as in accordance with the Noise Action Plan 2019-2023. Any development near a designated quiet area will be subject to additional scrutiny so as to ensure that the quiet area is not impacted and may be prohibited in certain cases.'*

The Kilkenny Noise Action Plan 2019-2023 states:

8.7.1 The Planning System

> *'… where new, or altered, sources of noise are introduced to existing residential or other noise sensitive locations; there is currently a number of guidance documents, which cover some of those situations as previously outlined. Where existing guidance does not cover the situation under consideration, it is recommended that the planning advice notes from The Scottish Office (The Scottish Office, Planning Advice Note PAN 1/2011: Planning and Noise & Technical Advice Note: Assessment of Noise) and BS 4142 (BS 4142:2014 Method for rating industrial and commercial sound, British Standards Institution (BSI), London 2014) are taken into consideration.'*

11.2.1 Noise Impact Assessment Criteria

The KCCDP and Noise Action Plan (2021-2027) do not specify noise limit values for new industrial developments.

For this assessment, we have referred to the EPA's published guidelines *'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities'* commonly referred to as NG4 [129]. The methodology for this noise impact assessment followed the best practice guidelines of NG4.

The limits outlined here will be utilised to ensure on-site activities can be monitored and noise control measures implemented. The limits are similar to international criteria for the protection of human health from noise nuisance. These limits will therefore be applied as the criteria within this Chapter for noise impact from the Proposed Development.

11.2.1.1 Construction Phase

Construction phase noise will be assessed utilising the British Standard BS5228-1 [117], which is designed for the assessment of noise arising from construction and open sites.

This standard identifies a methodology (the ABC method, section E.3.2 of standard) for assigning construction noise limits at noise sensitive receptors based upon the existing ambient noise levels. An excerpt detailing the ABC method is shown in Table 11-1 below.

Table 11-1: BS5228 ABC Method for assessing Construction Noise Impact

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB) ($L_{Aeq,T}$)**		
	Category A[A)]	**Category B[B)]**	**Category C[C)]**
Night-time (23:00-07:00)	45	50	55
Evening and weekends [D)]	55	60	65
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75

Note 1	A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.
Note 2	If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3dB due to site noise.
Note 3	Applied to all residential receptors only.

A)	Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
B)	Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.
C)	Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.
D)	19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday.

This method requires an understanding of the receiving environment at Noise Sensitive Receptor (NSRs) to allocate suitable construction noise limits.

11.2.1.2 Operational Site-Specific Noise

Operational site-specific noise will be assessed based on the Best Practice methodology implemented by the NG4 guidance [129]. NG4 identifies noise limit values for the daytime, evening-time and night-time periods. The limits for compliance assessment within this chapter for each time period are:

- Daytime (07:00 to 19:00hrs) – 55dB $L_{Ar,T}$;
- Evening (19:00 to 23:00hrs) – 50dB $L_{Ar,T}$; and,
- Night-time (23:00 to 07:00hrs)– 45dB $L_{Aeq,T}$.

These limits are applicable to noise arising from the Site and measured at NSR's.

Tonal and impulsive emissions should be avoided with penalty weightings during the day and evening periods, and non-compliance if they are detected at night. These values are relative to outside (free-field) at NSR's. The guidance from the EPA defines NSR 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 require the absence of noise at nuisance levels."*

11.2.1.3 Acoustic Change

The methodology of NG4 is a robust method for a noise assessment, however the human perception of noise is generally better reflected through a review of the change to the existing ambient noise environment by the Proposed Development. There are various methodologies, in relation to this application and the methodology of the IOA/IEMA *Guidelines for Environmental Noise Impact Assessment* have been followed here. Figure 11-1 below presents the relationship between noise impact and noise effect in generating an understanding of significance from the change to an acoustic environment.

In forming an assessment on the impact, this methodology looks at the following key elements:

- The change from the baseline presented by the Proposed Development;
- Type of noise source;
- Nature of the change; and,
- Other factors.

The guidance further identifies that the impact assessment should consider the following influences:

- Averaging period;
- Time of day;
- Nature of the noise source (intermittency, etc.);
- Frequency of occurrence;
- Spectral characteristics;
- Absolute level of the noise indicator; and,
- Influence of the noise indicator used.

Figure 11-1: IEMA IOA Chart on Magnitude, Significance and Effect

MAGNITUDE (Nature of Impact)		DESCRIPTION OF EFFECT (on a specific sensitive receptor)	SIGNIFICANCE (as required within EIA)
Substantial	BENEFICIAL	**Receptor perception = Marked change** Causes a material change in behaviour and/or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	**More Likely to be Significant** (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) **Less Likely to be Significant**
Moderate	BENEFICIAL	**Receptor perception = Noticeable improvement** Improved noise climate resulting in small changes in behaviour and/or attitude, e.g. turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight	BENEFICIAL	**Receptor perception = Just noticeable improvement** Noise impact can be heard, but does not result in any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	
Negligible		N/A = No discernible effect on the receptor	**Not Significant**
Slight	ADVERSE	**Receptor perception = Non-intrusive** Noise impact can be heard, but does not cause any change in behaviour or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	**Less Likely to be Significant** (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) **More Likely to be Significant**
Moderate	ADVERSE	**Receptor perception = Intrusive** Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance[81]. Affects the character of the area such that there is a perceived change in the quality of life.	
Substantial	ADVERSE	**Receptor perception = Disruptive** Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	
Severe	ADVERSE	**Receptor perception = Physically Harmful** Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	**Significant**

11.2.2 Noise Modelling

Noise modelling was carried out using SoftNoise Predictor version 2023.01 software. The noise model has been developed for the Proposed Development to incorporate the new noise emission sources and the layout of the local environment. The existing and future noise models only assess site specific emissions – i.e., it does not incorporate existing ambient sources such as road traffic. The modelling inputs and outputs are presented in Appendix 11-2.

11.2.2.1 Model Calculations

The Noise Model calculation formula is based on ISO 9613 – Parts 1 & 2. Utilising this standard Predictor calculates the noise level as follows:

$$L|t.per = L_{dW} - C_{m,per} - C_{t,per}$$

Where

1. $L_{dw} = L_W + D_c - A$

$L_{lt,per}$	Long-term average octave (or 1/3-octave) SPL during the evaluation period in dB
L_{dw}	Equivalent continuous downwind octave (or 1/3-octave) SPL in dB
$C_{m,per}$	Meteorological correction during the evaluation period in dB
$C_{t,per}$	Correction for the active time of the source during the evaluation period in dB
L_W	Sound power level in dB(A) per octave (or 1/3-octave), re 1 pW
D_c	Directivity correction in dB
A	Attenuation (octave-band) in dB per octave (or 1/3-octave)

The attenuation A is calculated as follows:

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{fol} + A_{site} + A_{hous}$$

A_{div}	Geometrical divergence in dB
A_{atm}	Atmospheric absorption in dB/octave (or 1/3-octave)
A_{gr}	Ground effect in dB/octave (or 1/3-octave)
A_{bar}	Screening in dB/octave (or 1/3-octave)
A_{fol}	Attenuation due to foliage in dB/octave (or 1/3-octave)
A_{site}	Attenuation due to installations on an industrial site in dB/octave (or 1/3-octave)
A_{hous}	Attenuation due to housing in dB

Modelling inputs and assumptions for the prediction of the site-specific noise impact included the following:

- AutoCAD drawings of the Proposed Development as supplied by the design architects;
- Details of plant emission by M&E and plant specialists in Excel and drawings;
- Elevation drawings showing the buildings, road plan and terrain heights within the Proposed Development;
- Height points and contours from client supplied survey data within the Site; and,
- Height contours outside of the Site sourced from BlueSky Maps.

11.2.2.2 Assumptions

The model has assumed that all relevant plant and equipment would be emitting a sound level as per the specifications supplied to MOR by the Applicant.

This modelling exercise has assumed that all fixed plant were operating at duty capacity for all time periods, as a conservative estimation of noise emissions.

The meteorological correction within the model was set to CO = 5, thereby calculating the conditions that are optimal for the spreading of noise towards NSRs.

Topography data was obtained from a combination of spot measurements taken on the Site and a 4km grid (25m resolution) obtained from BlueSky of the general area.

Buildings silos and plant on-site structure were inputted utilising data supplied by the engineering drawings for the Proposed Development, relative heights of buildings were used when necessary. Off-site building heights were inputted using estimations made from Google Street View and on-site observations.

11.2.2.3 Competent Person

The monitoring and analysis of the data was conducted by a MOR acoustician. This monitoring programme, data and report was directed and reviewed by Kenneth Goodwin, a full member of the Institute of Acoustics and the Association of Acoustic Consultants of Ireland (MIOA, AACI) with over 15+ years' experience in environmental and acoustic consultancy.

11.2.3 Noise Monitoring

11.2.3.1 Measurements

Noise monitoring was undertaken by MOR at 4No. locations (NM1 – NM4) to characterise local ambient sound levels.

At all locations the Sound Level Meter (SLM) was positioned to maximise distance from reflective surfaces and mounted on a tripod to an approximate height of 1.2 to 1.5 meters over ground level.

All ambient sound monitoring was conducted in line with best practice as outlined within the EPA NG4. The on-site monitoring, data analysis and assessment was completed by a competent MOR acoustician, as per the requirements and specifications of NG4.

The survey included both attended and unattended survey methods. Location NM1 was equipped with a continuous sound level meter, and setup to record for the full duration of the survey event, to identify any characteristics occurring locally during absence of the acoustician. The unattended sound level meter was set up to log data every 15 minutes.

Daytime monitoring events were conducted for a time period 'T' of 30-minutes each and repeated once. Giving 60-minutes of data at each monitoring location.

Evening time monitoring events were conducted for a time period 'T' of 30-minutes, with one measurement taken.

Night-time monitoring events were taken for a time period 'T' of 15-minutes and repeated once, for a total of 30-minutes at each monitoring location.

A weather station was set up in proximity, ca. 5m, to the unattended SLM. This unit, was set to record weather conditions, including wind speed, direction, rainfall and temperature, and log the data every 15minutes.

11.2.3.2 Frequency Analysis

Real time 1/3 octave band frequency analysis was carried out at each monitoring location, during both daytime, evening and night-time monitoring events.

Tones were objectively assessed in accordance with Section 5 of NG4. The standard states that:

> *"for a prominent, discrete tone to be identified as present, the time-averaged linear sound pressure level in the one-third octave band of interest is required to exceed the time-averaged linear sound pressure levels of both adjacent one-third-octave bands by some constant level difference".*

The standard gives the level differences as follows:

- 15dB in the low-frequency one-third-octave bands (25Hz to 125 Hz);
- 8dB in the middle-frequency bands (160Hz to 400Hz); and,
- 5dB in high-frequency bands (500Hz to 10,000Hz).

In addition, the on-site acoustician noted any subjective tonality or defining characteristic arising from site specific noise emission sources, as per Section 5.1 of NG4.

11.2.3.3 Equipment

Noise measurements were carried out using 2No Class 1 Hand-held Analyser SLM's, equipped with Frequency Analysis Software:

The SLM used were:

- NTI XL2 sound level meter (SLM); and,
- Cirrus Optimus Green CR-171C sound level meter (SLM).

Both SLMs were field calibrated utilising a:

- BK Type 4231 Calibrator, serial no:2217952

The Bruel & Kjaer sound level calibrator type 4231 was laboratory calibrated within the last 12 months. Broadband noise levels were measured using the A-weighted network, and a fast-sampling interval, unless otherwise stated.

Laboratory calibration certificates for the SLM and the BK 4231 field calibrator are available upon request.

A handheld GPS (Garmin GPS60) was utilised to accurately position the SLM.

11.3 Receiving Environment

A review of the locality was conducted utilising OSI online mapping, Google and Bing Aerial Photography.

The desk-based review noted no notable sources of vibration on or adjoining the Site.

Based on this research, NSRs were identified in the locality and are shown in Figure 11-2 and described in Table 11-2. During the Site survey a visual check of the locality was completed to identify any new NSRs, or any older buildings demolished, or changed in-use.

Figure 11-2: Noise Sensitive Receptors

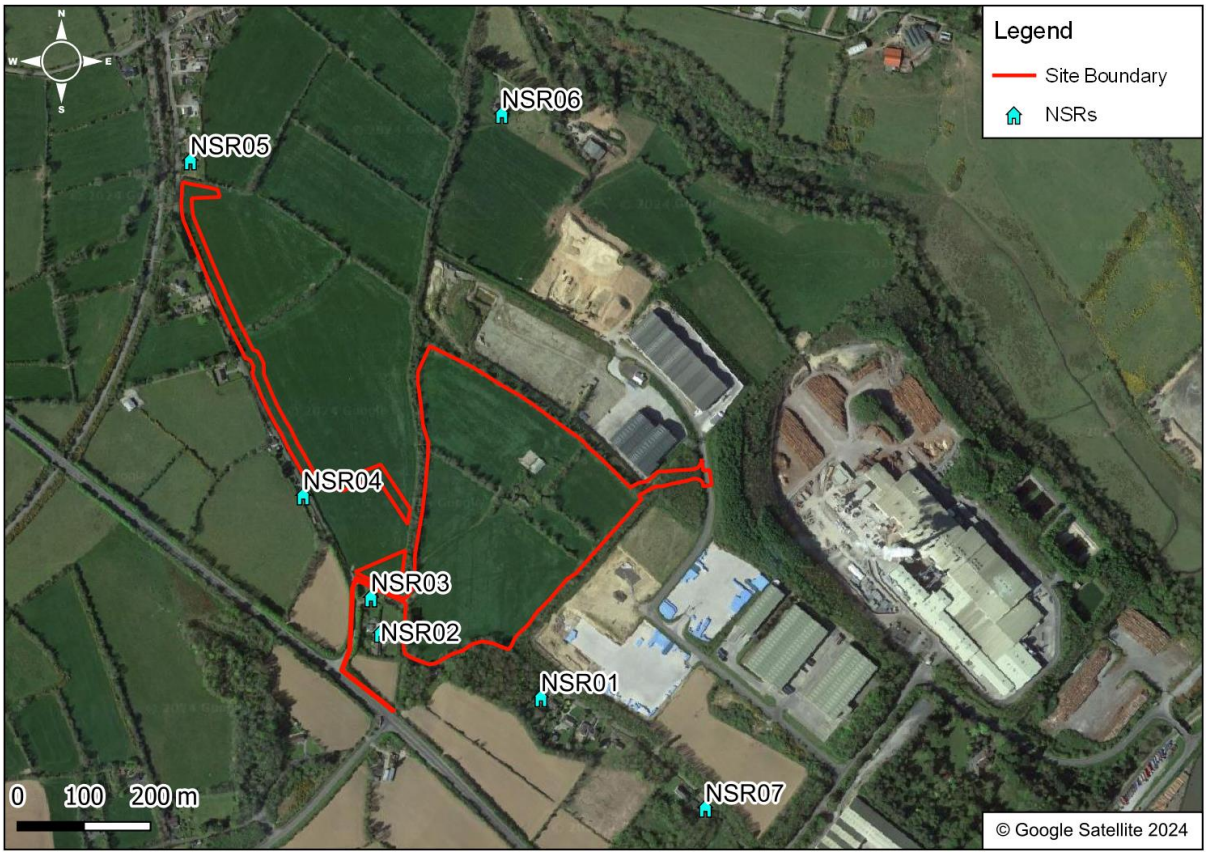


Table 11-2: Noise Sensitive Receptors

NSR ID	Description	Easting (ITM)	Northing (ITM)	Distance from Site boundary (m)
NSR01	Proxy for dwellings located to the southeast of the Site.	665408	613722	ca.87m
NSR02	Dwelling located to the south of the Site.	665166	613819	ca.36m
NSR03	Dwelling located to the southwest of the Site.	665152	613872	ca.15m
NSR04	Proxy for dwellings located to the west of the Site.	665050	614025	ca.19m
NSR05	Proxy for dwellings located to the northwest of the Site.	664881	614529	ca.35m

NSR ID	Description	Easting (ITM)	Northing (ITM)	Distance from Site boundary (m)
NSR06	Proxy for dwellings located to the north of the Site.	665349	614599	ca.366m
NSR07	Dwelling located to the southwest of the Site.	665655	613556	ca.379m

11.3.1 Baseline Ambient Acoustic Assessment

To acoustically characterise the locality MOR conducted desk-based and field-based assessments. The desk-based element included an assessment for 'Quiet Area' through a review of the noise action plan and screening as per the EPA guidelines. Furthermore, a review of available acoustic information, including the local strategic noise maps was undertaken. Field work included an MOR survey at designated locations to record ambient values. Utilising this data, MOR developed an overview of the ambient acoustics in the locality.

11.3.2 Screening for Quiet Area

Quiet Area is a defined criterion for areas with low intrusion of human activities and have been specified within the Environmental Noise Directive and subsequent S.I. Noise Regulations as areas that should be identified within each Local Authority area for special consideration.

The EPAs noise guidance document, NG4 [135], identifies a specific screening mechanism for Quiet Areas, and the screening process is shown in Table 11-3 below for the Site.

Table 11-3: Quite Noise Criteria Assessment

Parameter	Quiet Noise Criteria Distance	Criteria Met	Note
Distance to urban area with population >1,000 persons.	>3km	No	Waterford City (population 60,079, CSO 2022) within 3km of Site.
Distance to urban area with population >5,000 persons.	>10km	No	Waterford City (population 60,079, CSO 2022) within 3km of Site.
Distance to urban area with population >10,000 persons.	>15km	No	Waterford City (population 60,079, CSO 2022) within 3km of Site.
Distance to local industry (small or individual activities).	>3km	No	Tougher Seamus Sand and Gravel Supplier ca. 2.9km southeast of Site
Distance to major industry centre.	>10km	No	Port of Waterford within 1km to the south of the Site.
Distance to National Primary Route.	>5km	No	Nearest National Primary Route is the N29 ca. 1.1km south of Site
Distance to Motorway or Dual Carriageway.	>7.5km	Yes	M9 ca.8.5km northwest of Site.
Site locality is 'Quiet Area'		**No**	

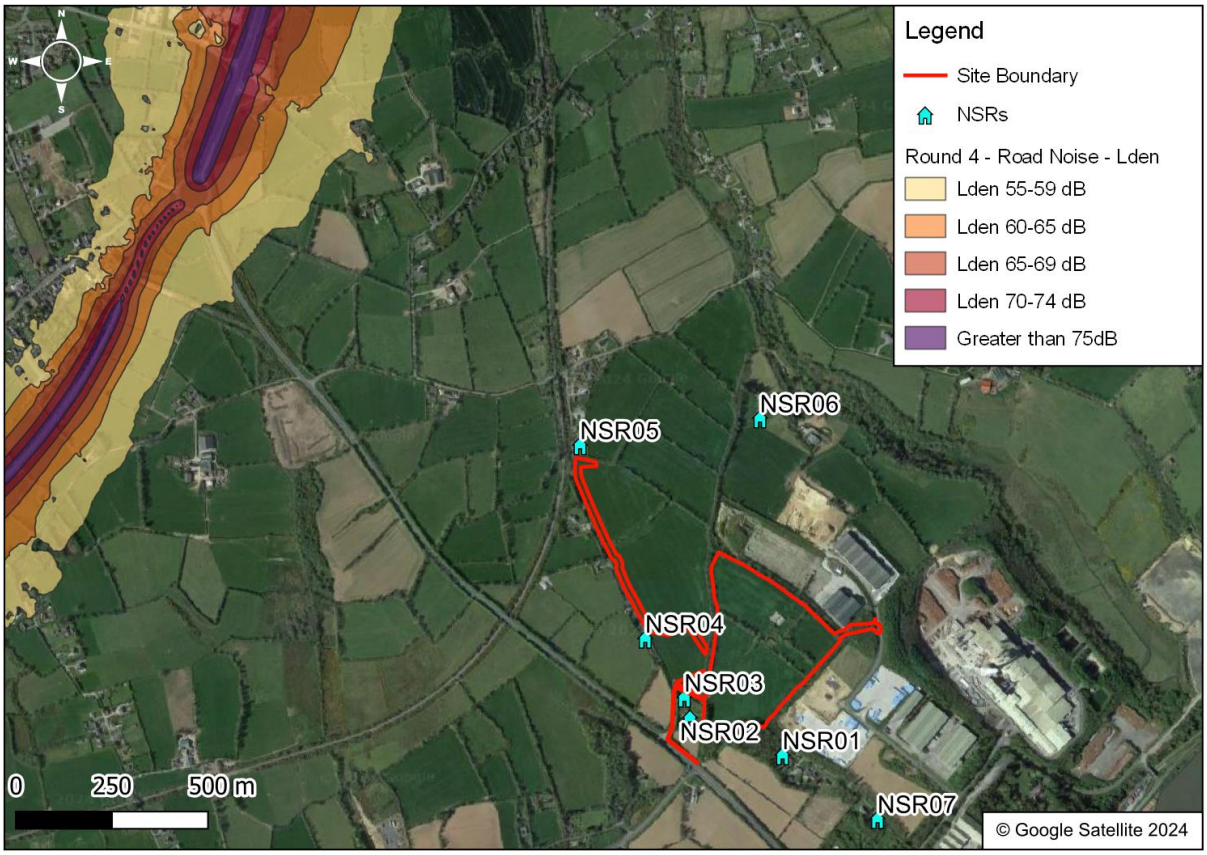
Based on the screening process, completed above, the Site does not qualify as a Quiet Area.

11.3.3 Strategic Noise Mapping

The nearest regional road, the N25, qualified for Strategic Noise Mapping under the Environmental Noise Directive (END), as transposed into Irish Law under S.I. No. 549 of 2018 as amended, Environmental Noise Regulations [119].

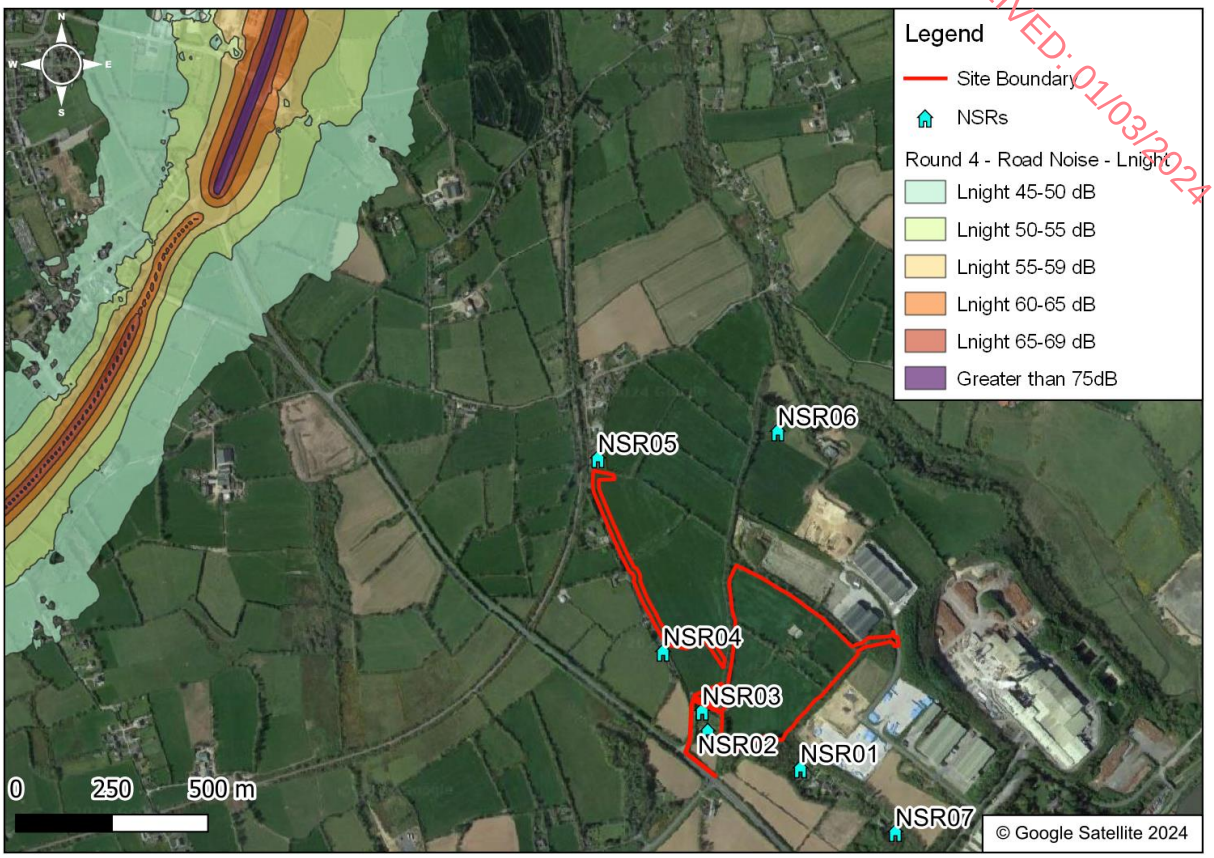
Under Kilkenny's Third Noise Action Plan 2019-2023, the N25 national road was identified as "Major Roads", with the road carrying over 3 million vehicles passengers per year.

Figure 11-3: Strategic Noise Mapping L_{den}



The L_{den} contours, refer to Figure 11-3 above, for the N25 do not overlay the Site, nor the proximity NSRs identified for the Site.

Figure 11-4: Strategic Noise Mapping Night



The L_{night} Strategic contours present the calculated night-time only impact from traffic on major roads. As shown in Figure 11-4 above, the Site, nor the identified NSR's to the Site, are not overlain by the road contours.

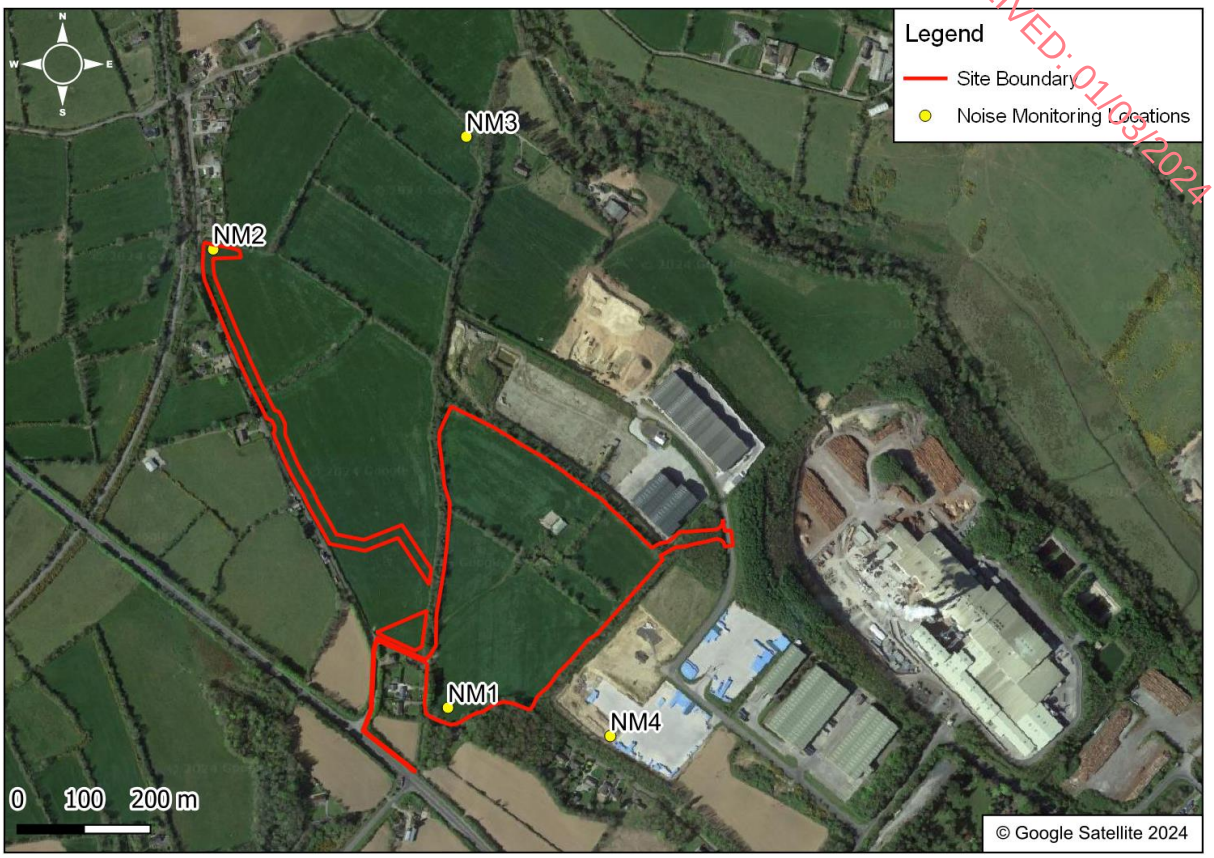
11.3.4 Baseline Ambient Acoustic Environment Survey

Ambient noise monitoring was conducted by MOR on 19th and 20th April 2023 in the vicinity of the Site. One location, NM1, was set up for continuous monitoring on the 19th April and collected on the 26th April. The monitoring locations are described in Table 11-4 below and are shown in Figure 11-5 below.

Table 11-4: Noise Monitoring Locations

Monitoring Point	Description of Location	ITM Easting	ITM Northing	Proxy NSR ID
NM1	Located in a field at the southwest site boundary ca 25m from a rural road in proximity to NSR02 and NSR04.	665236	613796	NSR02, NSR03
NM2	Located within the northwest Site Boundary ca, 25m from a rural road in proximity to NSR05.	664883	614485	NSR04, NSR05
NM3	Located in a field to the north of the site boundary ca,80m from NSR06.	665263	614655	NSR06
NM4	Located on Target property ca,40m from a rural road in proximity to NSR01.	665480	613754	NSR01 NSR07

Figure 11-5: Noise Monitoring Locations



11.3.4.1 Weather Conditions

Attended noise measurements for the ambient sound monitoring event were conducted on 19th and 20th April 2023 during suitable weather conditions by competent MOR acoustician. The unattended survey event at NM1 was conducted from 19th April 2023 to 26th April 2023.

Weather conditions on-site were recorded by a Davis Vantage Vue automated weather station (Serial ID 001DOAE09077), with weather recorded in 15-minute periods. These 15-minute intervals recorded wind speed, wind direction and rainfall events. Summaries for the monitoring period are presented in Table 11-5 below.

Table 11-5: Davis Vantage Vue Weather Data 19/04/2023-26/04/2023

Date Time	Temp Low (°C)	Temp Median (°C)	Temp max (°C)	Wind Speed Min (m/s)	Wind Speed Median (m/s)	Wind Speed Max (m/s)	Wind Dir Dominant	Rain Total (mm)
19/04/2023*	10.3	12.8	14.3	2.2	3.1	4.0	ENE	0.0
20/04/2023	6.4	10.4	13.8	0.9	2.7	4.5	ENE	0.0
21/04/2023	6.0	9.0	12.7	0.0	2.2	3.6	ENE	0.5
22/04/2023	3.3	9.0	12.3	0.0	0.4	1.3	NE	2.5
23/04/2023	5.7	9.2	14.2	0.0	0.4	2.7	W	6.6
24/04/2023	2.9	7.3	9.8	0.0	0.4	3.1	NE	17.5
25/04/2023	7.3	8.3	12.3	0.4	1.3	1.8	ENE	0.5
26/04/2023*	10.2	11.5	12.3	0.9	1.3	1.8	SSE	0.5

*Data is not 24hour completed.

At location NM1 a continuous sound level monitor and portable weather station was established. The use of a continuous sound level recording at this location permitted measurements without human presence during a 24-hour event. Attended measurements were also taken at this location on the 19th and 20th.

The summary results from the attended noise monitoring event are shown in Table 11-6, Table 11-7 and Table 11-8 below detail the results of the monitoring events and a description of noise sources for daytime, evening and night-time periods respectively. The ranges for the unattended measurements for location NM1 are presented in Table 11-9, results for the parameters L_{Aeq}, L_{A90}, and L_{AFmax} are presented in Figure 11-6, Figure 11-7 and Figure 11-8 for daytime, evening and night-time periods respectively.

Plates of the noise monitoring locations and 1/3 octave bar charts are supplied in Appendix 11-3 to this report.

Table 11-6: Ambient Attended Daytime Sound Levels

Location	Date	Duration	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)	$L_{AF,max}$ (dB)	Description
NM1 Day	19/04/2023 11:22	0:30:00	51	47	74	Air emission (E) constant but faint. Birdsong regularly audible (dominant). Plane overhead at 11:24, 11:26, 11:28 and 11:30 (E). Banging (E) at 11:38, 11:43 and 11:49. Distant traffic on N29 infrequently audible. Reversing alarms (E) at 11:21 and 11:39. Wind speed: 1-3m/s
NM2 Run 1	19/04/2023 16:17	0:30:00	46	41	63	Birdsong regularly audible. Wind audible. Car pass at 16:20, 16:23, 16:39 and 16:40. Constant but faint air emission (E). Distant reversing alarm (E) at 13:26 and 16:24. Factory alarm at 16:22. Banging at 16:38. Wind speed: 1-4m/s.
NM2 Run 2	19/04/2023 16:47	0:30:00	45	42	65	Birdsong. Plane (S) at 17:06. Car pass on multiple times. Air emission (E). Reversing alarm (E) at 16:58, 17:01, 17:02 and 17:12.
NM3 Run 1	19/04/2023 12:47	0:30:00	44	40	64	Birdsong regularly audible. Distant air emission (E). Plane audible* (E) at 12:47, 12:55 and 13:07. Banging audible (E) at 13:02, 13:08, 13:09 and 13:11. Truck engine (E) at 12:54 and 13:15. *Assumed based on characteristics, but not confirmed by sight.
NM3 Run 2	19/04/2023 13:17	0:30:00	46	41	71	Birdsong regularly heard. Air emission between 13:20 and 13:33. Forklifts alarms audible between 13:28 and 13:38, air emission increased between 13:38 and 13:47. Wind speed: 1-3.5m/s
NM4 Run 1	19/04/2023 14:54	0:30:00	51	46	67	Mobile machinery activity (S) on Target property. Birdsong regularly audible. Air emission (N). Hammering (N) between 15:19 to 15:22. Vehicle reversing alarm at 15:23. Plane overhead at 15:16 (S). Wind speed: 1-4m/s
NM4 Run 2	19/04/2023 15:25	0:30:00	54	50	66	Distant mobile machinery activity outside Target (N) between 15:24 and 15:30. mobile machinery nearby at 15:35. Banging and lawnmower audible at 15:29 (S). Truck on Target property at 15:47. Mobile machinery activity at 15:49. Wind speed: 1-4m/s.

Table 11-7: Ambient Attended Evening Time Sound Levels

Location	Date	Duration	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)	$L_{AF,max}$ (dB)	Description
NM1 Evening	19/04/2023 21:24	0:15:00	45	43	61	Constant air emission (E). Banging at 21:25 and 21:37 (E). Distant plane at 21:31 (W). Vehicle reversing alarm (E). Distant car at 21:29 and 21:35 (W). Wind speed: 0.5-2m/s
NM2 Run 1	19/04/2023 20:43	0:30:00	42	37	60	Stack emission (E). Bird song regular. Dog barking (N). Tractor (N) audible in distance at 20:59. Car pass at 21:04.
NM3 Run 1	19/04/2023 20:01	0:30:00	43	40	59	Air emission constant (E). Birdsong regularly. Faint dog bark (N). Tractor audible in distance on another field (W) regular. Tractor audible at 20:12 at NSL (E). Wind speed: 1-2.5m/s.
NM4 Run 1	19/04/2023 21:50	0:30:00	45	43	59	Constant air emission (N). Factory alarm (N) at 21:55. Distant car (W) at 21:57. Horn (N) at 21:58. Wind speed: 1-2.2m/s.

Table 11-8: Ambient Attended Night-Time Sound Levels

Location	Date	Duration	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)	$L_{AF,max}$ (dB)	Description
NM1 Run 1	20/04/2023 01:28	0:15:00	46	44	57	Constant air emission (E). Factory alarm (E) at 01:32 and 01:40. Wind audible Wind speed: 0.5-1m/s
NM2 Run 1	19/04/2023 23:48	0:15:00	36	34	46	Stack emission (E). Factory alarm at 23:49 and 00:01. Distant banging (SE) at 23:55.
NM2 Run 2	20/04/2023 00:05	0:15:00	37	34	46	Air emission (E). Distant cars (S) at 00:17. Wind speed: 1-3m/s.
NM3 Run 1	20/04/2023 00:37	0:15:00	39	35	52	Air emission (E). Site alarm (E) at 00:37, 00:47 and 00:54. Reversing alarm (E) at 00:57. Wind speed: 1-2.5m/s.

Location	Date	Duration	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)	$L_{AF,max}$ (dB)	Description
NM3 Run 2	20/04/2023 00:52	0:15:00	40	37	51	Reversing alarm at 01:01. (E)
NM4 Run 1	19/04/2023 23:01	0:15:00	46	44	58	Constant air emission (N). Factory alarm at 23:04, 23:08, 23:10 (N). Reversing alarm at 23:06. Wind speed: 1-2.5m/s.
NM4 Run 2	19/04/2023 23:20	0:15:00	45	43	57	Constant stack emission. Distant car (S) at 23:27 and 23:30. Factory alarm at 23:21, 23:23, 23:25 and 23:26. Wind speed: 1-2.5m/s

Table 11-9: Continuous monitoring location NM1 – 19th April 2023 to 26th April 2023

Location ID	Date	L_{day} (dB) (07:00 – 19:00)	$L_{evening}$ (dB) (19:00 – 23:00)	L_{night} (dB) (23:00-07:00)	L_{den} (dB)
NM1	19/04/2023	50	46	47	58
	20/04/2023	49	46	46	58
	21/04/2023	49	46	46	58
	22/04/2023	48	46	45	57
	23/04/2023	46	45	47	58
	24/04/2023	51	47	47	59
	25/04/2023	50	46	46	58
	26/04/2023	50	--	--	50

Figure 11-6: No. of occurrences for Daytime parameter L_{A90}, L_{Aeq} and L_{AFmax} at location NM1

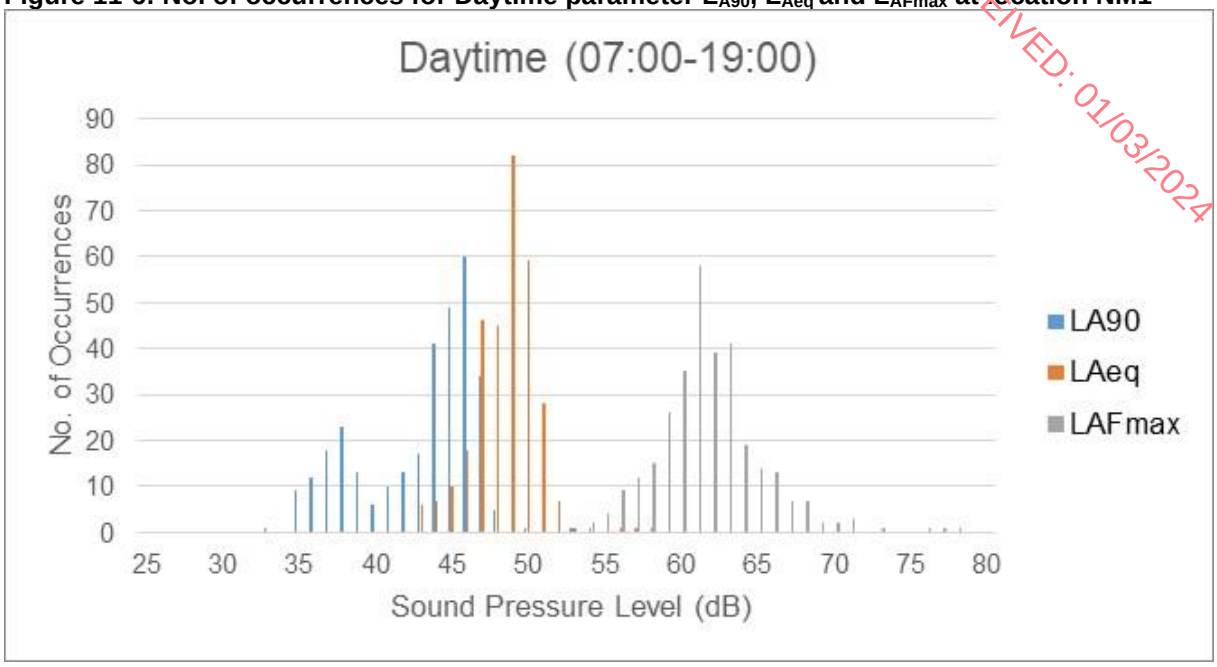


Figure 11-7: No. of occurrences for Evening parameter L_{A90}, L_{Aeq} and L_{AFmax} at location NM1

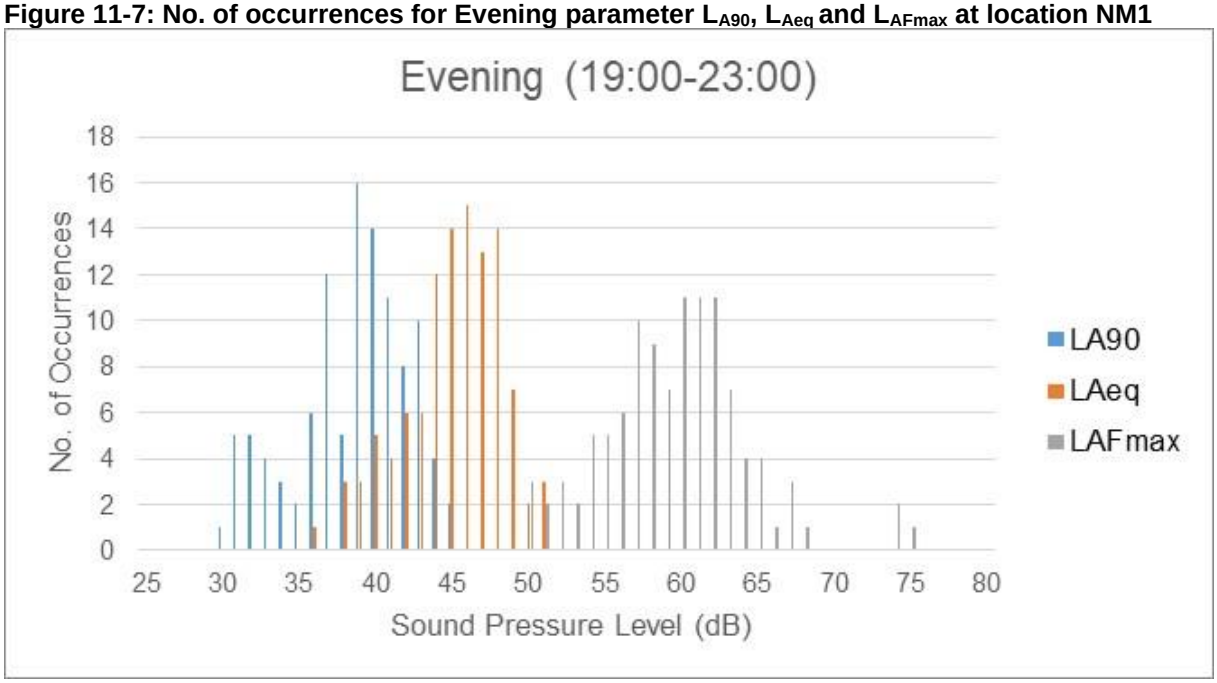


Figure 11-8: No. of occurrences for Night-time parameter L_{A90}, L_{Aeq} and L_{AFmax} at location NM1

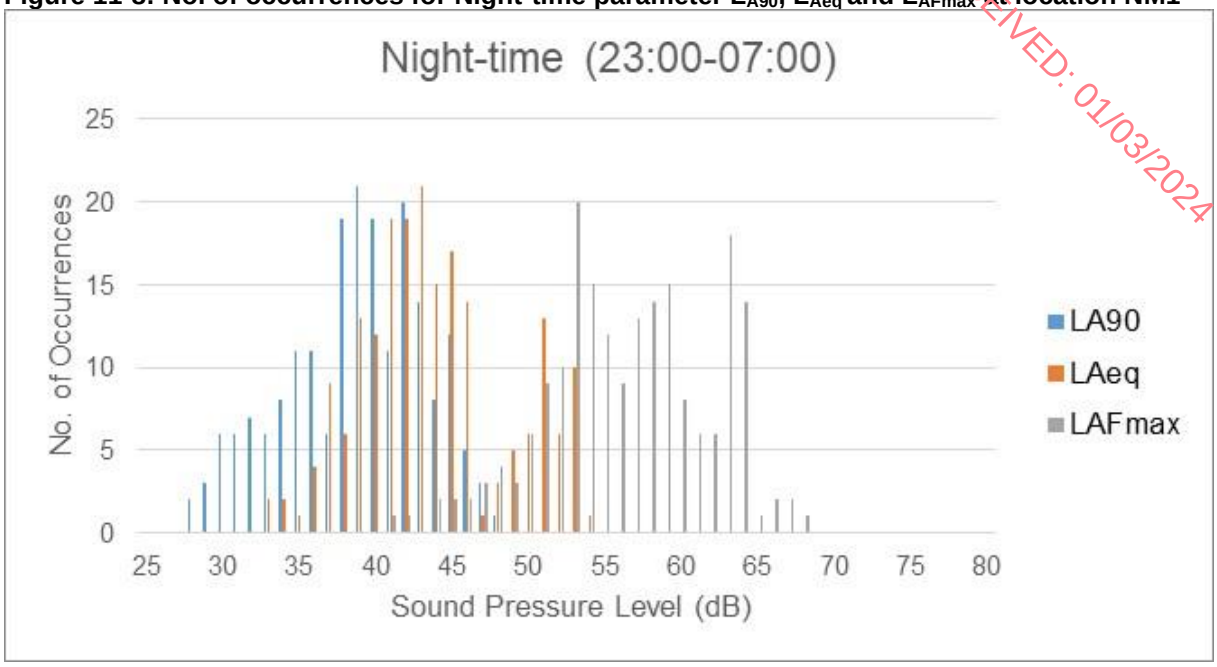


Table 11-10 below details the range noise levels for the different parameters during the daytime, evening and night-time monitoring events at all locations.

Table 11-10: Ambient Noise Characteristics

Monitoring ID	Period	$L_{Aeq,T}$ Range (dB)	$L_{AF90,T}$ Range (dB)	L_{AFmax} Peak Event (dB)
NM1 range NM1 dominant (most no. of occurrences)	Daytime	43 – 58 49	33 – 53 46	55
	Evening	36 – 51 46	30 – 45 39	60
	Night-time	33 – 54 43	28 – 48 39	53
NM2	Daytime	45-46	41-42	63-65
	Evening	42	37	60
	Night-time	36-37	34	46
NM3	Daytime	44-46	40-41	64-71
	Evening	43	40	59
	Night-time	39-40	35-37	51-52
NM4	Daytime	51-54	46-50	66-67
	Evening	46	43	59
	Night-time	45-46	43-44	57-58

11.3.5 Characterisation of the Acoustic Environment

The ambient sound survey found that the local ambient acoustic environment was influenced by:

- Transport - traffic noise from the N29 and surrounding road network;
- Industry –activity from near industry; and,
- Fauna - bird song and bird call;

Generally higher levels of ambient acoustic sound were found with proximity to the N29.

For daytime period, locations NM2 and NM3 recorded $L_{Aeq,T}$ values of 44dB to 46dB and ambient background values of $L_{A90,T}$ 40dB to 42dB. Locations NM1 and NM4, closer to N29 road recorded $L_{Aeq,T}$ values of 49dB to 58dB and ambient background values of $L_{A90,T}$ 33dB to 53dB.

For evening period, locations NM2 and NM3 recorded $L_{Aeq,T}$ values of 42dB to 43dB and ambient background values of $L_{A90,T}$ 37dB to 40dB. Locations NM1 and NM4, closer to N29 road recorded $L_{Aeq,T}$ values of 43dB to 58dB and ambient background values of $L_{A90,T}$ 33dB to 53dB.

During night-time periods, locations NM2 and NM3 recorded $L_{Aeq,T}$ values of 36dB to 40dB and ambient background values of $L_{A90,T}$ 34dB to 37dB. Locations NM1 and NM4, closer to N29 road recorded $L_{Aeq,T}$ values of 43dB to 46dB and ambient background values of $L_{A90,T}$ 39dB to 44dB.

11.3.6 Conclusion of Existing Ambient Acoustic Environment

Based on the desk-based review of the area and the baseline survey carried out by MOR, it is reasonable to conclude that the ambient existing sound levels surrounding the Site are typical for an industry environment in proximity to busy road (N25 and N29).

11.4 Characteristics and Potential Impacts of the Proposed Development

The potential for noise arising from the development has two distinct phases:

- Construction Phase; and,
- Operational Phase.

The sources and potential impacts arising from the phases are distinctly different and therefore have been discussed separately.

11.4.1 Construction Phase Noise

The construction phase for this project will be temporary insofar as the construction phase will be for a finite period. For the purposes of this assessment a 14-month construction phase was considered.

Construction noise is unavoidable, though short-term aspect, of any new development or modification of an existing development. The construction process will invariably require the use of noisy plant including, but not limited to:

- Heavy Good Vehicles (HGVs) delivering material to the Site;
- Site Preparation – JCBs, excavators, security, and hoarding works; and,
- Site Development – Cranes, consaws, concrete mixers, breakers, hammering, metal works.

There are several factors which will influence the type of plant utilised during the construction programme including the preference of the appointed contractor, construction materials and finishes, ground conditions and time pressures.

The BS5228 [117] standard is typically utilised to assess the potential impact arising from construction work.

The order of the construction phases and the precise work schedule within each phase are used to predict the noise emissions. The schedule in Table 11-11 below is based on the notable emission sources likely to occur during the construction works at the Site with the sound pressure presented at 10m of source plant as taken from BS5228 and MOR's acoustic library. The combined noise level at 10m per phase have been calculated considering the number of equipment used at each Phase. The phases of the construction programme, as outlined in section 3.4.1 of this EIAR are:

- Site set-up;
- Groundworks – cut and fill;
- Groundworks – foundation;
- Structural framing;
- Building envelope;
- Process fit out; and,
- Commissioning.

Table 11-11: Predicted Noise Emissions – Construction Phase

Phases	Description	Plant	Sound Pressure at 10m $L_{Aeq,T}$ dB	Combined Noise Level at 10m
Site Setup & Groundworks – cut & Fill	Enabling works and earthworks	Excavator	77	88
		Loading Shovels	67	
		Dump truck (fill)	79	
		Dump truck (empty)	87	
Groundworks - foundations & Structural framing	foundation and steel erection	Generator	73	94
		Rock Breaker	92	

Phases	Description	Plant	Sound Pressure at 10m $L_{Aeq,T}$ dB	Combined Noise Level at 10m
		Piling Rig (Hydraulic hammer rig)	89	
Building Envelope, Process fit out & commissioning	Rising concrete walls, fix electrics and plumbing. Installation of cladding, roofing, installation of doors and windows. Construction of hard standing apron	Dump truck (fill)	79	91
		Dump truck (empty)	87	
		Concrete Mixer	80	
		Crane	70	
		Concrete Mixer	80	
		Vibrating poker	71	
Site works – roads and hard standings	Construction of roads, installation of solar panels and invertors, gates and fencing, landscaping.	Excavator	77	80
		Loading Shovels	67	

The following standard noise equation, to evaluate the sound pressure (Lp2) at a distance r2, from a known sound pressure (Lp1) at distance r1 was used to predict noise values at the NSRs:

$$Lp2 = Lp1 - 20\log10(\frac{r2}{r1})$$

Where:

- Lp is the sound pressure (L_{Aeq}) in dB;
- r is the distance

Plant and equipment on and around the Site will be mobile during the construction phase. It is unlikely that all plant will be operational at the same exact location to enable direct cumulative noise, as calculated in Table 11-11 above. Typically, plant will be operating at distinct task around the Site, where noise emission will be dispersed. Therefore, to enable a calculation of the likely worst case for audible noise, the peak cumulative event (Phase 2) was assumed to occur at the location of the Proposed Development instead of Site Boundary. However, plant and equipment will be located closer to the receptors for the construction of the berm located to the west of the Proposed Development and water drainage, located to the south of the Proposed Development for a short duration.

The construction phase impacts at the nearest NSRs are detailed in Table 11-13 below.

Based on the 'ABC' method outlined in Table 11-1 above, the below construction noise limits are derived in Table 11-12 below. An assessment of construction noise based on the ABC method is shown Table 11-13 below.

Table 11-12: NSR Construction Limit Values

NSR ID	NML ID (proxy)	Ambient Baseline $L_{Aeq,T}$	Rounded value (closest 5dB)	ABC Limit
NSR01	NM4	51	50	65
NSR02	NM1	49	50	65
NSR03	NM1	49	50	65
NSR04	NM2	45	45	65
NSR05	NM2	45	45	65
NSR06	NM2	45	45	65
NSR07	NM4	51	50	65

Table 11-13: Propose Facility Construction Phase Impact Assessment

NSR	Distance to Proposed Development Boundary (m)	Predicted Site Specific Sound Pressure Level at NSR Façade $L_{Aeq,T}$ dB	Measured Ambient Sound $L_{Aeq,T}$ dB	Combined Noise Level (Predicted + Measured $L_{Aeq,T}$)	'ABC' Threshold Compliant
NSR01	235	66	51	67	No
NSR02	294	64	49	65	Yes
NSR03	248	66	49	66	No
NSR04	204	68	45	68	No
NSR05	456	61	45	61	Yes
NSR06	366	63	44	63	Yes
NSR07	419	61	51	62	Yes

Utilising the ABC method four (4No.) NSRs have been predicted to be compliant with construction noise thresholds, as presented in Table 11-13 above. Three (3No.) NSRs are predicted to exceed the construction limits, the predicted combined construction noise levels at NSR01, NSR02 and NSR03 show a $L_{Aeq,T}$ of 67dB, 66dB and 68dB respectively, prior to mitigation.

The equipment and plant to be used for the creation of the berm located to the southwest will be similar to a JCB and dump truck. The predicted cumulative construction noise at the receptors located near and being representative by NSR04 is $L_{Aeq,T}$ 68dB, prior to mitigation. This result exceeds the construction noise limit established at Table 11-12, however these works will be short in duration.

As part of the Proposed Development, a section of a new water supply pipe will need to be installed to connect the Site to the existing public water infrastructure. These works will likely occur in tandem with the Proposed Development construction programme. However, these works will be minor in acoustic terms and standard in effect to the supply of essential services by Uisce Éireann.

11.4.2 Construction Traffic Noise

Based on the assumption of up to 10 HGV movements at peak hours on the haul routes to and from the Site along public roads, the resulting average traffic noise level at the closest receptors is calculated as follows:

The predicted noise levels at any receptor located within 5m of the haul route has been calculated using a standard international acoustical formula as described below.

$$L_{Aeq,T} = SEL + 10\log_{10} N - 10\log_{10} T + 20\log_{10} ({}^{r1}/_{r2})$$

Where:

$L_{Aeq,T}$	is the equivalent continuous sound level over time period (T) (3,600sec)
SEL	is the A-weighted Sound Exposure Level (SEL) of the noise event (77dBA)
N	is the number of events over the time period T, (32 HGVs per hour)
r1	is the distance at which SEL is assessed (5m)
r2	is the closest distance to the receptor from the road (10m)

The calculations assumed a maximum scenario of 10 truck movements per hour with a maximum SEL of 77dBA for the trucks and the minimum distance between the local road passing by each of the nearest NSR's to the public road of 10m. No attenuation, above geometric spreading, has been considered within this calculation and as such may be considered the worst-case scenario.

The maximum predicted $L_{Aeq,1hr}$ values as a result of the HGV traffic movement at the nearest NSR's located along the haul route roads is predicted to be 44dBA.

It is not expected that the predicted short-term increase in HGV movements associated with the construction phase of the Proposed Development will have an adverse impact on the existing noise climate of the wider area or on local receptors.

11.4.3 Construction Phase Vibration

Vibration can arise as an issue where heavy plant, pilling or drilling occurs near buildings, particularly older construction where foundations may be decaying. All works will be separated from receptors by agricultural fields and/or road infrastructure. A review of the local NSRs in the vicinity showed the closest NSRs to the Proposed Development area is NSR03, located ca. 250m from the Proposed Development.

Due to the receptors being located more than 100m from the Proposed Development boundary, vibration during the construction phase was not deemed as a potential impact in relation to this project, and no further assessment has been conducted on construction phase vibration. Therefore, the impacts of vibration caused by the construction phase of the Proposed Development were determined to be Imperceptible.

11.4.4 Operational Phase Noise

As part of this assessment, a noise model using specialist acoustic software Predictor V.2023.01, has been prepared to assess predicted noise emissions at the Site during the operational phase. The results of this modelling are presented in Appendix 11-4.

Noise associated with the Operational Phase of the Proposed Development will consist of different areas as presented in Table 11-14. As no octave band data has been provided, a flat spectrum has been used to calculate the cumulative overall noise levels presented in Table 11-14 below.

Table 11-14: Operational Noise Sources

Area	Sound Pressure dBA at 1m
Calcining Fans	96
Mill	90
Ball Mill	100
Dryer Fans	85
Bundler (incl. new saws)	85
Burner	90
Fresh air fan	87
Exhaust Stack	86
All other areas	85

There are two (2No.) operational models for the Proposed Development as presented below:

- Model A – Normal operation; and
- Model B – Unloading boats and delivering material to the Proposed Development.

The differences between both models are the traffic movements from the port to the Proposed Development. To represent this model, two moving sources have been modelled to represent the truck movements for the Proposed Development, which are modelled at 34No. per hour. A typical noise level for an HGV have been used from BS5228-1 Table CA.2.34.

The rest of noise sources have been modelled as emitting facades, emitting roofs and point sources taking into account the different insulation that provide each construction element, as wall, doors, roof. The different Sound Reduction Indexes (SRIs) used in the model are presented in Table 11-15.

Table 11-15: Sound Reduction Index

Element	Sound Reduction Index (SRI) dB							
	One Octave Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Wall Reduction	20	18	20	24	20	29	39	47
Roof reduction	15	18	18	17	23	30	40	37
Louvre	10	10	10	10	10	10	10	10
Steel doors	8	11	10	10	18	23	26	27

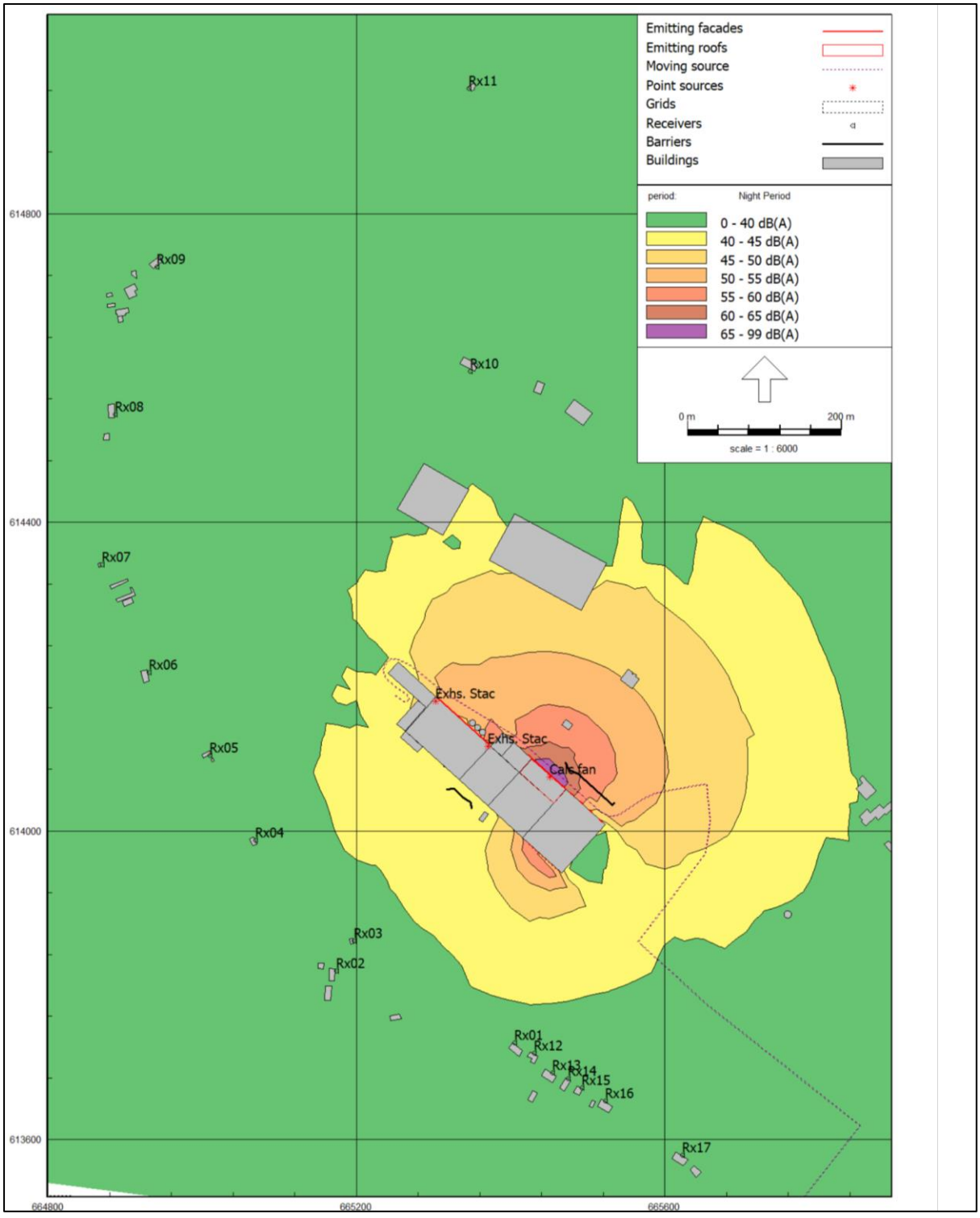
Due to no variation in the day, evening or night-time operations, the sound emission from plant, the day and evening results are predicted to be the same as the night-time values.

Where two receptors have been identified for a NSR (to represent upper and lower floor windows), the highest result have been used to calculate the effect on the receptor.

11.4.4.1 Model A - Results

The cumulative impact from the ambient acoustic environment and the site-specific emissions have been calculated. The cumulative values are shown from the Proposed Development for the Operational Phase of Model A in Table 11-16, with Figure 11-9 showing L_{night} values.

Figure 11-9: Noise Modelling Results – Night-time – Model A



These values are a likely worst-case scenario and demonstrate that the Proposed Development will operate in compliance with the NG4's typical noise criteria at all identified NSRs.

Table 11-16: Noise Model Results for Model A

NSR ID	Noise Outputs (dBA) for Model A		
	Daytime	Evening	Night-time
Typical NG4 Noise Limits	**55**	**50**	**45**
NSR01	38	38	38
NSR02	38	38	38
NSR03	39	39	39
NSR04	36	36	36
NSR05	29	29	29
NSR06	35	35	35
NSR07	33	33	33

The site-specific noise emission from the Proposed Development for Model A as shown in Table 11-16 above show that all NSRs will be compliant with the typical noise nuisance values. The predicted highest site-specific sound levels will be present at NSR03 to the south, with $L_{Aeq,T}$ value of 39dB.

Ambient Change

The cumulative impact from the ambient acoustic environment and the site-specific emissions have been calculated. The cumulative values for the Proposed Development, during the operational phase for Model A are outlined in Table 11-17, Table 11-18 and Table 11-19 below for day, evening and night-time periods respectively.

Table 11-17: Predicted Daytime Operational Stage Change in Noise at NSRs for Model A

NSR ID	Existing Ambient $L_{A90,T}$ dB	Predicted Site Specific $L_{Aeq,T}$ dB	Calculated Cumulative $L_{Aeq,T}$ dB	Change & Impact
NSR01	46	38	47	+1 Negligible
NSR02	46	38	47	+1 Negligible
NSR03	46	39	47	+1 Negligible
NSR04	41	36	42	+1 Negligible
NSR05	41	29	41	+0 Negligible
NSR06	40	35	41	+1 Negligible
NSR07	46	33	46	+0 Negligible

Table 11-18: Predicted Evening time Operational Stage Change in Noise at NSRs for Model A

NSR ID	Existing Ambient $L_{A90,T}$ dB	Predicted Site Specific $L_{Aeq,T}$ dB	Calculated Cumulative $L_{Aeq,T}$ dB	Change & Impact
NSR01	43	38	44	+1 Negligible
NSR02	39	38	41	+2 Negligible
NSR03	39	39	42	+3 Slight
NSR04	37	36	40	+3 Slight
NSR05	37	29	38	+1 Negligible
NSR06	40	35	41	+1 Negligible
NSR07	43	33	43	+0 Negligible

Table 11-19: Predicted Night- time Operational Stage Change in Noise at NSRs for Model A

NSR ID	Existing Ambient $L_{A90,T}$ dB	Predicted Site Specific $L_{Aeq,T}$ dB	Calculated Cumulative $L_{Aeq,T}$ dB	Change & Impact dB
NSR01	43	38	44	+1 Negligible
NSR02	39	38	41	+2 Negligible
NSR03	39	39	42	+3 Slight
NSR04	34	36	38	+4 Slight
NSR05	34	29	35	+1 Negligible
NSR06	35	35	38	+3 Slight
NSR07	43	33	43	+0 Negligible

For the daytime period, for all NSRs it has been predicted that the Proposed Development will result in a change below 3dB, on the existing measured ambient background, with a negligible impact as per the IOA/IEMA method.

For the evening period, four (4No) NSRs were predicted to result in a change below 3dB, on the existing measured ambient background, with a negligible impact. Two (2No) NSRs (NSR03 and NSR04) were predicted to experience a change in background of +3dB, with a slight impact, which was deemed ‘non-intrusive’ as per the IOA/IEMA criteria.

For the night-time period, three (3No) NSRs are predicted to result in a change below 3dB on the existing measured ambient background, with a negligible impact. However, three (3No.) NSRs (NSR03, NSR04 and NSR06) were predicted to experience a change in background up to 3 to 4dB, with a slight impact predicted, which was deemed ‘non-intrusive’ as per the IOA/IEMA criteria.

Model A Direct Effects Statement

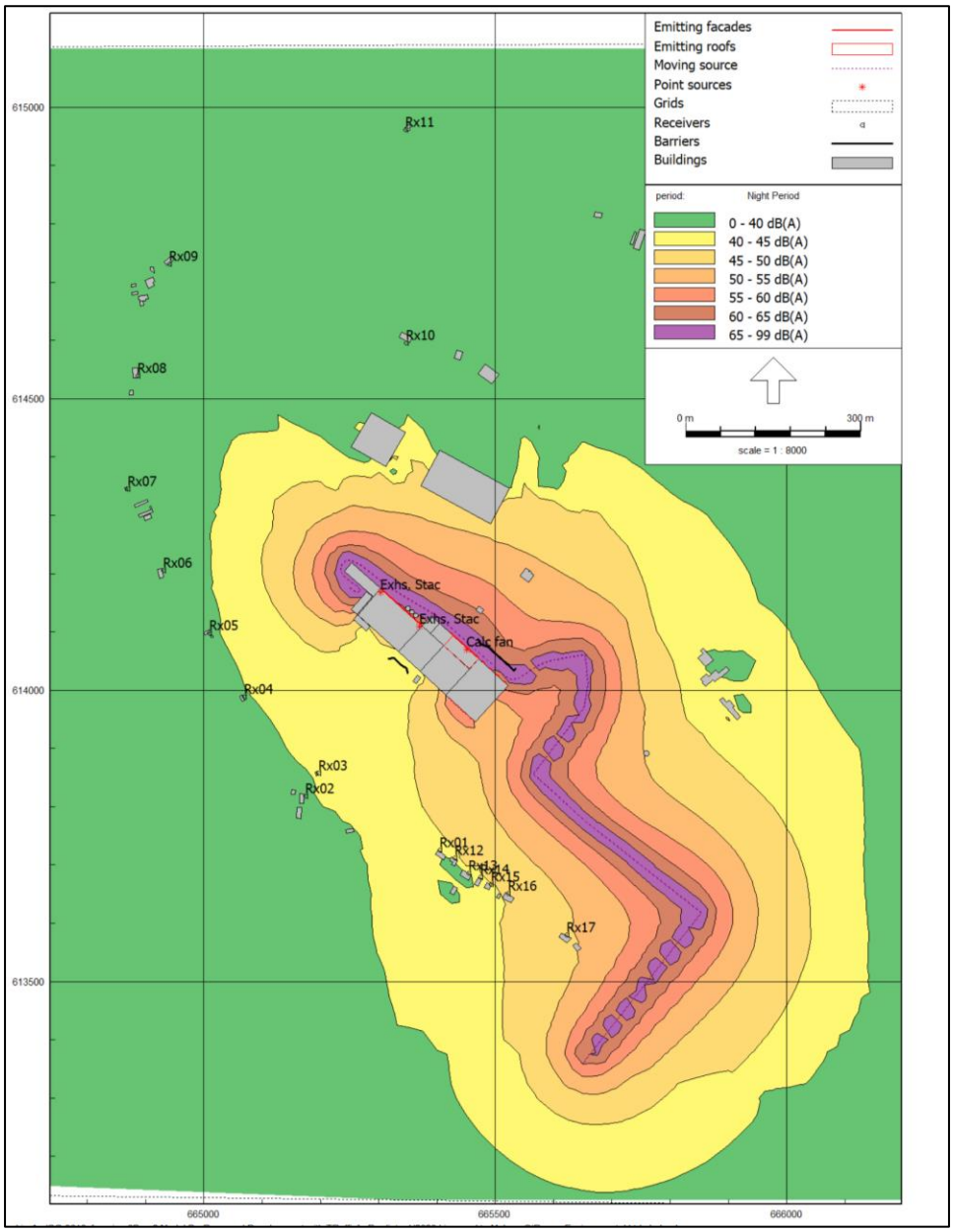
Model A representing operations throughout the majority of the year, where no additional traffic from the unloading campaign was included. Predicted cumulative sound level at all NSRs were predicted to be below noise nuisance criteria, with negligible effect associated with the Proposed Development.

The overall assessment, based on the predicted change in ambient sound levels at NSRs, the specific sound pressure associated with the Proposed Development at NSRs, the characteristics of the receiving environment, and the development and zoning of the Site locality, the direct effect on NSRs in relation to noise will be not significant.

11.4.4.2 Model B - Results

The cumulative impact from the ambient acoustic environment and the site-specific emissions have been calculated. The cumulative values were shown from the Proposed Development for the Operational Phase of Model B in Table 11-20, with Figure 11-10 showing L_{night} values.

Figure 11-10: Noise Modelling Results – Night-time – Model B



These values were a worst-case scenario and demonstrate that the Proposed Development will operate in compliance with typical noise nuisance criteria at all identified NSRs.

Table 11-20: Noise Model Results for Model B

NSR ID	Noise Outputs (dBA) for Model A		
	Day	Evening	Night
Typical NG4 Noise Limits	**55**	**50**	**45**
NSR01	44	44	44
NSR02	40	40	40
NSR03	41	41	41
NSR04	40	40	40
NSR05	34	34	34
NSR06	36	36	36
NSR07	49	49	49

The site-specific noise emission from the Proposed Development for Model B as shown in Table 11-20 above showed that most of NSRs will be compliant with the typical noise nuisance values, except for NSR07. The predicted highest site-specific sound levels will be present at NSR06 to the south, with $L_{Aeq,T}$ value of 49dB.

Ambient Change

The cumulative impact from the ambient acoustic environment and the site-specific emissions have been calculated. The cumulative values for the Proposed Development, during the operational phase for Model B are outlined in Table 11-21, Table 11-22 and Table 11-23 below for day, evening and night-time periods respectively.

Table 11-21: Predicted Daytime Operational Stage Change in Noise at NSRs for Model B

NSR ID	Existing Ambient $L_{A90,T}$ dB	Predicted Site Specific $L_{Aeq,T}$ dB	Calculated Cumulative $L_{Aeq,T}$ dB	Change (dB) & Impact
NSR01	46	44	48	+2 Negligible
NSR02	46	40	47	+1 Negligible
NSR03	46	41	47	+1 Negligible
NSR04	41	40	43	+2 Negligible
NSR05	41	34	42	+1 Negligible
NSR06	40	36	41	+1 Negligible
NSR07	46	49	51	+5 Moderate

Table 11-22: Predicted Evening time Operational Stage Change in Noise at NSRs for Model B

NSR ID	Existing Ambient $L_{A90,T}$ dB	Predicted Site Specific $L_{Aeq,T}$ dB	Calculated Cumulative $L_{Aeq,T}$ dB	Change (dB) & Impact
NSR01	43	44	47	+4 Slight
NSR02	39	40	43	+4 Slight
NSR03	39	41	43	+4 Slight
NSR04	37	40	41	+4 Slight
NSR05	37	34	39	+2 Negligible
NSR06	40	36	41	+1 Negligible
NSR07	40	49	50	+7 Moderate

Table 11-23: Predicted Night- time Operational Stage Change in Noise at NSRs for Model B

NSR ID	Existing Ambient $L_{A90,T}$ dB	Predicted Site Specific $L_{Aeq,T}$ dB	Calculated Cumulative $L_{Aeq,T}$ dB	Change (dB) & Impact
NSR01	43	44	47	+4 Slight
NSR02	39	40	43	+4 Slight
NSR03	39	41	43	+4 Slight
NSR04	34	40	41	+7 Moderate
NSR05	34	34	37	+3 Slight
NSR06	35	36	38	+3 Slight
NSR07	43	49	50	+7 Moderate

For the daytime period, the majority of NSRs were predicted to result in a change below 3dB, on the existing measured ambient background, with a negligible impact as per the IOA/IEMA guidance. One (1No.) NSR was predicted to experience a change in background up to 5dB, with a moderate impact, which would be deemed ‘intrusive’ as per the IOA/IEMA criteria.

For the evening period, two (2No.) NSRs were predicted with a change below 3dB, on the existing measured ambient background, with a negligible impact. Four (4No.) NSRs (NSR01, NSR02, NSR03 and NSR04) were predicted to experience a change in background of +3dB, with a slight impact predicted, which was deemed ‘non-intrusive’ as per the IOA/IEMA criteria. Furthermore, one (1No.) NSR (NSR07) was predicted to experience a change in background up to 5dB, with a moderate impact, which would be deemed ‘intrusive’ as per the IOA/IEMA criteria.

For the night-time period, five (5No) NSRs (NSR01, NSR02, NSR03, NSR05 and NSR06) were predicted to experience a change in background of +3dB, with a slight impact, which would be deemed ‘non-intrusive’ as per the IOA/IEMA criteria. Two (2No.) NSRs (NSR04 and NSR07) were predicted to experience a change in background up to 7dB, with a moderate impact predicted, which would be deemed ‘intrusive’ as per the IOA/IEMA criteria.

Model B Direct Effects Statement

Model B, incorporates the additional activities and associated noise emissions, occurring during a unloading campaign. These campaigns will be limited to ca.8 events per annum and will occur within a 24-hour period. These additional activities were predicted to increase noise effects locally, particularly at NSR04 and NSR07.

Predicted cumulative sound level at most of the NSRs will be below typical noise nuisance criteria, with negligible effects associated with the Proposed Development. Two (2No.) NSRs (NSR01 and NSR07) were predicted to experience an exceedance of typical night-time noise nuisance values of $L_{Aeq,T}$ 45dB.

Internal target noise levels, as presented in BS 8233:2014 [121] for sleeping activity located in the bedroom are given in Table 4 Section 7.7.2 of that guidance and start a $L_{Aeq,8hr}$ 30dB. However, the guidance further expands in Note 7, that:

"NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. "

In this case, internal noise level during night-time can be reasonable achieved when windows are open, as a reduction of 15dB from outside to inside is assumed [132]. This would result in an internal noise level when windows are open of 32dB and 35dB for NSR01 and NSR07.

This assessment represents a worst-case scenario for a unloading campaign.

The overall assessment, based on the predicted change in ambient sound levels at NSRs, the specific sound pressure associated with the Proposed Development during an unloading campaign event at NSRs, the characteristics of the receiving environment, and the development and zoning of the Site locality, the direct impact on NSRs in relation to noise will be a temporary, re-occurring, not significant effect.

11.4.5 Operational Phase Vibration

There are no proposed sources within the design that will result in the creation of vibration within the Proposed Development boundaries. Therefore, the proposed future operation will not have a vibration effect at NSRs.

11.5 Proposed Mitigation Measures and / or Factors

The assessment of the Proposed Development has identified construction stage noise and vibration will be above typical limit values at NSRs. The allocation of mitigation is outlined below under construction and operation as these are distinct acoustic stages of the Proposed Development with specific characteristics to be assessed.

11.5.1 Construction Phase

11.5.1.1 Noise

The assessment in Section 11.4.1 has concluded that there will be no likely significant effect caused by construction noise at any of the NSRs to the Site.

In advance of the construction phase commencing the appointed contractor will submit a CE&WMP to the Council for approval. The following commitments that are outlined within BS5228-will be specified in this CE&WMP:

- Turning off/powering down plant when not in use;
- Turning off HGVs when not in use;
- Reduction in drop heights of incoming materials;
- Developing the soil embankments during early construction phase of works;

- Appointing project liaison officer to communicate with locals regarding noisy works, their duration and organising construction phase noise monitoring;
- Strict controls on construction hours to prevent noise works occurring early morning or into the evening period;
- Positioning of hoarding and enclosures around noisy works or plant as required to ensure compliance with construction noise limits; and,
- Inclusion of response procedure to noise complaints and noise breaches.

The Contactor will ensure these commitments, required to manage construction stage noise emissions will be in place and all workers on the Site are kept aware of them through on-site toolbox talks.

11.5.1.2 Vibration

As discussed in section 11.4.3 above, the distance of the receptors from the main point of construction activity determines that there will be no likely significant effects by vibration. As a result, no mitigation measures regarding vibration have been committed to.

11.5.2 Operational Phase

11.5.2.1 Noise

The Proposed Development will be a commercial facility, that will operate 24/7/333 on a three-shift basis as outlined in Section 3.2.2.

The following measures will be in place as part of the Proposed Development:

- All plant (fixed and mobile) will be maintained to a high standard to reduce any tonal or impulsive sounds;
- On-site vehicles will be equipped with white noise/broadband sirens to minimise noise during reversing activities;
- Preventative maintenance programme will be in place for all plant and equipment on the Site and for the maintenance of all roads within the Site; and,
- All plant will be throttled down or switched off when not in use, where practicable;

The Proposed Development has been assessed and determined that no likely and significant acoustic effects will arise in relation to operational noise. The above operational management of the Site will further control noise and enable an early identification and investment to ensure noise control is central to the ongoing future operations for the Proposed Development.

11.5.2.2 Vibration

There are no proposed sources within the design that will result in the creation of operational vibration at the Proposed Development boundaries. Therefore, the proposed future operation will not have a likely and significant vibration effect at NSRs.

11.6 Cumulative and In-Combination Impacts

The Proposed Development has been assessed in relation to the potential variation in ambient noise levels and found no likely and significant effects.

Existing noise emissions, including those associated with the existing nearest industry operations, are incorporated to the ambient noise values utilised in this assessment and are therefore incorporated within the baseline assessment of this chapter. A review of the locality for other known applications and plans for development was undertaken, and no notable changes locally have been identified, refer to chapter 2.3 of this EIAR.

11.7 Interactions with other Environmental Attributes

Noise is closely linked with human beings, as residential receptors are the primary noise sensitive receptors, and have been discussed as the primary receptor in this chapter. The assessment has shown, where identified mitigation is in-place, the impacts on human nuisance will be controlled and within typical nuisance limit values.

Noise can influence fauna, through disturbance of animals, impacts on specific species have been outlined in Chapter 6 (Biodiversity) where relevant. The modelling shows no significant change to ambient noise levels at priority habitats such as SAC or SPAs designated sites.

Noise is influenced by traffic associated with the construction and operation of the Proposed Development. A review of the traffic numbers associated with both stages as outlined within Chapter 14, has been undertaken, and has informed the assessment of impact presented in this chapter.

11.8 Residual Effects

No likely and significant effect has been predicted arising from vibration during construction works, and no source of vibration are predicted from the Proposed Development during operation.

The Proposed Development has been predicted to comply with typical noise nuisance values for the majority of NSRs to the Site, both during construction and operation. Two NSRs have been predicted to experience an exceedance during night-time operations during the unloading campaigns, however these will be infrequent short duration events, and based on the likely effects, found to be in line with WHO and BS8233 guideline for a bedroom.

Following the implementation of mitigation additional control and awareness of the as built plant will enable the operation of the Proposed Development to be managed ensuring noise will be controlled.

Long-term, a negligible effect at all NSRs has been predicted.

11.9 Monitoring

To ensure compliance, both construction stage and operational stage monitoring is committed on this Site.

Construction monitoring will as a minimum be conducted at the Site close to NSRs. It is envisaged a minimum of 3No. monitoring locations will be needed and should include monitoring of each phase of the construction programme.

During the operational phase a minimum of 1No. monitoring event per annum, undertaken to capture an unloading campaign, will be sufficient to ensure adequate management of on-site noise. Monitoring locations should be set up in proximity to NSRs to the Site, and day and night-time monitoring undertaken.

Any tonal or impulsive characteristics of the operational site-specific noise emissions, during the day periods, will accrue a 5dB weighting. No tonal or impulsive characteristics should be audible from site specific noise emissions during the night-time period.

11.10 Reinstatement

Not applicable – noise is generated through operations on-site. In the event of a

Site closure noise emissions will cease.

11.11 Difficulties Encountered in Compiling this Information

No difficulties were encountered during the preparation or execution of his assessment.

12 LANDSCAPE AND VISUAL ASSESSMENT

12.1 Introduction

This chapter of the EIAR was prepared by Macroworks Ltd and comprises a Landscape and Visual Impact Assessment (LVIA) assessment to review the existing landscape setting of the Site and to assess the likely potential landscape and visual impacts arising from the Proposed Development.

It also describes any applicable proposed mitigation measures to reduce any likely adverse potential visual impacts on the receiving environment.

This assessment should be read in conjunction the photomontages prepared for the Proposed Development by Macro Works Ltd and included in Appendices 12-1 respectively.

12.2 Methodology

12.2.1 Assessment Methodology and Significance Criteria

Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment (LIA) relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment (VIA) relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from Visual Obstruction (blocking of a view, be it full, partial or intermittent) or Visual Intrusion (interruption of a view without blocking).

This LVIA methodology is as prescribed in the following guidance documents:

- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports', 2022 [9],
- EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, updated 2017 [10],
- Landscape Institute and the Institute of Environmental Management and Assessment ('IEMA') publication 'Guidelines for Landscape and Visual Impact Assessment, 2013 [136].

The preparation of this chapter involved:

- A desktop study to establish an appropriate study area, and relevant landscape and visual designations in the current Kilkenny County Development Plan 2021-2027 [48];
- Fieldwork to study the receiving environment and to confirm the set of viewpoints to be used for visual impact assessment;
- Production of verifiable photomontages, the photography for which was captured in 2023;
- Assessment of the significance of the landscape impact of the Proposed Development as a function of landscape sensitivity weighed against the magnitude of the landscape impact; and,

- Assessment of the significance of the visual impact of the Proposed Development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact.

12.2.2 Assessment Criteria

When assessing the potential impacts on the landscape resulting from a Proposed Development, the following criteria are considered:

- Landscape character, value and sensitivity.
- Magnitude of likely impacts.
- Significance of landscape effects.

The sensitivity of the landscape to change is the degree to which a particular landscape receptor (Landscape Character Area (LCA) or feature) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape Value and Sensitivity is classified using the following criteria set out in Table 12-1 below.

Table 12-1: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the Proposed Development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the Site boundary that may have an effect on the landscape character of the area. See Table 12-2.

Table 12-2: Magnitude of Landscape Impacts

Magnitude of Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an extensive change of the landscape in terms of character, value and quality.

Magnitude of Impact	Description
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to a considerable change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to noticeable changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements that would lead to discernible changes in landscape character, and quality.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable leading to no material change to landscape character, and quality.

The significance of a landscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the matrix set out in Table 12-3 below.

Table 12-3: Impact Significance Matrix: Landscape Value and Sensitivity

	Sensitivity of Receptor				
Scale/Magnitude	**Very High**	**High**	**Medium**	**Low**	**Negligible**
Very High	Profound	Profound-substantial	Substantial	Moderate	Slight
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. Judgements indicated in yellow are considered to be 'significant impacts' in EIA terms.

12.2.3 Visual Impact Assessment Criteria

As with the landscape impact, the visual impact of the Proposed Development will be assessed as a function of sensitivity versus magnitude - in this instance, the sensitivity of the visual receptor weighed against the magnitude of the visual effect.

12.2.3.1 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric basis. It considers factors such as the perceived quality and values associated with the view, the

landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape. A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below.

Susceptibility of Receptors

In accordance with the IEMA Guidelines for Landscape and Visual Assessment [136], visual receptors most susceptible to changes in views and visual amenity are:

- *'Residents at home*
- *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views*
- *Visits to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience*
- *Communities where views contribute to the landscape setting enjoyed by residents in the area and*
- *Travellers on road, rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened.'*

Visual receptors that are less susceptible to changes in views and visual amenity include:

- *'People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape and*
- *People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life.'*

Values Associated with Views

- **Recognised scenic value of the view** (County Development Plan designations, guidebooks, touring maps, postcards etc). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Developments Plans, for example, a public consultation process is required;
- **Views from within highly sensitive landscape areas.** Again, highly sensitive landscape designations are usually part of a county's Landscape Character Assessment, which is then incorporated within the County Development Plan and is therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
- **Primary views from dwellings.** A Proposed Development might be seen from anywhere within a particular residential property with varying degrees of sensitivity. Therefore, this category is reserved for those instances in which the design of dwellings or housing estates has been influenced by the desire to take in a particular view. This might involve the use of a slope or the specific orientation of a house and/or its internal social rooms and exterior spaces;
- **Intensity of use, popularity.** This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at county or regional scale;

- **Connection with the landscape.** This considers whether or not receptors are likely to be highly attuned to views of the landscape i.e., commuters hurriedly driving on busy national route versus hill walkers directly engaged with the landscape enjoying changing sequential views over it;
- **Provision of elevated panoramic views.** This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;
- **Sense of remoteness and/or tranquillity.** Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;
- **Degree of perceived naturalness.** Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;
- **Presence of striking or noteworthy features.** A view might be strongly valued because it contains a distinctive and memorable landscape feature such as a promontory headland, lough or castle;
- **Historical, cultural and / or spiritual significance.** Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;
- **Rarity or uniqueness of the view.** This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;
- **Integrity of the landscape character.** This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;
- **Sense of place.** This considers whether there is special sense of wholeness and harmony at the viewing location; and,
- **Sense of awe.** This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

12.2.3.2 Visual Impact Magnitude

The magnitude of visual effects is determined on the basis of two factors; the visual presence (relative visual dominance) of the proposal and its effect on visual amenity.

The magnitude of visual impacts is classified in Table 12-4 below.

Table 12-4: Magnitude of Visual Impact

Criteria	Description
Very High	The proposal obstructs or intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. An extensive degree of visual change will occur within the scene completely altering its character, composition and associated visual amenity.
High	The proposal obstructs or intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual change will

Criteria	Description
	occur within the scene substantially altering its character, composition and associated visual amenity.
Medium	The proposal represents a moderate intrusion into the available vista and is a readily noticeable element. A noticeable degree of visual change will occur within the scene perceptibly altering its character, composition and associated visual amenity.
Low	The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene.
Negligible	The proposal would be barely discernible within the available vista and/or it would not influence the visual amenity of the scene.

12.2.3.3 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix and applies the same EPA definitions of significance as used earlier in respect of landscape impacts – see Table 12-3 above.

12.2.3.4 Quality and Timescale of Effects

In addition to assessing the significance of landscape effects and visual effects, EPA Guidance for EIAs [9] requires that the quality of the effects is also determined. This could be negative/adverse, neutral, or positive/beneficial. In the case of new industrial developments within rural and semi-rural settings, the landscape and visual change brought about by an increased scale and intensity of built form is seldom considered to be positive / beneficial.

Landscape and Visual effects are also categorised according to their duration:

- Temporary – Lasting for one year or less
- Short-Term – Lasting one to seven years
- Medium-Term – Lasting seven to fifteen years
- Long-Term – Lasting fifteen to sixty years and
- Permanent – Lasting over sixty years.

12.3 Characteristics and Potential Impacts of the Proposed Development

As indicated in Section 12.1, potential impacts of the Proposed Development will be divided between landscape impact and visual impacts, weighing receptor sensitivity against the magnitude of effects in both instances.

12.3.1 Landscape Impact Assessment

12.3.1.1 Landscape Character Value and Sensitivity

The study area consists of a range of industrial, residential and rural land uses that weave together in a manner that has depth and diversity, but not necessarily a high degree of land use integrity. Nevertheless, and overall, land is well utilised with few neglected or degraded areas. Undulating pasture and woodland, as well as low ridgelines to the east and the presence of the Barrow and the Suir, help to instil a pleasant aesthetic. This is reflected in the presence of one protected scenic route (i.e. in southeast) and one protected view (in the east) of the study area. It is not considered that the landscape within the study area is particularly rare or distinctive.

In summary, it is considered that this is a robust, multi-faceted and deeply diverse working landscape with an overall Medium-low degree of landscape sensitivity. This is the balance of the central study area being lower sensitivity, while the wider study area, in particular the waterways and Minaun Hill, are higher.

12.3.1.2 Landscape Impact Magnitude

Construction Stage Landscape Impacts

There will be permanent physical effects to the land cover of the Site, which are not readily reversible. These relate to the excavation and removal of much of the site's existing grassland and topsoil and a number of trees, hedgerows and shrubs that currently act as field boundaries, to facilitate the proposed development.

The vast majority of landcover within the northern section of the site (i.e. both the majority area of pasture, trees, hedgerows and shrubs and the minority area of hardscape) will be excavated during the construction phase. There are two small sections of internal field boundaries that will be removed to facilitate the proposed development. These field boundaries take the form of broken, or inconsistent, tree-lined hedgerows and shrubs, are both located in the northeast section of the Site as defined by the redline, but within the southern section of the main building compound and development area. There is an area of scrub surrounding derelict buildings in this area which will be removed also. This will result in the perimeter hedgerows and one dividing hedgerow being retained as far as is practicable and protected from damage during construction.

During the construction stage, which is expected to last 12-14 months, there will be considerable construction related activity within and around the site including approach roads. This will consist of;

- HGVs transporting materials to and from the site;
- Movement of earth moving machinery on-site;
- Tower cranes;
- Temporary storage of excavated materials and construction materials on-site;
- Construction of temporary and permanent access tracks and crane hardstands;
- Gradual emergence of the incomplete facility;
- Worker car parking, welfare facilities and portacabins;
- Security fencing
- Temporary site lighting.

The physical impacts to the existing site land cover and vegetation will be permanent and are not readily reversible. However, none of the affected land cover or vegetation features is rare or decisive in forming the overall landscape character of the area. Nor is the site extensive in the context of this rural setting. Construction stage impacts on landscape character from the nature and intensity of construction related activity will be 'short-term' (lasting 1-7 years), in accordance with the EPA definitions of impact duration.

On the basis of the reasons outlined above, the magnitude of construction stage landscape impacts was deemed to be Medium. When combined with the Medium-low sensitivity of the receiving landscape, the overall significance of construction stage landscape impacts was considered to be Moderate.

Operational Stage Landscape Impacts

Following the completion of the Proposed Development, landscape impacts will relate almost entirely to the development's impact on the character of the receiving landscape and whether this is positive or negative.

The most notable landscape impacts will result from the construction of ca.26.5m high buildings (ca.28m high exhaust stack), in tandem with areas of concrete/hardscape surfacing across areas of the site. In terms of landscape character, the context of the proposed development is crucial: it is within an area of pastoral agricultural land directly adjacent to a number of warehouse buildings and associated infrastructure on the edge of Belview Port, a heavily industrialised area on the banks of the river Suir.

Furthermore, it sits within land zoned for industrial development and is also within 1km of the Industrial Technology Park, which is still in development. The Tirlán/Glanbia Ingredients Ireland plant and associated infrastructure, which is also still in development, is also contained within 1km of the Site. It is also within 2km of a substantial water treatment plant. While the proposed development will add to the intensity of this development, it is also in keeping with its context.

In terms of landscape character change, the main ameliorating factor is the presence of the adjacent, industrial warehousing and ancillary infrastructure, in what will be effectively read as the one coherent and consistent development and will provide a rationale and context for the Proposed Development. In terms of the broader context, the rural hinterland that is characterised by pasture, woodland and river, as well as residential and industrial development, has a landscape character that the proposed development is consistent with.

On the basis of the reasons outlined above, the magnitude of operational stage landscape impacts was deemed to be Medium. In accordance with the significance matrix at Table 12-3, the Medium magnitude of landscape effect is combined with the Medium-low sensitivity of the receiving landscape, the overall significance of operational stage landscape impacts was considered to be Moderate / Negative / Permanent.

12.4 Receiving Environment

12.4.1 Landscape and Visual Baseline

The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape and visual context brought about by the development will be assessed. A description of the landscape context of the Site and wider study area is provided below.

12.4.2 Definition of the Study Area

The Proposed Development will be difficult to discern beyond approximately 2km, due to screening afforded by intervening vegetation, buildings and/or landform. Even if discernible from greater distances, it will not give rise to significant landscape or visual impacts beyond this threshold. In the interests of a comprehensive appraisal, however, a 5km radius study area has been used in this instance (refer to Figure 12-1 below).

Figure 12-1: Study Area

12.4.3 Site Description

12.4.3.1 Landform and Drainage

The landscape of the study area is largely defined by the wide river channels cast by the River Suir and River Barrow: the third and second longest rivers in Ireland, respectively. The longest river in Munster, the Suir separates counties Kilkenny and Waterford within the study area, and winds through Waterford City in the west of the study area. In the northeast of the study area, the longest river in Leinster, the Barrow, drains into the Suir, before it flows south into the Celtic Sea soon after it exits the study area. There are numerous small rivers and streams that feed into these large watercourses, while there is an island called “Little Island” set within the Suir channel. The Landform within the Site varies between ca.32m AOD in the north-eastern corner and 51m AOD along its south-western boundary, with the centre of the Site lying at ca.40m AOD sloping northward. Figure 12-2 shows an example of the terrain.

Figure 12-2: Gently Undulating Terrain in the central study area

12.4.3.2 Vegetation and Land Use

The predominant land use in the central study area is that of agricultural farmland, followed by industry and residential settlement. In terms of agriculture, the central study area is characterised by regular, medium-sized fields, where pasture tends to dominate. Elsewhere, tillage and both deciduous and coniferous forestry plantations are evident. Several field boundaries consist of low, well-maintained hedgerows, with a slant on Birch and Alder trees. Another notable land use in the central study area is industry, mostly in the form of Belview Port and ancillary/adjacent development located immediately south of the Site.

Waterford City is the largest settlement within the area, while across the wider study area there are scattered clusters of residential development, such as immediately northwest of the site at Drumdowney. Most of the population of Waterford City lies within the study area, including Ferrybank, north of the Suir, which collectively account for large areas of land use in the area.

Within the Site, land use is primarily made up of pastoral agriculture. However, at the southern end of the Dite, there are areas of hardscape and built-up elements associated with the adjacent warehousing and industrial units. This includes the sizeable Tirlán / Glanbia Ingredients Ireland plant, located ca. 700m west of the site within the IDA Belview Science & Technology Park, and a Celtic Anglian water treatment plant (WTP), less than 1.5km south-west of the Site.

12.4.3.3 Centres of Population and Houses

The major population centre in the study area is Waterford City, is located less than 3km southwest of the site, at its closest point. It is a settlement that dates back to at least 853 AD and according to the 2016 Census, over 50,000 people live in the City, with a wider metropolitan population of more than 80,000. The eastern/south-eastern suburbs of the City extend to within 2.5km of the Site, while Ferrybank, on the northern side of the Suir, extends to within 2.5km west of the Site. While there are some small settlements in the study area (e.g. Cheekpoint in the north-eastern tip of County Waterford), most dwellings are within linear/ribbon developments along country roads. Owing to its proximity to Waterford City, these linear settlements are particularly prevalent in the western half of the study area.

12.4.3.4 Transport Routes

The Suir estuary, as well as Belview Port, is a major transport hub for freight cargo in and out of Ireland, while both the Suir and Barrow Rivers have served as important transport routes in this region for more than 1000 years. More recently, the study area serves as the home of two busy National roads: the N25 & the N29, with the latter running to within 500m of the Site's western edge. There are at least eight different regional roads in the study area, as well as a well-worn matrix of third-class roads serving the local community. Within the city, well-used rail lines connect the city to Dublin and to Limerick, while a short, commercial/freight-only rail line runs between Waterford City and Belview along the northern edge of the Suir, skirting to within 1km south of the Site. Furthermore, there's an abandoned rail line running within 500m northwest of the Site's northern boundary.

12.4.3.5 Tourism, Public Amenities and Facilities

Numerous sporting and cultural amenities are centred within Waterford City. In the sporting/outdoors realm, these include Waterford GAA Grounds, Ferrybank Sports Ground, Williamstown Golf Club, Waterford Golf Club and Waterpark Rugby Club. There's also a marina and jetty for recreational boating craft along Merchants Quay (i.e. the south bank of the Suir, within the city centre), and the Waterford-Dungarvan Greenway. There are numerous historic, cultural and tourist attractions within the city, including the Viking Triangle and Reginald's Tower.

Closer to the central study area, there are two renowned golf courses on the southern banks of the Suir: Waterford Castle Hotel & Golf Resort, ca. 2km south of the site, and Faithlegg Golf Club, ca. 1.5km southeast of the Site. There are a number of areas with more discrete heritage features or amenity values, such as the remnants of Snowhill House to the northeast of the Site, Barrow Bridge to the east. Larger features to the east include Kilmokea Manor and Gardens (4km east), and Dunbrody Abbey (slightly outside of the study area – 6km east). Further to the south, there are local recreation features in a walk to the top of Minaun Hill, ca.2.5km from the Site, and Coillte Deer Park Forest Recreational Area ca.2km to the south, as well as an informal local walking trail along the water's edge southwest of Cheekpoint.

12.4.4 Policy Context

As the study area encompasses three separate counties, the relevant Development Plan of each of these counties and area will be addressed in this section.

12.4.4.1 Kilkenny County Development Plan 2021-2027

The Landscape Character Assessment identifies four landscape character types (LCT's). These are: Upland Areas; Lowland Areas; River Valleys, and Transitional Areas. The Site is located within the Upland Areas LCA. These LCT's are then further subdivided into 14 landscape character areas (LCA's), with some areas identified as being of special landscape character value and also identified features and areas of high landscape sensitivity, along with a need to protect views of high amenity value. The site is fully contained within Landscape Character Area E: the South Eastern Hills. The other LCAs within the study area are 'G - South Kilkenny Lowlands' and the 'J - Suir Valley', which hugs the river corridor.

12.4.4.2 Ferrybank local Area Plan County Development Plan 2017

According to the Ferrybank-Belview Local Area Plan 2017 (i.e. under the auspices of Kilkenny County Council), the site is located within the Development Boundary of Ferrybank-Belview, identified as being within the 'Employment Area' within the Core Strategy and is zoned for 'Port Facilities & Industry (PFI)'. The purpose of this zoning is to:

> *'allow for the further development and expansion of portal facilities and associated industries, to assist in the economic development of the wider area, whilst not*

encouraging leakage of uses which would be more appropriately located in the existing urban centres of Waterford City and Ferrybank.'

As such, the permissible uses of this land are as follows:

'Car/Truck park, industry (General Industrial use), Industry (Light), Port related office, open space, park and ride facility, silos and storage areas, storage tanks including bulk liquid storage and general warehousing, wholesale/warehousing.'

Land uses which would be open for consideration on this land are as follows:

'Advertising board, ATM, buildings for the health, safety and welfare of the public, cafe, car repair/sales, childcare facilities, enterprise centre/campus industry, service/petrol station, recycling centre (bottle banks, etc), Shop - Convenience outlet, water based recreational cultural activities.'

12.4.4.3 Waterford County Development Plan 2022-2028

The Waterford County boundary lies within the Study Area, less than 1km south of the site, within the River Suir Corridor. Therefore, the Waterford County Development Plan (CDP) 2022-2028 will be assessed within this section.

Chapter 10 of the Waterford CDP 2022-2028 identifies 7 Landscape Character Types (LCT's): coastal landscapes, river corridor and estuary landscapes, farmed lowland landscapes, foothill landscapes, upland landscapes and urbanising landscapes. These LCT's are then further characterised into Landscape Character Units (LCU's). The LCU's that fall within the study area are as follows:

- **Landscape Character Unit (LCU) 1A1 – Lower Waterford Estuary**

  2. Characterised as being most sensitive with 'very distinctive features with a very low capacity to absorb new development without significant alterations of existing character over an extended area.'

- **Landscape Character Unit (LCU) 2C – East Waterford Lowlands**

  3. Characterised as being of low sensitivity and having 'a common character type with a potential to absorb a wide range of new developments.'

- **Landscape Character Unit (LCU) 4B – Suir Estuary**

  4. Characterised as being most sensitive with 'very distinctive features with a very low capacity to absorb new development without significant alterations of existing character over an extended area.'

- **Landscape Character Unit (LCU) 7A – Waterford City Environs**

  5. Characterised as being least sensitive and incorporating 'areas of existing development and infrastructure. New development reinforces existing desirable land use patterns.'

12.4.4.4 Wexford County Development Plan 2022-2028

The Wexford County boundary lies in the east of the study area, on the eastern side of the Barrow, Suir and the confluence of both. The Landscape Character Assessment, volume 7 of Wexford County Development Plan 2022-2028, identifies 4 overarching Landscape Character Units (LCU's), within which it is noted that there are some areas which contain '*distinctive landscape features'*, which for policy reasons are classed as an additional LCU. Therefore, there are 5 LCU's as determined by the Wexford Landscape Character Assessment: Uplands, Lowlands, River Valleys, Coastal, and Distinctive. Only the River Valleys LCU lies within the study area. The key features of which are as follows:

- **River Valleys**

  'The Slaney and Barrow River Valleys have similar characteristics to that of the Lowlands, but have a more scenic appearance due to the presence of the rivers and their associated topography and riparian and woodland habitats. This unit is sensitive to development.'

Descriptions of the Lowlands LCU can be found in Volume 7 of the Wexford CDP. The River Valleys are noted as being of Moderate to High sensitivity to change. In these areas development has the potential to give rise significant individual or cumulative impacts.

12.4.5 Visual Impact Assessment

Viewshed Reference Points (VRPs) are the locations used to study in detail the visual impacts of a proposal. It is not warranted to include each and every location that provides a view of a development, as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the Proposed Development. Instead, the selected viewpoints are intended to reflect a range of different receptor types, distances and angles. The VRPs selected in this instance are set out in Table 12-5 and Figure 12-3 below. No relative importance should be inferred by the order of listing.

Table 12-5: Outline Description of Selected Viewpoints

VRP No.	Location	Representative of:	Direction of View
VP1	N25 northwest of site at Curraghmore	LCV, MR	S
VP2	Local road northwest of site at Rathpatrick	LCV	S
VP3	Local road northeast of site at Drumdowney Upper	LCV	SW
VP4	Railway overpass at Rathpatrick	LCV, CP	S
VP5	Local road east of site at Drumdowney Upper (1)	LCV	W
VP6	Local road north of site at Gorteens	LCV	S
VP7	Local Road east of site at Drumdowney Upper (2)	DSV, LCV	W
VP8	Dunbrody Abbey	LCV, AH	NW
VP9	R711 west of site at Rathculliheen	LCV, MR	E
VP10	Local road southwest of site at Kilmurry	LCV	E
VP11	Y-junction south of site at Gorteens	LCV	NE
VP12	Local river walk southeast of site at Cheekpoint	LCV, KV, AH	NW
VP13	Cheekpoint pier	LCV, CP, AH	NW
VP14	Deerpark Forrest Recreational Area at Faithlegg	LCV, AH	N
VP15	May Park Trail at Ballynakill	LCV, AH	NE
VP16	Faithlegg Golf Course at Faithlegg	LCV. AH	N
VP17	R683 southwest of site at Knockboy	LCV, MR	NE
VP18	N25 northwest of site at Rhu Glenn Hotel	LCV, MR	S
VP19	Kilkenny Scenic Designation 22 (1)	DSV, LCV	W
VP20	Kilkenny Scenic Designation 22 (2)	DSV, LCV	W

Figure 12-3: Viewpoint Location Map

The sensitivities associated with each VP are presented in Table 12-7 below. The factors used to establish visual receptor sensitivity are those listed in section 12.2.3.1 above. The scale of value for each criterion is presented in Table 12-6 below.

Table 12-6: Scale of Value for Each Criterion

Strong association	Moderate association	Mild association	Negligible association

Table 12-7: Visual Receptor Sensitivity

Values associated with the view	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8	VP9	VP10	VP11	VP12	VP13	VP14	VP15	VP16	VP17	VP18	VP19	VP20
Susceptibility of viewers to changes in views																				
Recognised scenic value of the view																				
Views from within highly sensitive landscape areas																				
Primary views from residences																				
Intensity of use, popularity (number of viewers)																				
Viewer connection with the landscape																				
Provision of vast, elevated panoramic views																				
Sense of remoteness / tranquillity at the viewing location																				
Degree of perceived naturalness																				
Presence of striking or noteworthy features																				
Sense of Historical, cultural and / or spiritual significance																				
Rarity or uniqueness of the view																				
Integrity of the landscape character within the view																				
Sense of place at the viewing location																				
Sense of awe																				
Overall sensitivity assessment	L	M	ML	ML	ML	ML	M	H	M	ML	ML	HM	M	HM	HM	M	M	ML	ML	M

Key: **N** = Negligible Sensitivity; **L** = Low Sensitivity; **ML** = Medium-Low Sensitivity; **M** = Medium Sensitivity; **HM** = High-Medium Sensitivity; **H** = High Sensitivity, **VH** = Very High Sensitivity

The assessment of visual impacts and the magnitude of these impacts at each of the selected viewpoints is summarised in Table 12-8 below and further aided by the photomontages of the Proposed Development. Photomontages are a 'photo-real' depiction of the scheme within the view utilising a rendered three-dimensional model of the development, which has been geo-referenced to allow accurate placement and scale. For each viewpoint, the following images have been produced:

- Existing View;
- Outline view;
- Montage view (where relevant); and
- Mitigation establishment view at year 1, year 4 and year 8 (where relevant).

These photomontages are presented in Appendix 12-1.

Table 12-8: Description and Assessment of Impact on Viewpoints

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
VP1	**N25 northwest of site at Curraghmore** – The view looks south towards the site from the junction of a local road and N25. The centre of the view extends along the N25 corridor bound by pastoral fields, unmanaged hedgerows, fence-lined field boundaries, and intermittent residential properties at Luffany. On the left of the view, beyond the VRS and unmanaged scrub field boundaries, long-distance views across gently undulating pastoral and arable fields are afforded. Intermittent blocks of woodland and vegetated field boundaries are visible across the landscape. In the distance, views of the industry at Belview Port are available, with a chimney visibly breaking the skyline. To the right of the N25 corridor, long-distance views are screened by landform and field boundary vegetation. This is a view across a non-distinct rural landscape with several visible detractors, including industry and overhead cables.	**Low**	The Proposed Development will be partially visible and highly screened by intervening vegetation and built features, including residential properties at Luffany. It will add marginally to the intensity and concentration of built development in this section of the view. Consequently, the magnitude of visual impact was determined to be **Low-negligible** before mitigation. Following mitigation, the upper sections will be lightened, which reduces contrast with the surrounding skyline; however, not sufficient to reduce the magnitude of impact, which remains **Low-negligible**.	**Slight - Imperceptible / Negative - Neutral / Short Term**	**Slight - Imperceptible / Negative - Neutral / Long Term**
VP2	**Local Road northwest of the site at Rathpatrick** – View looking southeast towards the site from a location along a local road at Rathpatrick. The foreground of the view comprises a residential garden bound by a mix of shrubs, ornamental planting and intermittent trees; this view is partially representative of views from local residents. Beyond the residential gardens are open views across the undulating pastoral landscape. Hedgerows and linear belts of woodland scrub demarcate field boundaries. The majority of the Site is visible from this location. South of the site, in the view,	**Medium**	The Proposed Development will be visible along the ridgeline, behind the existing hedgerows from this location. This extends the scale of visibility of the industry and anthropocentric peri-urban working landscape associated with Belview Port. The smooth and homogenous form of the buildings contrasts with the organic and verdant tones and textures of the pastoral fields and will increase the intensity of built development in this scene. However, there is perceptual separation and screening of much of the Site through the proposal's location on the far side of the	**Moderate-slight / Negative / Short Term**	**Moderate-slight / Negative / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
	sizeable industrial warehousing units and chimneys associated with Belview Port are visible detractors within the landscape. This is an ordinary rural view with some attractive landscape features but visible industrial detractors.		hedgerow. As a result, the pre-mitigation visual impact was deemed **Low.** Following mitigation, the upper sections of the warehousing units remain visible, with the lower sections slightly more integrated with the surrounding landscape patterns. Due to the foreground vegetation, the mitigation planting is not clearly visible. Following mitigation, the magnitude of visual impact remains **Low** post-mitigation establishment.		
VP3	**Local road northeast of the site at Drumdowney Upper** - View looking southwest towards the site from a local road at Drumdowney Upper. This view is partially representative of those from residential receptors along this road. To the left and right of the image dense vegetation screens views along the roadside. In the centre of the frame brief, glimpsed views of gently undulating pastoral land appear between gaps in this vegetation. There are no long-distance views from this location due to the landform and intervening field boundary vegetation. Partial views of the canopy of trees on site can be seen against the skyline. This is an attractive, ordinary rural view across a pastoral landscape.	**Medium-low**	While the Proposed Development is entirely screened from micro-siting of the viewpoint and vegetation, the level of screening from existing intervening vegetation, it is anticipated that only glimpsed views of the proposed development will likely be available from these locations. The pre-mitigation magnitude of visual impact was deemed **Negligible.** Once fully established, the proposed mitigation screen planting will infill some of the gaps in vegetation towards the lower sections of the proposed development. Therefore, the post-mitigation magnitude of the visual impact will remain **Negligible**.	**Imperceptible / Neutral / Short Term**	**Imperceptible / Neutral / Long Term**
VP4	**Railway overpass at Rathpatrick –** This is a rural village view comprising mainly residential properties and gardens within Rathpatrick and partially representative of views from residential properties. Several detractors, including local road infrastructure and overhead cables, are visible within the view. Above the residential rooflines, the canopy of a number of trees and taller	**Medium-low**	The Proposed Development will be entirely screened by existing vegetation and the residential buildings across the foreground of this view. Consequently, the magnitude of visual impact was determined to be **Negligible.**	**Imperceptible / Neutral / Short Term**	**Imperceptible / Neutral / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
	shrubs are visible. Above the canopy, a chimney associated with Belview Port can be seen breaking the skyline. This is an ordinary view with limited scenic value.				
VP5	**Local road east of Drumdowney Upper –** This is an ordinary view typical of the rural setting, comprising a local single-track road bound on either side by tall unmanaged hedgerow boundaries that screen views of the agricultural landscape beyond. Above the hedgerows, overhead cables are visible detractors. This view could be considered partially representative of those from nearby residential properties. While located along the described 'Scenic Route 22' within the Kilkenny development plan, this location does not experience the described 'Views over the confluence of the Rivers Suir and Barrow at Snow Hill'	**Medium-low**	The Proposed Development will be entirely screened within this view. Brief glimpses of the development may be available from this location through small gaps in the roadside vegetation. However, even if viewed from here, the fleeting view of the development will have little notable influence on the visual amenity of this rural view or the scenic designations, the focus of which is orientated in the opposite direction to the (screened) proposed development. Additionally, the local road and viewer context is heavily influenced by the existing local road corridor and other existing developments such as overhead electricity cable corridors and steel pylon structures. Consequently, the magnitude of visual impact was **Negligible**, both before and after mitigation.	**Imperceptible / Neutral / Short Term**	**Imperceptible / Neutral / Long Term**
VP6	**Local road north of site at Gorteens** – This is an ordinary, rural view across gently undulating agricultural farmland. The view is partially representative of those from local residential receptors. The foreground of the view comprises pastoral farmland. The sloping landscape and the wooded field boundaries in the centre of the view screen long-distance views from this location. Chimneys and industrial buildings associated with Belview Port are visible above the canopy. Pylons and overhead lines are also detractors within the view.	**Medium-Low**	At this location, the retained vegetation is most effective with regard to visual screening. Even before any additional mitigation vegetation becomes established, all but the roof profile of the proposed buildings will be thoroughly screened, separated from the viewer context, including the adjacent road and residences. As such, the pre-mitigation impact was deemed **Low-negligible.** With the addition of the mitigation colour scheme, the lower sections of the proposed development are further integrated into the surrounding vegetation. However, due to the proximity, the addition of built form retains a similar magnitude of impact. As such, the post mitigation impact remains **Low-negligible**.	**Slight-imperceptible / Negative-Neutral / Short Term**	**Slight-imperceptible / Negative-Neutral / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
VP7	**Local Road east of site at Drumdowney Upper** – This view is representative of Ferrybank/Kilkenny Scenic Designation 22, described as 'Views over the confluence of the Rivers Suir and Barrow at Snow Hill'. The view doesn't have clear visual access to the waterways, and most of the road corridor is highly screened by vegetation. The viewpoint is oriented to the west, to the existing built-up areas of Belview Port, particularly new storage areas and Smartply stack. The landform drops away in the foreground, rising up again to place the developed areas above the viewpoint height, defining the horizon.	**Medium**	As described in the existing viewpoint description, the Proposed Development is viewed in the built context of existing storage warehouses and new development associated with the port. Set behind these structures, the proposed development has limited impact on the viewer setting. As such, the magnitude of impact was deemed to be **Low**. Following mitigation, the lighter sections of the building add separation to the warehouses in the foreground. The colouration also serves to recess the Proposed Development into the background, whilst tying in with the prevailing form and tone of the warehouse development and surrounding vegetation. As such, following mitigation, the magnitude of impact was deemed **Low-negligible**.	**Slight / Negative / Short Term**	**Slight-imperceptible / Negative-Neutral / Long Term**
VP8	**Dunbrody Abbey** – A view from recreational receptors and visitors to Dunbrody Abbey. This is a pleasant rural view comprising mainly agricultural farmland and river corridor. The foreground of the view is of a working landscape, flat low-lying arable farmland and river flood plain. Beyond this the tributary, lined on its western side by riparian woodland scrub, weaves its way westward to meet the River Barrow, To the right if the view railway bridge infrastructure is visible between a gap in the vegetation that lines the track. To the left of the view the river bend is met with pastoral farmland where the landscape inclines southward. In the background, long distance views across the flat landscape are available with the elevated plateaus of Cullen's Hill, Waterford to the left and Drumdowney Upper, Kilkenny	**High**	Due to the distance, scale of development and intervening vegetation, land form and built up elements the Proposed Development will not be visible from this location. Therefore, both pre and post-mitigation the magnitude of visual impact will be **Negligible.** This view was utilised as an 'illustrative view', to illustrate the absence of impact at a sensitive receptor.	**Imperceptible / Neutral /Short Term**	**Imperceptible / Neutral / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
	to the right. Chimneys and associated infrastructure associated with Great Island Power Station are a visible detractor, against the skyline, in an otherwise pleasant view.				
VP9	**R711 west of Rathculliheen** – This view is an ordinary rural view across a gently undulating rural farmland landscape. The foreground of the view comprises roadside scrub and unmanaged grasses, left of this the view is dominated by R711 road infrastructure and signage. The road is bound to the north by a mature belt of linear woodland, which continues as the road moves eastward. In the centre of the view the landscape slopes slightly southward across arable farmland bound with hedgerows and intermittent hedgerow trees. Long distance views east and southward are afforded from this location due to the gently undulating landform with pockets of residential properties scattered across an otherwise rural landscape. Long distance, elevated views of Cullen's Hill, Waterford are available. Chimneys associated with Belview Port are a visible detractor against the skyline.	**Medium**	Due to the distance, intervening vegetation, landform and built-up elements, the Proposed Development will be highly screened from this location. The Proposed Development's upper (roofline) sections can be seen below the existing Smartply stack, which sits considerably higher over the horizon than the proposal. Therefore, the pre mitigation magnitude of visual impact will be **Low-Negligible.** Following mitigation, the Proposed Development remains partially visible, and while the colouration lightens the tone of the building to be similar to the surrounding built features, the impact remains **Low-Negligible**.	**Slight-imperceptible / Negative-Neutral / Short Term**	**Slight-imperceptible / Negative-Neutral / Long Term**
VP10	**Local road southwest of site at Kilmurry –** This is an ordinary, rural view across flat agricultural farmland. The view is partially representative of those from local residential receptors. The foreground of the view comprises rough pasture farmland. To the left, all views are screened by dense vegetation along residential gardens. In the centre, the pastoral farmland landscape continues. Due to the landform, various intermittent blocks of woodland combine to screen most of the long-distance views.	**Medium-low**	The Proposed Development will be viewed in profile, with most of the lower sections of the built form screened by existing vegetation. The vista features several larger-scale features (Glanbia and Smartply sites), which provide context and consistency in the scale of development. However, the Proposed Development will be clearly visible along the horizon and extends the proportion of the view occupied by such land uses. Therefore, pre-mitigation, the magnitude of visual impact will be **Medium-Low**.	**Moderate - Slight / Negative / Short Term**	**Slight / Negative / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
	There are, however, long-distance views of the top of Cullen's Hill. Infrastructure and buildings associated with Glanbia Ingredients Ireland to the right of the view, chimneys associated with Belview port in the centre and pylons with overhead cables crossing the landscape from north to south are a visible detractor.		Following the establishment of mitigation planting and application of the colour scheme, the mass and prominence of the Proposed Development is reduced slightly to a residual visual impact of **Low.**		
VP11	**Y-junction south of site at Gorteens** – This is an ordinary view typical of the rural setting, comprising a local single-track road bound on either side by tall unmanaged hedgerow boundaries. In the foreground of the view, the road runs northward, bound to the east by dense hedgerows. Beyond this, a glimpse of pastoral landscape is available through gaps in the hedgerow at a field gate. Due to the landform and tall belts of linear woodland, there are no long-distance views from this location. Pylons and overhead lines are a visible detractor.	**Medium-low**	Due to the retained vegetation along the site boundary, the site has minimal visibility despite the proximity. The upper sections of the tallest built form can be seen over the top of vegetation; however, it has little visual presence. For those familiar with the location, such as the local residents and road users, the filling in of filtered views through vegetation and knowledge of a large commercial/ industrial development will be the primary impacts. Therefore, the impact is deemed **Low.** Following mitigation, there will be a gradient in the colour of the building slightly visible; however, due to the limited visibility, this only results in lowering the impact to **Low-Negligible.**	**Slight / Negative/ Short Term**	**Slight - Imperceptible / Negative-Neutral / Long Term**
VP12	**Local river walk southeast of site at Cheekpoint –** This is an attractive rural riverside view. Receptors are primarily recreational users of the river walk and those that would reasonably be expected to visit the location for the views associated. The foreground of the view comprises grassland scrub within the river floodplain with a series of channels and scrapes that lead towards the River Suir, lined on its north by dense riparian woodland. To the right, beyond the	**High-medium**	Due to the landform and intervening vegetation, the proposed development is only partially visible, located behind the SmartPly site over the crest of the ridge. It will add to the intensity and clutter of industrial built development in this section of the view. However, due to distance and intervening development, the Proposed Development is deemed to have a pre-mitigation magnitude of visual impact of **Low-Negligible.**	**Slight - Imperceptible / Negative - Neutral / Short Term**	**Slight - Imperceptible / Negative - Neutral / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
	river the undulating pastoral landscape and elevated plateau at Drumdowney Upper are available from this location. To the left of the view the harbour at Belview Port is visible, with chimneys associated with the Port and adjacent infrastructure visible against the skyline. This is a pleasant riverside view with a number of visible detractors.		Following mitigation, the colour scheme of the upper sections of the tallest built form contrasts slightly with that in the intervening factory and sets the proposal into the background slightly. However, the magnitude remains unchanged.		
VP13	**Cheekpoint Pier** – The view is dominated by the working harbour at Cheekpoint Pier, with both occupational and recreational/residential boats. To the left, a cluster of residential properties can be seen at Cheekpoint Pier village. Beyond the pier, long-distance views of the rolling agricultural landscape at Drumdowney Upper and chimney stacks associated with Belview Port are available across the River Suir.	**Medium**	Due to the distance, scale of development and intervening vegetation, landform and built-up elements, the Proposed Development is only incrementally visible from this location, set amongst the wider development surrounding the port. Therefore, both pre and post-mitigation the magnitude of visual impact will be **Negligible.**	**Imperceptible / Neutral / Short Term**	**Imperceptible / Neutral / Long Term**
VP14	**Deer Park Forrest Recreational Area at Faithlegg –** This is an expansive, elevated view across the landscape. In the foreground of the view, the Forest canopy is visible, sloping northwards down to the River Suir. Beyond the river, the immediate view is dominated by infrastructure and industry associated with Belview Port. Long-distance views across the flat to the gently undulating landscape of Kilkenny are available. A number of other detractors are visible across the landscape, including factories and associated infrastructure at Glanbia Ingredients Ireland.	**High-medium**	Due to the elevated viewpoint, the development is visible from this location. However, considering the distance and scale of development, the Proposed Development does not appear incongruous with the heavily industrialised Belview Port. There is a degree of intensification as a result of the development. However, this is settled within an appropriate context, contained by existing built form. Additionally, the Proposed Development context is well separated from the viewer's immediate context and does not detract from the natural amenity experienced by those walking over Deer Park, as views of different land uses are an expected and familiar aspect of the distant view. Therefore, the magnitude of visual impact is deemed **Low- Negligible.**	**Slight-Imperceptible / Negative-Neutral / Short Term**	**Slight-Imperceptible / Negative -Neutral / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
			Following mitigation, the contrast between the lighter, uppermost sections of the Proposed Development and the surrounding vegetation will be evident. However, this will not notably increase the visual impact, and therefore the magnitude of impact remains **Low-negligible**.		
VP15	**May Park Trail at Ballynakill** – This is an attractive rural riverside view. Receptors are primarily recreational users of the river walk and would reasonably be expected to visit the location for the associated views. This view also partially represents those from residential properties at Kings' Channel, Waterford. The foreground of the view comprises grassland scrub within the river floodplain that extends north towards the River Suir; beyond the river, the flat pastoral landscape extends northward to the left of the view dense woodland screens views. In the centre of the view, properties at Gyles Quay are visible from this location. A chimney at Belview Port and the roofline of Glanbia Ingredients Ireland factory are visible detractors against the flat skyline.	**High-medium**	Due to the distance, scale of development, intervening vegetation, landform and built-up elements, the Proposed Development will not be visible from this location. Therefore, both pre and post-mitigation the magnitude of visual impact will be **Negligible**.	**Imperceptible / Neutral / Short Term**	**Imperceptible / Neutral / Long Term**
VP16	**Faithlegg Golf Course at Faithlegg –** Receptors are primarily recreational users of the golf course and those that would reasonably be expected to visit the location for the views associated. The view is dominated by the well-managed grassed golf course with scattered mature trees and shrubs. In the centre of the view, some residential properties are visible. Above the residential roofline warehousing, the infrastructure and chimneys associated with Belview Port are visible detractors.	**Medium**	From this location, the Proposed Development will be visible along the ridgeline, set within existing vegetation, slightly separate from the more prominent industrial features at Belview Port. The Proposed Development will extend the anthropocentric peri-urban working landscape associated with Belview Port. The smooth and homogenous form of the buildings contrasts with the surrounding organic and verdant tones and textures of the established trees. However, there is perceptual separation from the viewer and screening of much of the Proposed Development through its location on	**Slight / Negative / Short Term**	**Slight / Negative / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
			the far side of the River Suir. As a result, the pre-mitigation visual impact is deemed marginally **Low.** Following mitigation, the upper sections of the warehousing units remain visible, with the lower sections slightly more integrated with the surrounding landscape patterns. Due to the foreground vegetation, the mitigation planting is not clearly visible. Following mitigation, there is a marginal reduction in the visual effect, but the magnitude judgement remains the same.		
VP17	**R683 southwest of site at Knockboy** – This is an ordinary, slightly elevated rural view partially representative of views from nearby residential receptors. In the foreground, a well-managed hedgerow bounds the R683 with views of pastoral fields and residential property through a field gate and gap in the hedgerow. To the right, views are entirely screened by mature trees. Long-distance views extend northwards from this location with a number of residential rooflines, built-up elements and woodland blocks scattered across the landscape. Pylons and overhead cables are a visible detractor against the skyline.	**Medium**	Due to intervening vegetation the Proposed Development will only be visible as one small section of roofline, at considerable distance. Therefore, both pre and post-mitigation the magnitude of visual impact will be **Negligible.**	**Imperceptible / Neutral / Short Term**	**Imperceptible / Neutral / Long Term**
VP18	**N25 northwest of site at Rhu Glenn Hotel** – The view looks south towards the site from the Rhu Glen Hotel along the N25. The centre of the view extends across pasture, unmanaged hedgerows and fence-lined field boundaries, with intermittent residential properties at Luffany. On the view's left, long distant views across gently undulating pastoral and arable fields are afforded. In the distance, views of the industry at Belview Port are available, with	**Medium-Low**	The Proposed Development will be partially visible, with filtered views through intervening vegetation. The Proposed Development will sit low along the skyline, within the context of the existing large-scale industry and pylons. Consequently, the magnitude of visual impact will be **Low-negligible** before mitigation. Following mitigation, the upper sections will be lightened, which reduces contrast with the	**Slight - Imperceptible / Negative - Neutral / Short Term**	**Slight - Imperceptible / Negative - Neutral / Long Term**

VP No.	Existing View	VP Sensitivity	Visual Impact Magnitude (Pre & Post Mitigation)	Pre Mitigation Significance / Quality / Duration of Impact	Post Mitigation Significance / Quality / Duration of Impact
	a chimney visibly breaking the skyline. To the right is the N25 corridor, and long distant views are screened by a residence, mid-ground landform, and vegetation.		surrounding skyline. However, the magnitude of impact remains marginally **Low-negligible**.		
VP19	**Kilkenny Scenic Designation 22 (1)–** This viewpoint is adjacent to VP5, with the same rural context, comprising a local single-track road bound on either side by tall hedgerow boundaries that screen views of the agricultural landscape beyond. This view could be considered partially representative of those from nearby residential properties, with filtered views across the existing warehousing development. While located along the described 'Scenic Route 22' within the Kilkenny development plan, this location does not experience the described '*Views over the confluence of the Rivers Suir and Barrow at Snow Hill.'*	**Medium-low**	The Proposed Development is almost entirely screened within this view. While glimpses of the development may be available, the fleeting view of the development will have little notable influence on the visual amenity of this rural view or the scenic designation. Additionally, any views will be in the context of the existing development, which demarcates the transition from rural to the more developed areas surrounding the port – into which the proposed development will be a background element from this location. Consequently, the magnitude of visual impact is **Negligible**, both before and after mitigation	**Imperceptible / Neutral / Short Term**	**Imperceptible / Neutral / Long Term**
VP20	**Kilkenny Scenic Designation 22 (2)** – This view is representative of Kilkenny Scenic Designation 22, described as '*Views over the confluence of the Rivers Suir and Barrow at Snow Hill'*. Located on Snowhill, the viewpoint is elevated over the surrounding landscape, providing clear context to the viewer and nearby land use patterns. The view doesn't have clear visual access to the waterways, and most of the road corridor is highly screened by vegetation. Oriented to the west, the existing built-up areas of Belview Port, particularly new storage areas and the tall Smartply stack, are visible, separated from the viewer by the dip in landform.	**Medium**	The Proposed Development is viewed in the built context of existing storage warehouses and new development associated with the port. The Proposed Development is set behind these built features and has limited impact on the viewer setting. As such, the magnitude of impact will be **Low**. Following mitigation, the lighter sections of the building will add separation from the warehouses in the foreground. The colouration will also serve to recess the Proposed Development into the background. However, the magnitude of effect is not considered to reduce below **Low**.	**Slight / Negative / Short Term**	**Slight / Negative / Long Term**

12.5 Proposed Mitigation Measures and / or Factors

This section should be read in conjunction with the Landscape Mitigation Plan produced and issued by Macro Works in as part of this application (Appendix 6-4).

The main mitigation by avoidance measure employed in this instance is the siting of the Proposed Development in well contained industrial zoned lands within a peri urban area where such development is already a characteristic feature.

Furthermore, the colour scheme mitigation subtly reduces the visual presence of the proposal, recessing it with low contrast against the sky.

In addition, mitigation by design measure will be the formation of perimeter berms along the western and southern boundaries of the Site using excavated subsoil and topsoil from the construction stage. These will rise up to ca.3m and will be densely planted with native woodland tree species with wild grass seeding.

12.5.1 Visual Impact Summary

For the vast majority of the VPs, the Proposed Development will not be clearly visible due to intervening screening by terrain or vegetation. Visibility is generally limited to the highest section of the proposal, which is typically further reduced by the mitigation colour scheme.

The highest pre-mitigation impact of marginally Moderate-slight is experienced at VP10 to the southwest of the Site and VP16 from within Faithlegg Golf Course due to the clear elevated view of the Proposed Development, which interrupts the rolling vegetated horizon. However, distance and contextual separation prevent higher impacts, and following mitigation, the final significance is reduced to Slight. The highest (pre-mitigation) magnitude of impact experienced at these viewpoints was assessed to be Low, resulting in a pre-mitigation significance of Slight at VP7 and VP20. However, as identified in the viewpoint assessment, the Proposed Development is consistently viewed away from the primary source of amenity along the scenic designation and contextually separated.

In terms of visual effects, receptors at one representative viewpoint (VP10) will experience moderate-slight / negative visual impacts before the establishment of the mitigation colour scheme and screen planting, and thereafter, the residual visual impact is reduced to Slight.

Therefore, it is not considered that the Proposed Development will generate any significant visual impacts in EIA terms.

12.6 Cumulative Impacts

In terms of cumulative impacts, the cumulative impact at VP2 was deemed to be Medium-Low, with a final significance of Moderate-slight. The other viewpoints experience partial or highly screened views, where the two developments are separate, each with a relatively low visual presence. As such, these were deemed to have Slight cumulative impact significance.

Viewpoints where the warehousing development will be screened and presented as outlined only are VP1, 6, 9, 10, 12, 14, and 17. It is considered there will be Negligible/Imperceptible cumulative impact at these locations and the receptors they represent. It should be noted that mitigation planting was also included within the warehousing planning application, which will also provide screening in particular from within the surrounding local road network. Where practicable, mitigative planting has been incorporated to integrate the Proposed Development into the surrounding landscape and to screen views.

For the reasons outlined above, it is considered that the Proposed Development will not contribute to significant landscape or visual impacts.

12.7 Interactions with other Environmental Attributes

The other environmental factors with which landscape and visual impacts interacts with include:

- Chapter 5 – Population and Human Health:

  The Proposed Development will be keeping with typical industrial developments and will be in keeping with the surrounding industrial land uses.

- Chapter 6 – Biodiversity:

  In the assessment of impact on landscape and visual aspects, cognisance has been given to the alterations to existing land cover at the Site.

- Chapter 7 – Soils and Geology:

  A change in land use can also impact on landscape and visual impacts. These impacts have been assessed in this chapter.

- Chapter 13 – Cultural Heritage:

  There will be no significant negative impacts on potential archaeological features. These potential impacts are taken into account in this chapter and assessed in Chapter 13.

12.8 Indirect Effects

No indirect landscape and visual impacts from the Proposed Development will be likely.

12.9 Residual Effects

In this instance the mitigation measures will be integral to the design of the Proposed Development even in the context of the perimeter berm and screen planting that will establish to full effectiveness over 8-10 years.

12.10 Monitoring

It is recognised that the maintenance of all new planting will be very important to ensure that it will become fully established to achieve the required screening objectives. Therefore, a detailed site-specific landscape specification has been prepared in respect of the Proposed Development. All of the commitments outlined in this plan will be strictly adhered to.

12.11 Reinstatement

Nor applicable.

12.12 Difficulties Encountered in Compiling this Information

No difficulties were encountered.

13 CULTURAL HERITAGE

13.1 Introduction

This Chapter that has prepared by Dr. Maurice Hurley and with assistance of Mr. Vincent Price provides a description and evaluation of the likely significant effects of the Proposed Development on archaeological, architectural and cultural heritage resource of the Site.

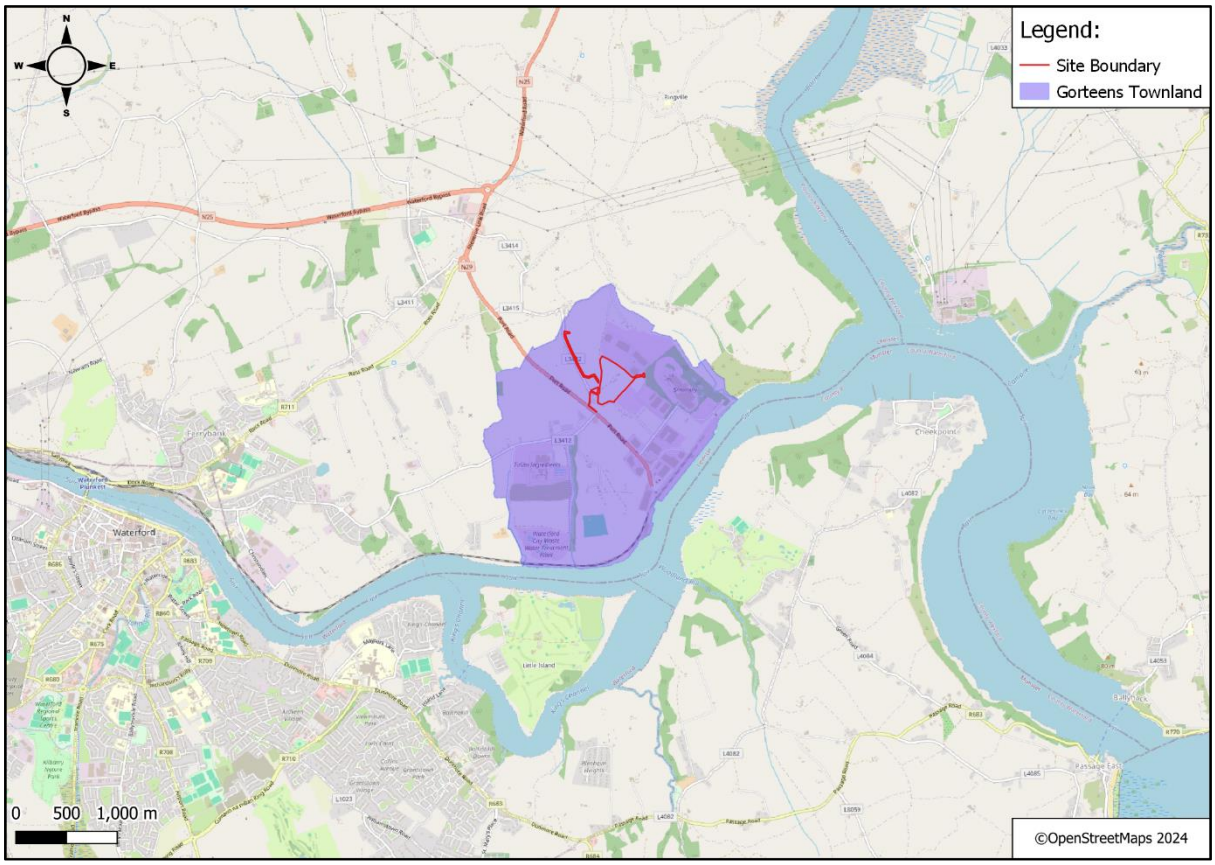
The aim of this assessment was to evaluate the baseline cultural heritage environment of the Site and the likely adverse effects, if any, that the Proposed Development may have on the archaeological and historical environment and to provide mitigation measures as required.

It is proposed to develop a plasterboard plant and associated works at Gorteens, Co. Kilkenny. The study evaluates the cultural heritage resource of the Site and its environs and also assess the potential for direct and indirect impacts likely to arise from the Proposed Development. Suggested mitigations are proposed.

The archaeology and cultural heritage assessment is prepared to accompany a planning application for the development of a new plasterboard plant at Gorteens townland, north-west of the Belview Port (Waterford Port facility), Co. Kilkenny (Figure 13-1).

Plates referred to in this chapter are presented in Appendix 13-1.

Figure 13-1: Site Location and Gorteens Townland (blue)



13.2 Methodology

The assessment was based on site inspection, cartographic and documentary research.

In regard to studies of this type, The Department of the Housing, Local Government & Heritage generally requires the following to be undertaken as part of an Archaeological Cultural Heritage Assessment:

- Documentary and map research regarding the location of the proposed development with particular reference to the archaeological landscape;
- The Record of Monuments and Places (RMP) for Counties Kilkenny and Waterford were consulted for the relevant area;
- Consultation with the topographical files held by the Irish Antiquities Divisions, National Museum of Ireland;
- Review of all editions of the Ordnance Survey maps;
- Examination of vertical and oblique aerial photographs of the site (if available);
- A site inspection with the aim of assessing the current landscape and likely impact of the development on archaeological monuments, features and possible deposits;
- A record of any upstanding monuments that will be affected by the development;
- Recommendations with regard to the visual impact of the development in relation to the archaeological landscape; and
- Recommended mitigation measures to protect archaeological deposits/features.

All editions of the Ordnance Survey maps were consulted, the Excavation Bulletin website; a database that contains summary accounts of excavations carried out in Ireland from 1970 onwards. The Kilkenny Development Plans 2014-2020 and The Ferrybank-Belview Local Area Plan 2017 were also consulted.

Other recent developments in the area required archaeological assessment, survey and investigation; amongst the projects where archaeological work took place were the Port at Belview 1989 to 2004, Glasshouse (2001), various industrial plants in the vicinity of Belview (1990-2005), access roads to the port (1993 & 2003), waste water treatment plant (2010); continental cheese facility at Belview (2019) and the adjoining Glanbia site to the north (2013). The procedures undertaken for those sites are accordingly deemed the most appropriate template for the Site under review.

13.3 Legislative Framework

Ireland has committed to the protection of its archaeological and architectural heritage as a signatory to two international conventions that seek to protect cultural heritage;

- The 1985 European Convention on the Protection of Architectural Heritage (The Granada Convention) provides for the protection of monuments, groups of buildings and sites that are of 'historical, archaeological, artistic, scientific, social or technical interest' [137].
- The 1992 European Convention on the Protection of the Archaeological Heritage (The Valletta Convention) aims to 'protect the archaeological heritage as a source of the European collective memory and an instrument for historical and scientific study' [138]

Both these conventions have been incorporated into Irish law.

The policy of the Department of Housing, Heritage and Local Government (DoHHLG) in relation to the protection of archaeological and architectural heritage as set out in the

Frameworks and Principals for the Protection of the Archaeological Heritage [139]. The National Monuments Act 1930 and amendments of 1954, 1987, 1994 and 2004 provide for the protection of the archaeological heritage which includes monuments, buildings, shipwrecks and archaeological artefacts. Under the Acts, protection is afforded to all monuments listed in the RMP which was established under Section 12 of the National Monuments (Amendment) Act 1994.

13.3.1 Kilkenny City and County Development Plan 2021-2027

The KCCDP 2017-2023 [140] outlines the County policies relating to archaeological and architectural heritage. The Council is committed to the preservation and protection of its rich cultural heritage resource and has regard to the recommendations of the DoHHLG when considering proposals that may have potential impact on heritage. The Planning Authority recommends that potential developers consult as early as possible with the relevant agencies, such as the National Monuments Service and the Planning Section of KCCDP, in order to ensure that archaeological and architectural concerns can be integrated into development proposals at an early stage. This consultation was carried out as outlined in Section 1.11 above, and the responses received are included in Appendix 1-1 of this document.

The principal policies in relation to archaeological heritage in the KCCDP are as follows;

> *'9C To protect archaeological sites and monuments (including their setting), underwater archaeology, and archaeological objects, including those that are listed in the Record of Monuments and Places, and in the Urban Archaeological Survey of County Kilkenny or newly discovered sub-surface and underwater archaeological remains.*
>
> *9D To carry out further research on the eighteen archaeological landscapes as identified in the Preliminary Audit of Archaeological Landscapes in County Kilkenny.*
>
> *9E To develop an enhanced policy framework for the three priority sites identified in Section 9.3.1.1 above, plus for any additional sites identified through Objective 9D above.'*

13.4 Receiving Environment

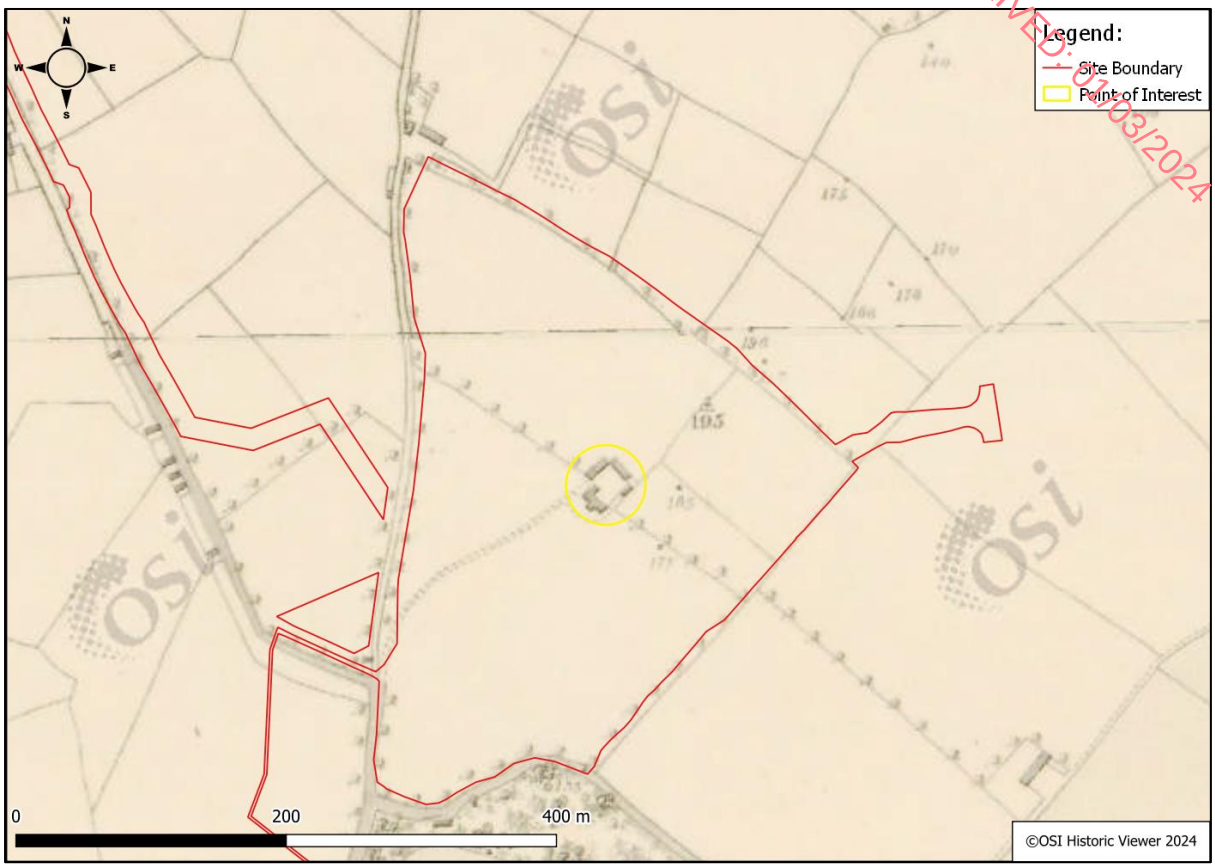
13.4.1 The Site

The Proposed Development will be located on a largely agricultural site, ca. 11.57 hectares in size, adjacent to the existing SeedTech processing plant at Gorteens, Co. Kilkenny, refer to Figure 13-2. The agricultural lands where the Proposed Development will be located adjoin the south-western boundary of the existing plant with the Smartply distribution plant and Bv4 warehouses bordering the Site to the east. The lands where the development is proposed is currently in agricultural use and contain ruined 19th century farm buildings. The buildings once consisted of a dwelling and outbuildings of the now demolished Suir View house. The River Suir is located ca. 900m to the south-east.

Figure 13-2: The Site

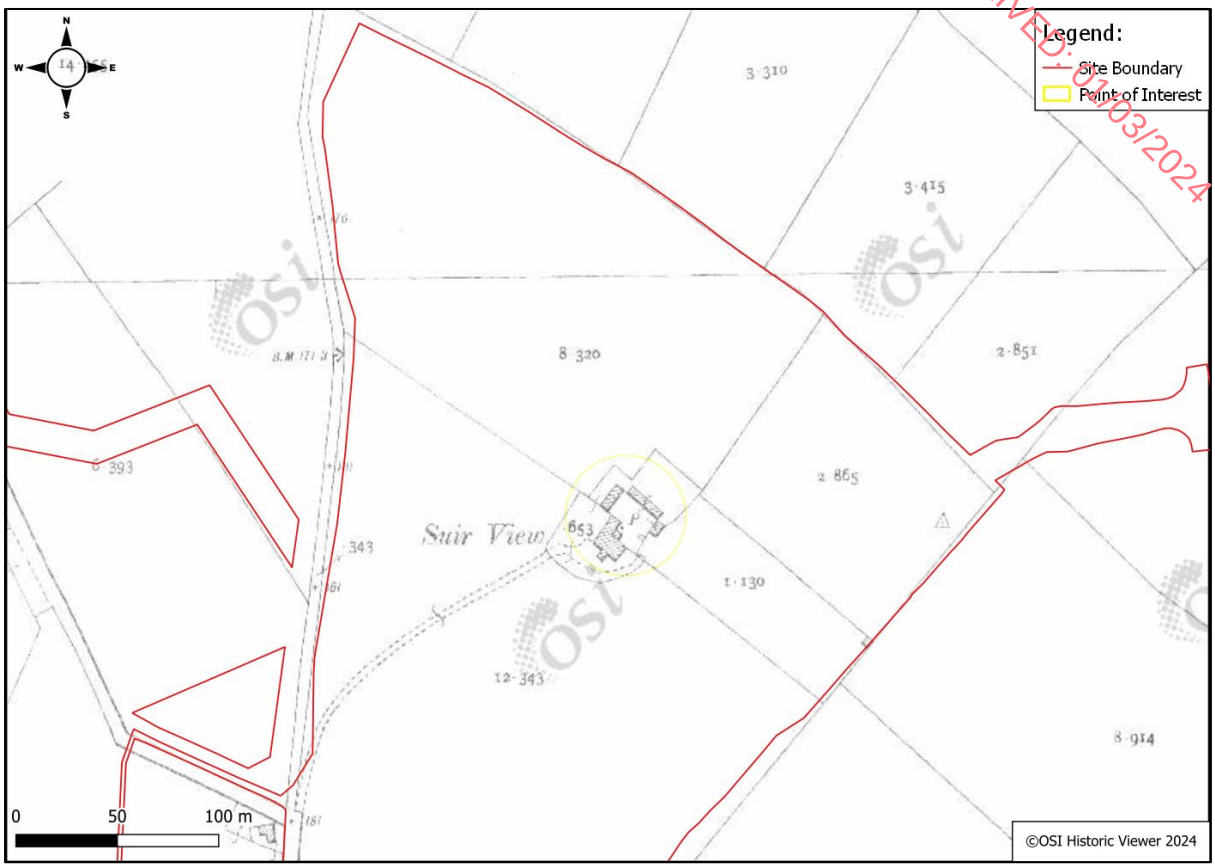
The Site under review consists primarily of agricultural land on a gently south facing slope of the valley of the River Suir/Waterford Harbour. The land is currently laid out in four fields, two rectangular fields to the north, a small rectangular field on the eastern side of the derelict farm buildings and a large triangular field to the south (Figure 13-2 below and Plate 5 of Appendix 13-1). The northern fields are square to rectangular in shape (Plates 1-3, Appendix 13-1). A derelict farm occupies the centre of the site, with only the northern range surviving as two ivy covered ruins (Plates 6 and 7 of Appendix 13-1).). A modern farm building and yard (Plate 4 of Appendix 13-1).) are located immediately north of the derelict farm. The farm house and yard are depicted on the 1st edition (ca. 1829-42) O.S. Map (Figure 13-3) where they are shown as an 'L'-shaped house with a porch, a rectangular yard flanked on three sides by rectangular buildings.

Figure 13-3: Indicative Site and First OS Map



A similar arrangement of buildings is depicted on the second edition (ca. 1880-1913) O.S. map (Figure 13-4) where the house is named 'Suir View'. The layout of the fields in both 19th century maps is similar to that of today but a driveway leads from the southwest. In addition to the derelict farm buildings, a square, two-storey structure is located at the north-eastern corner of the small rectangular field to the east of the farm. It is depicted on the second edition O.S. 25-inch scale map (Figure 13-4) but is not shown on the 1st O.S. map (Figure 13-3) suggesting the building is of later 19th century date.

Figure 13-4: Indicative Site and Second OS Map



The building is now covered in ivy. The building is of stone and brick construction with a rough outer render (Plates 8 and 9 of Appendix 13-1).). A northwest-facing door is present at ground level, above which is the first-floor window (blocked-up) with a brick surround and a concrete sill. The purpose of this building is unknown but it is likely to be related to the former 'Suir View' house as it is located (Figure 13-4, yellow circle) on the lands in the corner of the small rectangular field.

The four fields are currently in pasture, divided by stone and clay banked field fences with mature trees (Plates 1, 2 3 and 5 of Appendix 13-1). One of the NE/SW banks to the north has been levelled but traces of it remain. Comparison of the current situation with the first edition O.S. map of 1829-41 (Figure 13-3) shows that the field-pattern has remained largely unchanged for the last 200 years.

13.4.2 General History of the Area

The visible surviving archaeological monuments in the vicinity date to the prehistoric period as well as Viking and medieval times. The Waterford Harbour was subject to an extensive survey in the late 1980's (Zvelebil, Moore, Green & Henson 1987). In the course of this project, field survey was used to assess the occurrence and densities of prehistoric flint in several areas around Waterford Harbour.

A range of Neolithic stone monuments occurs in East Waterford and South Kilkenny. These include passage tombs, portal tombs and wedge tombs. All of the County Waterford group of wedge tombs occurs in land below 400ft in height. There are no Neolithic tombs in the area under review and the megalithic tombs are some 5km distant.

A number of Bronze Age tumuli also occur in the lowlands of east Waterford and in Co. Kilkenny, but no examples stand close to the banks of the River Suir. There are also examples

of standing stones in Co. Waterford and South Kilkenny, but none in the area of the development.

Other Bronze Age monuments common in Co. Waterford and south Co. Kilkenny are *fulachta fiadh* or Bronze Age cooking places. Again, some occur in the vicinity of the proposed development site, at ca.2km radius at either side of the river, but the possibility of the unidentified existence of these monuments adjacent to streams or in other damp places can never be ruled out. More often than not surface trace of *fulachta fiadh* are absent from the landscape. The early medieval period saw the development of ringforts in the Irish landscape, and these are the most common field monument in Ireland. Frequently it is not possible to distinguish ringforts from medieval moated sites where surface features have been denuded or levelled.

The Rivers Barrow and Suir were of particular significance during the Viking period. Archaeological investigation on the route of the new N25 Waterford City By-pass discovered evidence in the townland of Woodstown, northwest of Waterford City for a site of predominately ninth to eleventh century date. The style and composition of the artefacts as well as the morphology and location of the site on the banks of the River Suir have led to the identification of the site as a Viking settlement (Russell & Hurley, 2014). The settlement is of unquestionable Viking Age (9th-11th AD) and it contained many artefacts of undisputable Viking character. Most of the artefacts were of metal or stone, organic materials did not survive in the well-drained acidic soils. The artefacts display a strong indication of a site used primarily for trade.

The Hiberno-Norse (a mixture of Viking and Native Irish peoples) City of Waterford has traditionally been recognized as covering fifteen acres in the north-east triangular area extending from Reginald's Tower along the south bank of the River Suir to the Site of Turgesius's Castle, from there southwards to St. Martin's Castle, and returning parallel to the marshy ground adjacent to St John's River. The location, on a triangular promontory flanked by rivers and a marsh, is naturally defensive. This area was defended by earthen ramparts in the 11th century. To the west of this a second, late twelfth century defensive wall exists, traditionally recognized as the western limit of the Hiberno-Norse city – the so-called Viking triangle. The city was not the product of one grand plan developed in a single episode; rather there is evidence from a variety of sources for a lengthy developmental process (Hurley 1997).

The area defined as the Hiberno-Norse triangle continued to form the nucleus of the Anglo-Norman City. Several historical maps of Waterford clearly depict a triangular area extending from Reginald's Tower to Broad Street as the principal urban area, filled with densely packed, large houses fronting three principal east-west streets. A north-south thoroughfare had developed parallel to the triangle, on the western side. This is the line of modern Barron strand Street, Broad Street and Michael Street. Elsewhere within the walled area, in later medieval times the houses were smaller, and in places sparse.

The location of Waterford City did not offer a fording point on the River Suir and the first bridge across the river at Waterford was not built until 1793. Up until then ferries had been used to connect the city with the opposite riverbank where a subsidiary village, known as Ferry bank, developed.

Settlement from the medieval period is sparse on this length of the River Suir. The most significant medieval monument in the vicinity of the site under review is Gorteens Castle (RMP KK047-001). Gorteens Townland was described in the Down Survey as having two castles and four dwellings although the only remains visible on the ground today are of a fragmentary gatehouse. The early medieval history of the site is unclear but in the 16th and first half of the 17th century the Fitzgerald's held the 'manor, town and lands of Gurtins' (Carrigan 1905, 203-4). John Fitzgerald fortified the lands of 'Gurteens' under the Cromwellian regime and it would appear that the land was divided up between various New English settlers. Little is known of the new owners of Gorteens in the late 17th century. Archaeological excavation near the

gatehouse in 1993 produced evidence of occupation of the site in the 17th and 18th century (King, 1999).

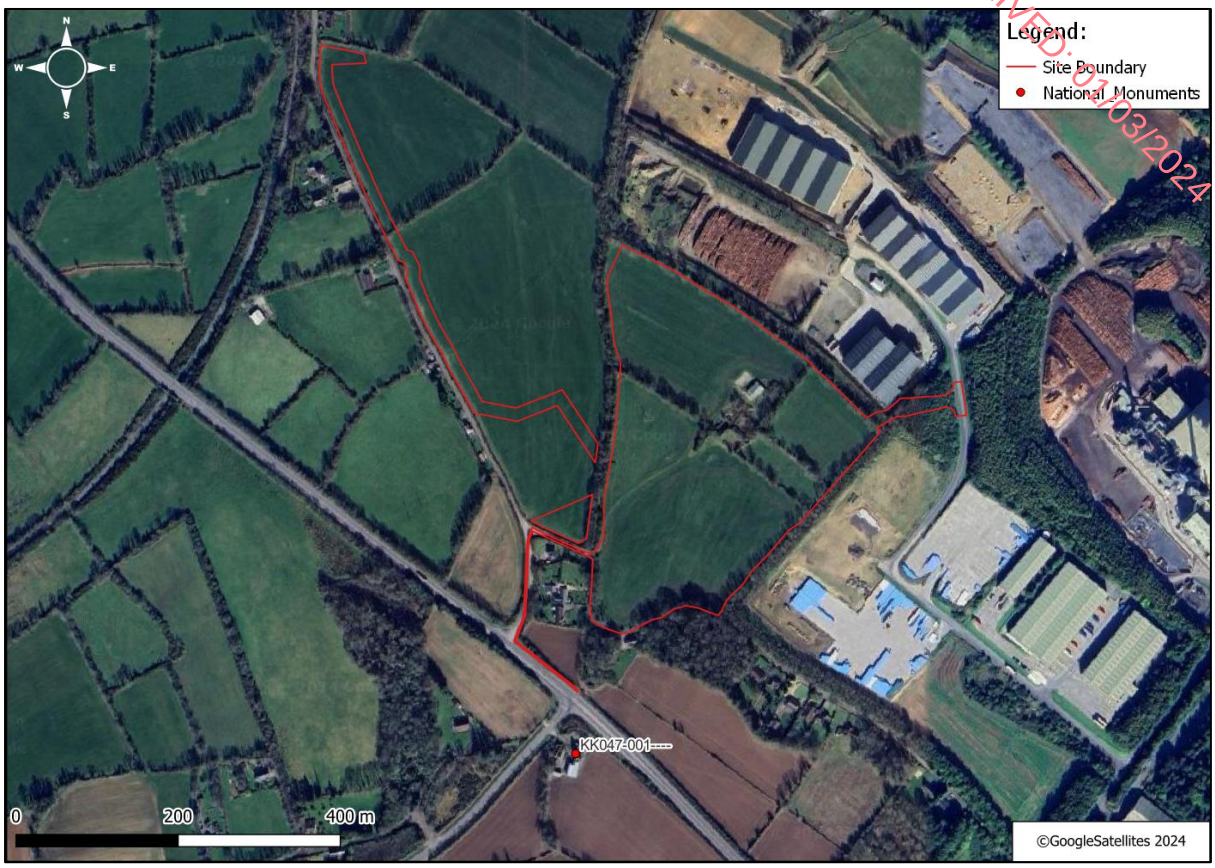
During the 18th century the harbour area, downstream from Waterford City became a popular location for country houses, owned by wealthy Waterford merchants. Property on the Kilkenny side of the River Suir was largely in the possession of land-owning families who had settled in the area in several waves of colonial settlement between the 13th and 17th century. Following the construction of the first bridge connecting Waterford to South Kilkenny in 1793 the northern bank of the River Suir became increasingly accessible. Many villa style residences were built by wealthy Waterford merchants in the area between Ferrybank and the mouth of the River Barrow. These villas were not the focal point of agricultural estates but rather residences set amongst extensive landscaped parkland with sufficient land holdings for their convenience and domestic needs. Newpark House was one such residence built in the late 18th century by the Newport family of Waterford. Rathculliheen House, Christendom House, Lakefield Houses Springfield House and Glasshouse appear to have belonged to an earlier generation of landowners, while the owners of Bellevue (Gorteens), Newpark, Rockland, Annmount and Snowhill derived their wealth from business.

Springfield House was occupied by the Waring family from about 1740 to 1860 (Walsh 2001). The house and lands were purchased in the 1920s by the Barton family and eventually fell into ruin and was eventually sold to the IDA. The house in now a ruin within the Wastewater Treatment Plant site. ‘Suir View’ house, while evidently a substation farmhouse, with well-constructed farm buildings was not one of the notable mansions of the area and there are no significant documented historical associations.

13.4.3 List of Archaeological Sites in the Vicinity

Five archaeological sites are listed in the Record of Monuments and Places (RMP) for the townland of Gorteens, Co. Kilkenny. Four of the monuments are known only from historical references, therefore the exact location of these sites is unknown. The precise location of only one site is recorded in the Record of Monuments and Places (Figure 13-5); namely RMP KK047-001. There are no recorded archaeological sites listed in the Record of Monument and Places for the areas directly affected by the Proposed Development or in the immediate vicinity. In addition to being a Recorded Monument Gorteen Castle is also listed as a Protected Structure (RPS C659) in the County Kilkenny Development Plan.

Figure 13-5: Recorded Monument in Vicinity of the Site



The following is the entry from the Record of Monuments and Places for Gorteens Castle.

RMP no: KK047-001-

Townland: Gorteens

Distance nearest part of the Site: 150m

Description: Castle

Recorded in the 1st & 2nd edition of O'Donovan 1839, letters p.291 'Thomas Fitzgerald castle still exists in Gorteens.' Eoin O'Kelly's (1969; re-issued 1985) Placenames of Co. Kilkenny records Gorteens Castle as 'in ruins, Fitzgerald castle'

The Castle:

The remains on the ground today are a fragmentary gatehouse of three/four floors with a possible section of bawn wall extending from the northeast angle.

Excavation was undertaken near the castle in 1993 by H.A.King (Licence No. 93E0013) [the excavation was undertaken prior to the construction of the new road to Belview Port] *and the following is a summary of her findings: The diagnostic material recovered from the site included North Devon wares, German stone wares, Ligurian faience, late Saintonge, Iberian earthenware, late 17th/early 18th century clay pipes and early 18th century glass bottles.*

The historical and archaeological evidence points to Gorteens being occupied from the second half of the 16th century into the first half of the 18th century. The site was subsequently levelled and some of the building stone deliberately buried in pits.

13.4.4 The Archaeological Potential of the Site and Surrounds

No other archaeological sites, or landscape anomalies that might be interpreted as archaeological sites were identified in the course of the study.

Archaeological sites are not always identified as monuments however, and the only remaining traces of some sites will be in the form of stone artefacts, particularly from the early prehistoric periods (Mesolithic and Neolithic). An extensive programme of field surveying, undertaken in the mid-1980s (Zvelebil *et al.*1987) revealed that scatters of stone tools, of Mesolithic, Neolithic and bronze Age date were found in the area of Waterford harbour. Although, the study area was concentrated to the south of the Proposed Development.

The Viking settlement at Woodstown, Co. Waterford or the Viking and Medieval city of Waterford is unlikely to have any major impact on the medieval landscape of the northern bank of the River Suir. Urban development and associated settlement was confined to the south bank of the river in the Viking and Medieval periods, but some settlement at Ferrybank pre-dating the post-medieval period is possible. The impact of this settlement is very unlikely to have extended as far as the area of Gorteens. The eighteenth century landscape on the north bank of the River Suir was dominated by grand houses and villas with parks and gardens. All but a few of the eighteenth-century houses have now been demolished and their landscaping swept away to make way for agricultural land e.g. Snowhill (demolished 1955), Glasshouse (disused 1990) now largely a ruin, Bellevue House (disused 1940, later dismantled), part of a dilapidated ruin still stands.

The use of streams for water-powered industry on the north bank of the River Suir and Barrow is well documented, particularly by the discovery of a horizontal-wheeled water-powered mill dating to the early Christian period (600-1100AD) at Kilmakea, Co. Wexford (ca. 5 miles downstream). This established beyond doubt the potential of such favoured sites to have been utilised for waterpower throughout many periods of history.

13.4.5 Previous Archaeological work in the Area

A summary of archaeological work undertaken in the vicinity of the Proposed Development is outlined below.

- Gorteens Townland Excavation Licence No. 94E049

Location: Adjoining the NE corner of the site under review

Prior to the development of the Louisiana Pacific Plant (now Smartply) extensive archaeological testing and subsequent monitoring of soil removal did not reveal any finds or features of archaeological significance (Hurley 1995)

- Gorteens Townland Excavation Licence No. 93E0012

Location: 100m to the south of the site under review (To the east of Gorteens Castle)

In 1993 during construction work on the new Belview Port road to link the Slieveroe bypass with the new Waterford Port on the River Suir (King 1994). Excavation revealed the foundations of two houses together with a contemporary field system. Parts of the bawn wall around the castle were also exposed. A number of trenches and drains, two small spreads of charcoal, a cobbled surface and a concentration of postholes were located, together with a large deposit of slag, burnt stones and burnt clay which appeared to suggest iron working on the site. The archaeological evidence indicated that the site was occupied from the second half of the 16th century into the first half of the 18th century.

- Gorteens Townland Excavation Licence No. 03E0255

Location: 100m to the south of the site under review (To the north and west of Gorteens Castle)

Testing was undertaken in the vicinity of Gorteens Castle in advance of a road realignment project (Walsh 2004). The excavation of 22 test trenches revealed the presence of numerous medieval features and deposits including the remains of stone walls which seemed to define the walls of out-buildings associated with the castle. The remains of a north-south oriented ditch and associated features were uncovered close to the castle.

- Gorteens Townland Excavation Licence No. 01E0269

Location: 700m to the south-east of site under review (In the environs of Belview Port)

Archaeological testing of the environs of Glass House was undertaken in April 2001 prior to the proposed restoration of the dwelling house. The test trenches were placed along the line of drainage trenches. Very little was found in the way of domestic debris despite the link to early glass making in this area of the River Suir. There was no evidence for wasters, furnaces, slag or any other indication of glass making in the tested areas and as a result it has been suggested that the glassmaking facility was located closer to the quay in the former hamlet of Gorteens (Hurley 2002).

- Gorteens Townland Excavation Licence No. 00E0105

Location: 700m to the south-west of the site under review

Testing prior to development in Gorteens townland produced numerous post medieval finds including glazed print ware, porcelain ware and a single sherd of Leinster cooking ware. Stone-filled drainage features and early cultivation furrows were also identified (Kelleher 2001). In another area a large hearth site was exposed that spanned the width of the test trench. The hearth was clay-lined and the excavator has suggested that it may be associated with the former Springfield House estate to the immediate south of the Proposed Development site.

- Gorteens Townland. (Excavation Licence 13E0068).

Location: 800M to the south-west of the site under review

Archaeological testing was carried out in advance of the development the Glanbia Dairy Processing and Manufacturing facility. The testing was undertaken in response to planning conditions attached to the proposed development (Planning Reg. Ref.: 12/324, Bord Pleanala Ref.: PL.10.241077). The testing was preceded by geophysical survey carried out in 2004 by John Nicholls (Nicholls, 2004; Licence Ref.: 04R004). Sixty-four test trenches were excavated over an area of ca. 21ha. **Nothing of archaeological significance was identified**.

Six of the test trenches undertaken in 2013 were within the site boundary of the proposal under review. *The south-east of the site (in the area of the proposed compound, Trenches 25-31) was relatively low-lying and wet and subsoil was consisted of a mixed stony grey clay/marl and orange-brown silty clay*. The excavator concluded that **'there was nothing of archaeological significance**' present in any of the trenches excavated.

- Gorteens Townland Excavation Licence No. 07E0874

Location: 1.1km south-west of site under review.

Archaeological testing was undertaken at the site of the proposed SUPRAM site in the IDA Business Park. A previous geophysical survey had identified a number of potential archaeological features but the subsequent test excavation indicated that these were natural and no features or finds of archaeological merit were uncovered (Kyle 2007).

- Gorteens Townland Excavation Licence No. 01E0959

Location: 1.3km south of the site under review.

Monitoring of groundworks during the construction of the Wastewater Treatment Plant revealed two features of archaeological significance; a fulacht fiadh and a drying kiln. The fulacht fiadh was uncovered during the laying of a temporary roadway leading to the new treatment plant. The burnt mound was not disturbed during groundworks and it was sealed and covered with earth. The kiln was exposed in the area for the tanks and after recording it was covered with a protective membrane and backfilled with topsoil as there were no plans to build on that area. The kiln lay to the southeast of Springfield House.

13.4.6 Buildings standing on the Site

Two ranges of 19th century vernacular buildings in the centre of the site under review are ruins heavily covered in ivy (Plates 6 & 7 of Appendix 13-1).). One range of buildings represents the remains of an outbuilding associated with the farmhouse named 'Suir View'. The buildings as shown on the historic maps (Figures 13-3 and 13-3) comprise a series of out-buildings flanking a central courtyard to the rear of the former farmhouse (now demolished). Today, only two yard-buildings survive; a single storey stone-built outbuilding (ca. 20m by 4m) with a slate roof and arched doorway (Plate 7 of Appendix 13-1).) and a former cottage with a central chimney and two sky lights (Plate 6). The slate roof has been removed, but the wooden rafters remain. The walls of the cottage are covered in ivy. A small building on the southern side of the yard depicted on the historic maps, no longer survives.

Approximately 100m to the southeast of the derelict farm buildings, a two-storey square shaped building stands in the northeast corner of the rectangular field. This building measures ca.4m by 4m. The building is thickly covered in ivy; it is stone-built with a ground floor doorway with a stone lintel on the western wall and a blocked-up first floor window directly above the door. The window has a brick surround and a concrete sill. A render is apparent on the exposed stone-work. The function of the building is unclear. It is not shown on the first edition OS six-inch (Fig. 5) map dated to 1829-1841, however it is depicted as an free-standing square building on the second edition OS 25-inch map (Figure 13-3) dating to the later 19th century.

These buildings are not listed in the National Inventory of Architectural Heritage although they comprise good examples of local vernacular architecture.

13.5 Characteristics and Potential Impacts of the Proposed Development

Proposals such as the development under review have the potential to result in both direct and indirect impacts on the archaeological heritage of the site and area. Direct impacts tend to be mainly physical impacts resulting from the construction process and indirect impacts tend to be mainly visual. Direct impacts on the archaeological heritage are permanent as archaeology is a non-renewable resource. Issues of visual impact do not arise as the proposed site is flanked by a pre-existing industrial development to the north, and east and no archaeological sites or monuments are known in the immediate vicinity.

13.5.1 Construction Phase

The Proposed Development will involve the excavation of large amounts of soil during site preparation. The excavation of ground for the foundations of the proposed new building and associated features will involve significant ground excavation. Although there are no known archaeological monuments within the Site, the possibility always exist that hitherto unknown buried archaeological features may be present on the Site and these may come to light in the course of construction. Mitigation to offset such potential on buried archaeological features is outlined below.

In addition to potential burial archaeology, the construction will directly impact ruined upstanding vernacular buildings of 19th century date located at the centre of the site. A small building of unknown function located ca.100m to the north-east of the derelict farm will also likely be impacted from the works.

13.5.2 Operational Phase

There will be no impacts on the archaeological resource of the Site during the operational phase.

13.6 Proposed Mitigation Measures and / or Factors

13.6.1 Construction Phase

The greatest potential impacts of the proposed development are likely to arise from the large-scale soil removal arising from the excavation of foundations, and other related services and access roads.

Risk of inadvertent impact on hitherto unknown buried archaeological material can be mitigated by pre-development geophysical survey followed by archaeological test-trenching. A geophysical survey of the Site would indicate potential subsurface archaeological features or deposits on the Site. Archaeological test-trenching may be necessary to clarify the nature of any anomalies identified in the geophysical survey. Alternatively, a testing strategy might involve a comprehensive coverage of the Site or a combination of this and specific emphasis on anomalies (possible archaeological features) identified in the geophysical survey. The archaeological testing should be carried out under licence to the National Monuments Service of the Department of Housing, Heritage & Local Government.

The surviving ruined outbuildings of ‘Suir View’ farm, comprising of two standing vernacular structures, should be cleared of vegetation and a survey of the surviving remains carried out. A small two storey structure situated 100m to the north-east of the farm also requires survey. The buildings are not Recorded Monuments or Protected Structures, they are nevertheless examples of local vernacular architecture and therefore the surveys would provide preservation by record.

13.6.2 Operational Phase

There are no proposed mitigation measures during the operational phase.

13.7 Cumulative and In-Combination Impacts

No potential cumulative impacts were identified in the course of this assessment.

13.8 Interactions with other Environmental Attributes

No interactions were identified during the assessment process.

13.9 Indirect Effects

Indirect Impacts tend to be mainly visual. As the known Recorded Monument to the south of the Site (KK047-001) is ca. 450m from the main facility and will be screened by existing vegetation and proposed berms there will be no indirect impact on the monument visually.

13.10 Residual Effects

There will be no residual effects from the Proposed Development if the appropriate mitigation outlined above is put in place prior to construction phase.

13.11 Monitoring

All physical archaeological, issues will be resolved at the pre-Construction Phase of the proposed Project and therefore no potential impacts are envisioned at the Operational Phase of the development. There will be no requirement for monitoring post-construction.

13.12 Reinstatement

Not applicable.

13.13 Difficulties Encountered in Compiling this Information

No difficulties were encountered during the assessment process.

14 MATERIAL ASSETS – TRANSPORT & TRAFFIC

14.1 Introduction

This chapter of the EIAR presents the findings of the transport assessment carried out by RoadPlan Ltd for the Proposed Development. The existing transport features and surrounding road network is described, the likely impacts on the road network are assessed and mitigation measures are proposed where required.

14.2 Methodology

This chapter describes the assessment methodology to assess the potential impact the proposed development may have on the surrounding road network. The assessment describes the existing situation at the Site in terms of access while also describing the existing situation and the predicted future situation on the external road network. The methodology adopted for this assessment is summarised as follows:

- Traffic counts were undertaken by Irish Traffic Surveys on Tuesday 23rd May 2023 during a 12-hour period (07:00 – 19:00). Count information was obtained at the existing L7582 Industrial Access Road / Development Access Road priority junction, the existing N29 / L7582 Industrial Access Road priority junction and the existing N29 / L3412 / L7482 crossroads junction;
- Existing Traffic Assessment – A spreadsheet model was created which contains the base year DO-NOTHING traffic count data described above. The traffic count data was used to develop a PICADY model of the existing L7582 Industrial Access Road / Development Access Road priority junction, the existing N29 / L7582 Industrial Access Road priority junction and the existing N29 / L3412 / L7482 crossroads junction;
- Future Year Assessment – The estimated future year traffic volumes on the study area road network, as a result of the increase in background traffic and development related traffic was used to assess the future operational performance of the junction at the year of opening of the proposed development, 5 years after opening and 15 years after opening.

14.3 Receiving Environment

The existing road network within the vicinity of the Site is illustrated in Figure 14-1 below and is described further below.

14.3.1 Existing Road Network

The access to the Proposed Development will be via the existing L7582 industrial access road which provides vehicular access from the proposed development to the existing N29 national road.

The existing L7582 industrial access road has the following characteristics:

- It is a single carriageway road that is approximately 7m wide;
- It has a footpath on the eastern side of the carriageway; and
- Lighting columns are provided on the eastern side of the carriageway.

The existing industrial access which provides access to the proposed development road has the following characteristics:

- It is a single carriageway road that is approximately 7m wide;
- It has a footpath on the northern side of the carriageway; and
- Lighting columns are provided on the southern side of the carriageway.

The existing N29 national road has the following characteristics:

- It is a single carriageway road that is approximately 7.5m wide with a 2m wide hard shoulder on either side;
- A 3.5m wide ghost island is provided at the N29 / Industrial Access Road priority junction; and,
- The N29 national road is approximately 4km in length and provides vehicular access from the N25 national road to Belview Port.

The L7582 industrial access road is governed by an 80km/h speed limit, the industrial access road which provides access to the Site is governed by a 30km/h speed limit and the N29 is governed by a 100km/h speed limit.

Figure 14-1: Local Roads Network

14.3.2 Existing Traffic Volumes

A traffic count was undertaken by Irish Traffic Surveys on the 23rd May 2023 during a 12-hour period (07:00 to 19:00). The count data is provided in Appendix 14-1 – Traffic Counts. Count information was obtained at the following junctions:

- The existing L7582 Industrial Access Rd / development Access Rd priority junction;
- The existing N29 / L7582 Industrial Access Road priority junction; and,
- The existing N29 / L3412 / L7482 crossroads junction.

The traffic flows during the AM and PM peak hours were abstracted from the surveyed data and are shown in the following tables:

Table 14-1: L7582 Industrial Access Rd / Development Access Priority Junction –2023 AM Peak Flows

From / To	Industrial Access Rd (south)	Development Access Rd	Industrial Access Rd (north)	Totals
Industrial Access Rd (south)	0	27	85	**112**
Development Access Rd	8	0	2	**10**
Industrial Access Rd (north)	39	3	0	**42**
Totals	**47**	**30**	**87**	**164**

Table 14-2: L7582 Industrial Access Rd / Development Access Priority Junction – 2023 PM Peak Flows

From / To	Industrial Access Rd (south)	Development Access Rd	Industrial Access Rd (north)	Totals
Industrial Access Rd (south)	0	7	16	**23**
Development Access Rd	37	0	4	**41**
Industrial Access Rd (north)	47	4	0	**51**
Totals	**84**	**11**	**20**	**115**

Table 14-3: N29 / L7582 Industrial Access Rd Priority Junction – 2023 AM Peak Flows

From / To	N29 (north)	Industrial Access Rd	N29 (south)	Totals
N29 (north)	0	135	81	**216**
Industrial Access Rd	51	0	10	**61**
N29 (south)	20	10	0	**30**
Totals	**71**	**145**	**91**	**307**

Table 14-4: N29 / L7582 Industrial Access Rd Priority Junction – 2023 PM Peak Flows

From / To	N29 (north)	Industrial Access Rd	N29 (south)	Totals
N29 (north)	0	23	29	**52**
Industrial Access Rd	111	0	9	**120**
N29 (south)	122	9	0	**131**
Totals	**233**	**32**	**38**	**303**

Table 14-5: N29 / L3412 / L7482 Crossroads – 2023 AM Peak Flows

From / To	N29 (south)	L3412	N29 (north)	L7485	Totals
N29 (south)	0	2	198	**192**	**392**
L3412	4	0	3	**4**	**11**
N29 (north)	81	0	0	**2**	**83**
L7485	45	1	12	**0**	**58**
Totals	**130**	**3**	**213**	**198**	**544**

Table 14-6: N29 / L3412 / L7482 Crossroads – 2023 PM Peak Flows

From / To	N29 (south)	L3412	N29 (north)	L7485	Totals
N29 (south)	0	1	50	**38**	**89**
L3412	5	0	0	**2**	**7**
N29 (north)	208	0	0	**19**	**227**
L7485	123	12	4	**0**	**139**
Totals	**336**	**13**	**54**	**59**	**462**

14.3.3 Background Traffic

Transportation Infrastructure Ireland (TII) issues a range of traffic growth factors to be applied to existing traffic flows which are broken down into three groups;

- Low growth;
- Medium growth; and,
- High growth.

Due to the nature and location of the Proposed Development it is assumed that medium growth is most likely for the road network surrounding the Proposed Development.

The zone in which the Site is located is numbered 650 in the TII National Traffic Model. The medium growth factors for each operational phase are as follows:

Table 14-7: Future year Traffic Growth

Zone	2023 Existing	2025 Development Operational	2030 Development Operational	2040 Development Operational
650	1.00	+ 4.04%	+ 14.88%	+ 24.47%

These percentages have been used to predict the increase in background traffic along the road network surrounding the proposed development that will occur in future years. Full summary tables and predicted future traffic flows for 2025, 2030 and 2040 future years are included in Appendix 14-1.

14.3.4 Proposed Access Arrangements

Access to the Proposed Development is via a proposed priority junction onto the existing industrial access road as indicated on the site layout drawing provided in Appendix 3-1. A speed limit of 30km/h applies along the existing industrial access road.

14.4 Predicted Impact of Proposed Development

The Proposed Development will operate 24/7 over a period of ca.48 weeks per year. The following information relating to inbound and outbound materials have been supplied by the client to Roadplan Consulting.

Inbound Materials:

- 195,000 tonnes of bulk gypsum annually will be delivered to the plant from Belview Port.
- A shipping vessel will arrive at Belview Port ca. eight (8No.) times per year containing ca.24,375 tonnes of gypsum material.
- Unloading of the shipping vessel will occur over a 24-hour period. Each HGV will carry 30 tonnes of gypsum material which equates to 813 deliveries (24,375 tonnes / 30 tonnes) or 34 HGV deliveries per hour (813 HGV's / 24).

The gypsum material that arrives via the shipping vessel will be transported from Belview Port via the N29 northbound direction.

Other inbound material associated with the manufacturing of the plasterboards are as follows:

- 7,000 tonnes per annum (tpa) of paper liner which equates to 280 deliveries of 25 tonnes per year which equates to 5.6No. HGV deliveries per week, over 50 weeks;
- Chemical additives; approximately 1 delivery per week;
- 100 tpa of chopped glass fibres; approximately five (5No.) deliveries of 20 tonnes in one (1No.) tonne bags annually; and,
- 25,000 tpa of recycled plasterboard delivered by HGV in 20 tonne loads. This equates to four (4No.) HGV deliveries per day.

The above deliveries to the Proposed Development will arrive via the N29 northbound direction.

Outbound Materials:

- It is predicted that the Proposed Development will produce approximately 583 tonnes of plasterboard per day. It is anticipated that an HGV can carry a maximum weight of 29 tonnes of plasterboard. Therefore, it is estimated that the number of HGVs departing the Proposed Development per day is 20 HGVs (583 tonnes / 29 tonnes).

Other Vehicle Movements:

- Maintenance Personnel Vans; 4 trips per day;
- Courier spare parts deliveries; 1 trip per day;
- Cleaning; 1 trip per day;
- Post; 1 trip per day.

Staff Vehicle Movements:

- The Proposed Development will operate 24/7 with three 8-hour shift periods. Staffing levels for each shift period will be approximately 10-15 staff per shift period. Therefore, the Proposed Development would employ a maximum of 45 staff;
- It is assumed that staff will arrive in single car occupancy therefore during a shift change over it is assumed that 15 car trips will arrive to the plasterboard plant and 15 car trips will depart the Proposed Development.

All staff car trips arriving to the Proposed Development will arrive via the N29 northbound direction.

In order to carry out a robust assessment on the additional traffic generated by the Proposed Development an assessment was carried out on a peak operational day whereby the above development traffic would arrive and depart the Proposed Development during the AM and PM peak hours.

Tables 14-8 and 14-9 below shows the predicted AM and PM peak flows of traffic predicted to be generated by the plasterboard plant during a peak operational day.

Table 14-8: AM Peak – Traffic Flows

Material	Trips to Development	Trips from Development
Gypsum	34	34
Paper Liner	1	1*
Chemical Additives	1	1
Glass Fibers	1	1
Recycled Plaster Boards	1	1
Outbound Plaster Boards	1	1
Maintenance	1	1
Courier	1	1
Staff	15	15
Post	1	1
Total	**57 Trips**	**57 Trips**

*HGV Vehicles leaving the Development empty

Table 14-9: PM Peak – Traffic Flows

	Trips to Development	Trips from Development
Gypsum Deliveries	34	34
Recycled Plasterboards	1	1
Outbound Plasterboards	1	1*
Maintenance	1	1
Staff	15	15
Cleaning Staff	1	1
Total	**53 Trips**	**53 Trips**

*HGV Vehicles leaving the Development empty

The access to the Proposed Development will be via the existing industrial access road which provides access to the N29 national road. It is envisaged that all material arriving from Belview Port will arrive via the N29 southbound direction and all other arrivals to the Proposed Development will arrive via the N29 northbound direction.

14.4.1 Junction Capacity Assessment

A capacity assessment using the computer programme PICADY for the following junctions:

- The existing L7582 Industrial Access Rd / Development Access Rd priority junction;
- The existing N29 / L7582 Industrial Access Road priority junction; and
- The existing N29 / L3412 / L7482 crossroads junction.

Full details and results of capacity assessments are contained in Appendix 14-2 – PICADY Results. The parameters shown in the tables are defined as follows:

- **Ratio of Flow to Capacity (RFC)** is a factor indicating the flow on a junction arm relative to its capacity. An RFC of 1.0 means the junction has reached its ultimate capacity and an RFC of 0.85 means that the junction has reached its reserve capacity.
- **Avg. Queue** is the average number of vehicles queued over the time period on the junction approach.
- **Queue delay** is the average number of seconds delay to each vehicle in the time period.

- **Total Delay** is the total number of vehicle hours of delay to all vehicles at the junction over the time period.

14.4.2 L7582 Industrial Access Rd / Development Access Priority Junction

The following tables show the predicted RFC values (Ratio of Flow to Capacity), average queue lengths, average vehicle delay and total delays for the L7582 Industrial Access Rd / Development Access priority junction.

Table 14-10: L7582 / Industrial Access Rd / Development Access Priority Junction

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
2023 Base Year	AM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.02	0	8
		Industrial Access Rd (north)	0.01	0	7
	PM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.10	0	9
		Industrial Access Rd (north)	0.01	0	6
2025 No Dev.	AM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.02	0	8
		Industrial Access Rd (north)	0.01	0	7
	PM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.10	0	9
		Industrial Access Rd (north)	0.01	0	6
2025 With Dev.	AM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.17	0	10
		Industrial Access Rd (north)	0.01	0	7
	PM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.23	0	10
		Industrial Access Rd (north)	0.01	0	7
2030 No Dev.	AM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.03	0	10
		Industrial Access Rd (north)	0.01	0	7
	PM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.24	0	11
		Industrial Access Rd (north)	0.01	0	7
2030 With Dev.	AM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.17	0	10
		Industrial Access Rd (north)	0.01	0	7
	PM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.24	0	11
		Industrial Access Rd (north)	0.01	0	7
2040 No Dev.	AM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.03	0	8
		Industrial Access Rd (north)	0.01	0	7
	PM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.12	0	9
		Industrial Access Rd (north)	0.01	0	6
2040 With Dev.	AM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.18	0	10
		Industrial Access Rd (north)	0.01	0	7
	PM Peak	Industrial Access Rd (south)	-	-	-
		Development Access Rd	0.25	0	11
		Industrial Access Rd (north)	0.01	0	7

At present the existing junction operates within capacity with no queues and minimal delays during the AM and PM peak hour.

In 2023, 2030 and 2040 with the Proposed Development operational the existing entrance will continue to operate within capacity with no queues and minimal delays during the AM and PM peak hour.

14.4.3 N29 / Industrial Access Rd Priority Junction

The following tables show the predicted RFC values (Ratio of Flow to Capacity), average queue lengths, average vehicle delay and total delays for the N29 / Industrial Access Road priority junction.

Table 14-11: N29 / Industrial Access Rd Priority Junction

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
2023 Base Year	AM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.13	0	9
		N29 (east)	0.02	0	6
	PM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.27	0	11
		N29 (east)	0.02	0	6
2025 No Dev.	AM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.13	0	9
		N29 (east)	0.02	0	6
	PM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.28	0	11
		N29 (east)	0.02	0	6
2025 With Dev.	AM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.20	0	11
		N29 (east)	0.08	0	7
	PM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.34	1	13
		N29 (east)	0.08	0	6
2030 No Dev.	AM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.14	0	10
		N29 (east)	0.02	0	6
	PM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.31	0	12
		N29 (east)	0.02	0	6
2030 With Dev.	AM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.21	0	11
		N29 (east)	0.09	0	7
	PM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.37	1	13
		N29 (east)	0.08	0	6
2040 No Dev.	AM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.16	0	10
		N29 (east)	0.02	0	7
	PM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.34	1	12
		N29 (east)	0.02	0	6
2040 With Dev.	AM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.23	0	11
		N29 (east)	0.09	0	7
	PM Peak	N29 (west)	-	-	-
		Industrial Access Rd	0.40	1	14
		N29 (east)	0.08	0	7

At present the existing junction operates within capacity with no queues and minimal delays during the AM and PM peak hour.

In 2023, 2030 and 2040 with the plasterboard plant operational the existing entrance will continue to operate within capacity with no queues and minimal delays during the AM and PM peak hour.

14.4.4 N29 / L3412 / L7485 Crossroads Junction

The following tables show the predicted RFC values (Ratio of Flow to Capacity), average queue lengths, average vehicle delay and total delays for the N29 / L3412 / L7485 crossroads junction.

Table 14-12: N29 / L3412 / L7485 Crossroads Junction

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
2023 Base Year	AM Peak	N29 (east)	0.43	1	9
		L3412	0.02	0	11
		N29 (west)	0.00	0	6
		L7485	0.12	0	8
	PM Peak	N29 (east)	0.08	0	7
		L3412	0.01	0	9
		N29 (west)	0.02	0	6
		L7485	0.28	0	9
2025 No Dev.	AM Peak	N29 (east)	0.45	1	9
		L3412	0.02	0	11
		N29 (west)	0.00	0	6
		L7485	0.13	0	8
	PM Peak	N29 (east)	0.09	0	7
		L3412	0.01	0	10
		N29 (west)	0.02	0	6
		L7485	0.29	0	9
2025 With Dev.	AM Peak	N29 (east)	0.46	1	9
		L3412	0.02	0	12
		N29 (west)	0.00	0	7
		L7485	0.13	0	8
	PM Peak	N29 (east)	0.09	0	7
		L3412	0.01	0	10
		N29 (west)	0.02	0	6
		L7485	0.29	0	9
2030 No Dev.	AM Peak	N29 (east)	0.51	1	10
		L3412	0.02	0	12
		N29 (west)	0.00	0	7
		L7485	0.14	0	8
	PM Peak	N29 (east)	0.10	0	7
		L3412	0.02	0	10
		N29 (west)	0.02	0	6
		L7485	0.32	1	10
2030 With Dev.	AM Peak	N29 (east)	0.52	1	10
		L3412	0.02	0	12
		N29 (west)	0.00	0	7
		L7485	0.14	0	8
	PM Peak	N29 (east)	0.10	0	7
		L3412	0.02	0	10
		N29 (west)	0.02	0	6
		L7485	0.33	1	10
2040 No Dev.	AM Peak	N29 (east)	0.57	2	11
		L3412	0.02	0	12
		N29 (west)	0.00	0	7
		L7485	0.16	0	8
		N29 (east)	0.11	0	7

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
	PM Peak	L3412	0.02	0	10
		N29 (west)	0.03	0	6
		L7485	0.36	1	10
2040 With Dev.	AM Peak	N29 (east)	0.58	2	11
		L3412	0.02	0	12
		N29 (west)	0.00	0	7
		L7485	0.16	0	9
	PM Peak	N29 (east)	0.11	0	7
		L3412	0.02	0	10
		N29 (west)	0.03	0	6
		L7485	0.36	1	11

At present the existing N29 / L3412 / L7485 crossroads junction operates within capacity with minimal queues and delays during the AM and PM peak hour.

In 2023, 2030 and 2040 with the Proposed Development the junction will continue to operate within capacity with minimal queues and delays during the AM and PM peak hour.

14.5 Mitigation

It has been demonstrated in this chapter that the development proposal would generate a small increase in HGV movements on the surrounding local network. HGV traffic can be of particular concern to both local residents and highway users, and the mitigation measures outlined below are designed to alleviate any adverse impacts:

- GABM Limited will adhere to a routing policy to ensure all movements are made via the strategic road network to avoid HGVs passing through residential areas as far as is practical;
- GABM Limited would employ a policy of safety and environmental awareness for all HGV drivers accessing the Site.

14.6 Construction Traffic Effect

The construction period is estimated to take place for approx. 14 months. During construction, taking into consideration the normal intensity of on-site activity and the duration of the programme, it is expected that the construction schedule is likely to have a maximum of 100 staff on-site during the peak construction period.

Staff are anticipated to arrive at the site in the 30-minute period preceding the start of the operating day (i.e., 07:30 to 08:00hrs) and depart in the 30-minute period following the end of the operating day (i.e., 18:00 to 18:30hrs).

It is expected that construction workers will arrive together in shared transport. It is assumed that no construction workers will arrive by walking, cycling or use of public transport. On that basis a vehicle occupancy rate of two (2No.) persons per vehicle is predicted, giving an expected 50 vehicular staff trips per day during the peak construction period.

All workers vehicles will park on the Site to avoid obstruction to the operation of the public roadway, and this will be strictly enforced. A vehicle compound for construction staff will be created within the site boundary.

During the construction period it is estimated that there will be approximately 20 HGVs accessing the site on a daily basis. During peak construction periods such as concrete pouring, it is expected that 80 to 100 HGVs will arrive to the Site over short duration of 3 or 4 weeks. All HGV traffic will travel via the N29 in order to gain access to the Proposed Development. The construction compound will provide an area within the Site to allow loading and unloading of HGV vehicles if required.

14.7 Residual Effect

Junction capacity assessment was carried out to determine the operation performance of the existing L7582 Industrial Access Rd / Development Access Rd priority junction, the existing N29 / L7582 Industrial Access Road priority junction and the existing N29 / L3412 / L7482 crossroads junction. The analysis showed the following:

- The existing L7582 Industrial Access Road / Development Access Road priority junction currently operates within capacity with no queues and minimal delays;
- The existing L7582 Industrial Access Road / Development Access Road priority junction will operate within capacity with no queues and minimal delays when the plasterboard plant is operational in 2023, year of opening, 2030, five years after completion and in 2040, fifteen years after completion;
- The existing N29 / L7582 Industrial Access Road priority junction currently operates within capacity with no queues and minimal delays;
- The existing N29 / L7582 Industrial Access Road priority junction will operate within capacity with minimal queues and delays when the plasterboard plant is operational in 2023, year of opening, 2030, five years after completion and in 2040, fifteen years after completion;
- The existing N29 / L3412 / L7482 crossroads junction currently operates within capacity with minimal queues and delays; and,
- The existing N29 / L3412 / L7482 crossroads junction will operate within capacity with minimal queues and delays when the Proposed Development is operational in 2023, year of opening, 2030, five years after completion and in 2040, fifteen years after completion.

14.8 Cumulative and In Combination Impact

Potential cumulative impacts associated with the proposed development were also assessed.

There will be a small increase in journeys during the construction and operational phases of the Proposed Development. Therefore, a small change in cumulative traffic demand will occur from the Proposed Development in the locality.

14.9 Monitoring

GABM Limited will continuously monitor the routing policy to ensure all movements are made via the strategic road network to ensure that delays and impact at key junctions are minimised.

14.10 Rehabilitation

Not applicable.

14.11 Difficulties Encountered in Compiling this Information

No difficulties were encountered when compiling this information.

15 MATERIAL ASSETS – NATURAL RESOURCES, ENERGY & WASTE

15.1 Introduction

This chapter of the EIAR examines the potential impacts of the Proposed Development on the supply of key resources, energy infrastructure and waste infrastructure. It details the mitigation measures undertaken where necessary.

15.2 Methodology

The methodology that was undertaken for this assessment was a desk-based assessment focusing on relevant legislation and guidance.

In addition to all relevant legislation that was examined in detail, various documents were consulted in order to prepare this section of the EIAR. These include:

- National Waste Statistics Summary Report for 2019 [141];
- Waste Action Plan for a Circular Economy 2021-2025 [142];
- Ireland's Environment – An Integrated Assessment 2020 [143];
- National Hazardous Waste Management Plan 2021-2027 [144];
- Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects [145]; and,
- Best Environmental Management Practice in the Building and Construction Sector [146].

15.3 Receiving Environment

15.3.1 Construction Phase

15.3.1.1 Material Resources

The construction of the Proposed Development will as per any large industrial development will require a range of material resources such as stone for groundworks, concrete and steel.

Table 15-1 below outlines the national capacity for the major resources needed for the construction phase of the Proposed Development [147] [148]. The most recent figures identified are from 2018, therefore it is expected that availability of these materials will be higher in 2024.

Table 15-1: National Construction Material Capacity 2018

Construction Material	2018 Production	Production Area
Aggregate	36,000,000 tonnes	Ireland
Precast Concrete Paving/slabs	2,000,000 m^2	Ireland
Ready Mix Concrete	4,800,000 m^3	Ireland
Crude Steel	167,000,000 tonnes	EU*

*There is minimal steel production within Ireland.

There are two (2No.) rock quarries located within 10km of the site that could potentially supply the hardcore materials needed for foundations (see Table 15-2). Precast and ready-mix concrete will be sourced locally, while crude steel will likely be sourced internationally.

Table 15-2: Quarries Close to Site

Company	Address	Distance
Roadstone	Kilmacow, Co. Waterford	10 km
Oakland Quarries	New Ross, Co. Wexford	10 km

15.3.1.2 Construction and Demolition Waste

In the European Union, the principles of waste management are outlined in the EU Waste Framework Directive (2008/98/EC). This directive, adopted into Irish law through the Waste Directive Regulations 2011 (S.I. 126/2011), emphasizes the waste hierarchy as a fundamental guide for the control and management of waste. The waste hierarchy (see Figure 15-1) establishes the preferred order of methods for handling waste. Member States are mandated to actively encourage re-use and recycling while fulfilling an obligation to minimize the proportion of waste directed to landfills.

The key piece of legislation in Ireland governing waste management is governed by Waste Management Act 1996, as amended. Additionally, numerous statutory instruments and regulations have been enacted to outline specific requirements and regulations related to waste management.

Figure 15-1: Waste Hierarchy

Construction and Demolition (C&D) waste represent the most substantial waste stream in Ireland, both in terms of weight and volume. In 2019, a total of 8.8 million tonnes of C&D waste was collected. [141]. Of the total C&D waste in Ireland, about 85% comprised soil and stones [141]. A total of 96% of the C&D waste was treated in Ireland [149].

The Waste Framework Directive mandated EU member states to attain a 70% material recovery rate for construction and demolition waste by 2020. In 2019, about 82% of the construction and demolition waste was backfilled, while nearly 7% underwent recycling. Only 10% of the waste was sent for final disposal. [141]. Although soil and stones constituted the majority of back-filled material, substances such as concrete, brick and bituminous wastes were also recovered for back-fill.

15.3.2 Operational Phase

15.3.2.1 Raw Ingredients

The primary raw material for the Proposed Development will be gypsum rock, primarily sourced from Southern Spain and Northern Africa. Gypsum rock will be imported into Belview Port, unloaded, and then transported to the Site. The total global production of gypsum from mines in 2022 amounted to an estimated 150 metric tonnes, the Proposed Development will import ca. 0.1% of this amount, which is considered immaterial.

Water which is required for the process will be supplied from a combination of mains water supply and/or abstracted groundwater supplemented by rainwater harvesting, with no on-site water treatment necessary. Besides gypsum rock and water, key ingredients for manufacturing plasterboards include chemical additives, paper, and chopped glass fibre.

The Proposed Development will also incorporate recycled gypsum from construction and demolition wastes, accepting in the region of 25,000 tonnes per annum. As recycled gypsum levels increase, the need for imported gypsum rock will decrease. GABM Limited will apply to Kilkenny County Council for a waste permit to handle in the region of 25,000 tonnes of waste plasterboard per annum. Initially, the intake of waste plasterboard is expected to be small, gradually increasing over time.

For details on the operational phase's plasterboard manufacturing processes, refer to Section 3.2.1, while Chapter 16 outlines the water supply and the Proposed Development's impact on local water infrastructure.

15.3.2.2 Energy Infrastructure

Electrical production in Ireland is largely gas-driven, with over 50% of all electricity generated in 2020 being derived from natural gas [150]. The average peak daily electricity demand is between 5,000 – 5,500 MW and the highest peak recorded as of September 2022 was 6,878MW, recorded on 21/12/2010 [151]. Night-time demand is typically between 50 – 65% of peak demand [151]. Figure 15-2 below shows the breakdown of total fuel inputs for electricity generation by fuel type for 2020 [150]. Figure 15-3 shows the average breakdown of electricity produced by fuel type for 2020 [150]. The difference between the two datasets is due to differing levels of efficiency between fuel types – thermal power plants running on natural gas etc have a lower efficiency of generation compared to wind and hydro power which can be regarded as being 100% efficient [150].

Figure 15-2: Breakdown of Electricity Produced in Ireland by Fuel Input (2020)

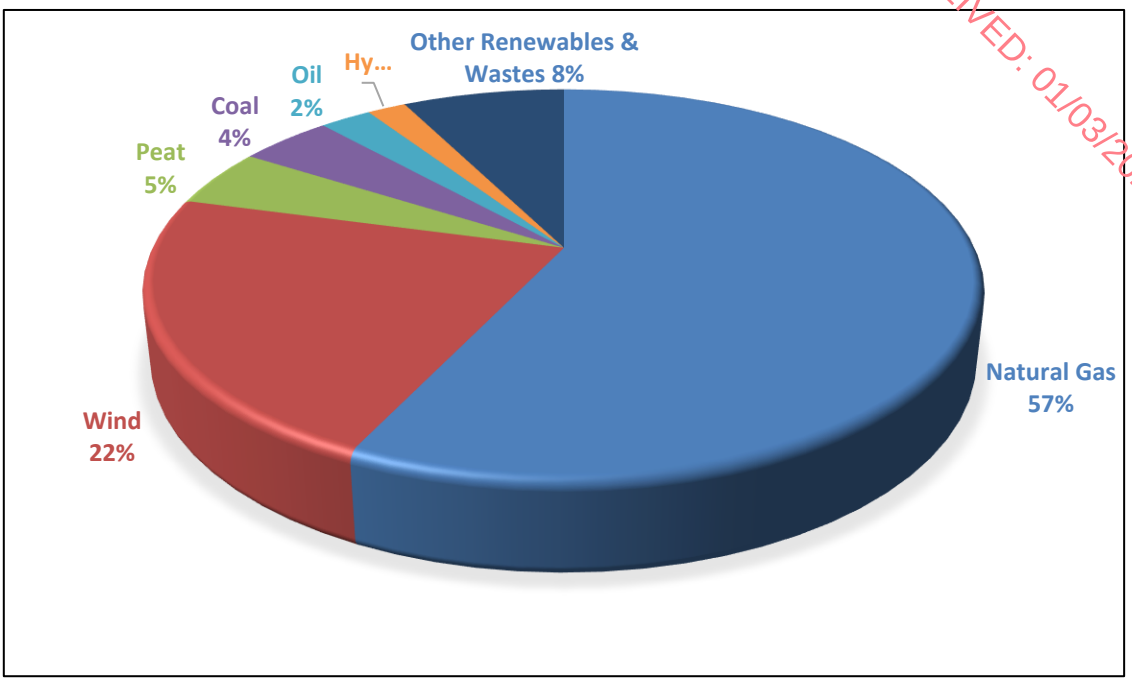
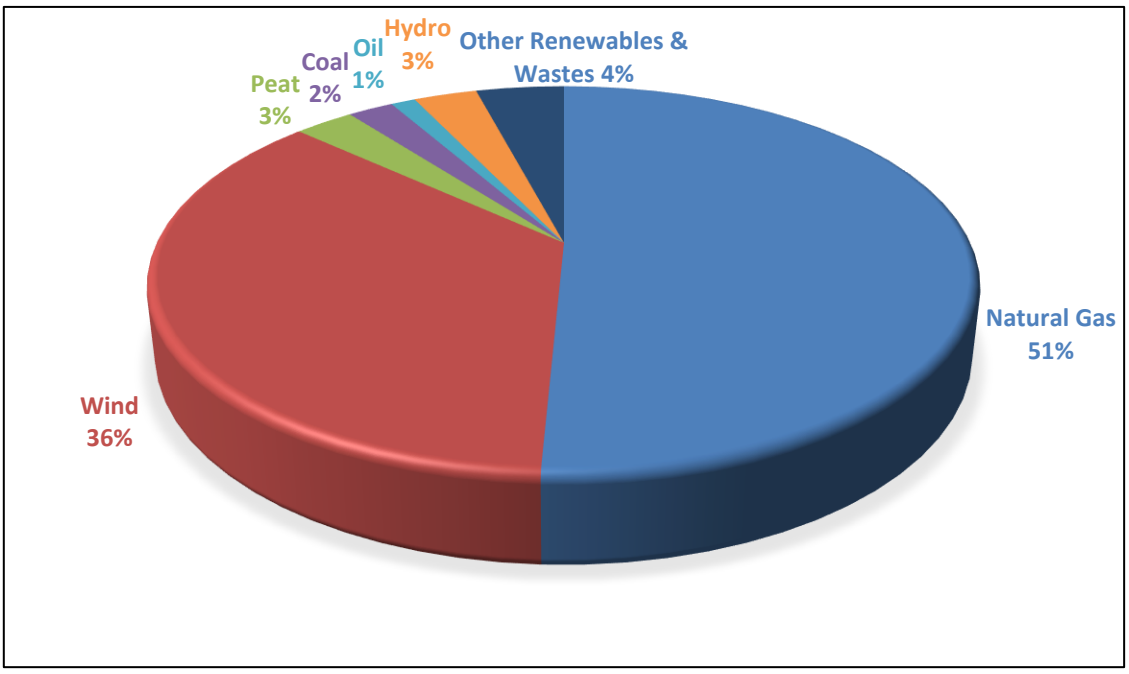


Figure 15-3: Breakdown of Electricity Produced In Ireland by Source (2020)



15.3.2.3 Waste

Waste management plays a vital role in the protection of the environment and human health. In 2021, the Government of Ireland produced the Waste Action Plan for a Circular Economy, which outlined Ireland's national waste policies for the period 2020-2025.

The ongoing challenge of waste capacity in Ireland is a pressing issue. In 2018, the country's waste production reached an estimated 14 million tonnes [152], surpassing treatment capacity and necessitating the export of wastes across all streams [142]. While landfill deposits are decreasing, the reduction is primarily attributed to an uptick in energy recovery as a final treatment, rather than a substantial increase in recycling [152]. Currently, 14% of waste in Ireland is sent to landfill, falling short of the 2035 target of 10% or less [152].

The production of hazardous waste, encompassing materials like sludges, oils, and solvents, is on the rise in Ireland. In 2019, more than 580,000 tonnes of hazardous waste, including contaminated soil, were generated, with over 350,000 tonnes exported for treatment [144]. Notably, approximately 7% of this waste underwent treatment in Northern Ireland, and an additional 17% in the United Kingdom. The UK's withdrawal from the EU in 2020 is anticipated to impact this arrangement. Within Ireland, licensed hazardous waste facilities treated a total of 146,309 tonnes of hazardous waste in the same year, achieving a recovery rate of 38% [144].

15.4 Characteristics and Potential Impacts of the Proposed Development

15.4.1 Construction Phase

15.4.1.1 Construction Resources

The Proposed Development will necessitate a large amount of cut-and-fill of topsoil and subsoils to deliver the finished Site levels. It is estimated that ca. 28,500m^3 of topsoil and of subsoil will need to be excavated. The Proposed Development has been specifically designed to ensure that none of these excavated materials will need to be removed offsite. A breakdown of these volumes is presented in Table 3-2 in Chapter 3. These materials will be stockpiled and re-used for landscaping works/screening berms. As the material will be excavated, the filling element will commence using imported stone.

In addition, the Proposed Development will require key materials laid out in Table 15-3 below. These are broad estimates for some key construction materials for illustration purposes. As the annual supply figures come from 2018 publications, it can be expected that this will be higher in 2023 [147] [148].

Table 15-3: Key Material Used for Construction vs. Supply

Key Material	Site Requirements	Annual Supply	Proportion of Site Requirements vs Annual Supply
Aggregate	141,000 tonnes	36,000,000 tonnes	0.39%
Concrete Paving/slabs	N/A	2,000,000 m^2	N/A
Ready Mix Concrete	3,800m^{3*}	5,000,000 m^{3} ***	0.008%
Steel	675 tonnes	167,000,000 tonnes	0.0004%
Permeable asphalt	150m^3	Data not available	N/A
Cladding Panels	9931m^2	Data not available	N/A

*at average of 2.4m/tonne
** Includes structural steel, rebars, pipework estimated at 16kg/metre
*** Figure published by Irish Concrete Federation for 2019, used in Chapter 10. Figure for 2018 is 4,800,000.

The impact of the deliveries of these materials during construction is examined in Chapter 14 – Traffic.

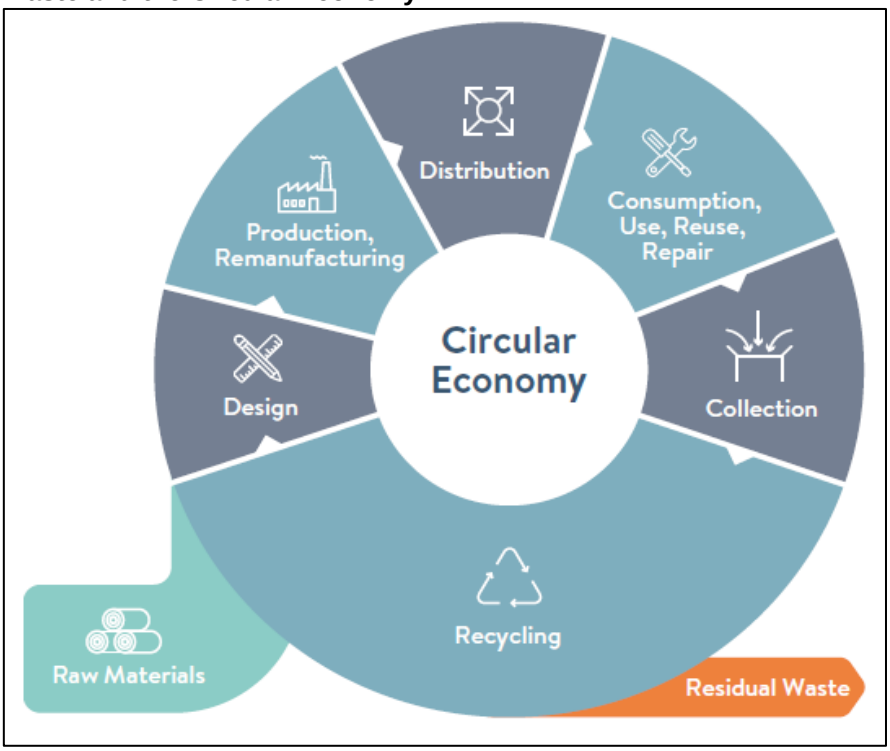
The impact of these material requirements on the average annual supply considered to be not likely and not significant.

15.4.1.2 Construction Waste

During the construction phase, waste management will adhere to industry guidelines outlined in the documents referenced in Section 15.2 above, including the utilisation of the waste hierarchy depicted in Figure 15-1. The EPA *Best Practice Guidelines* provide a comprehensive approach to waste management, emphasising measures such as designing for reduced

waste, material re-use, and recovery, as well as strategic procurement planning to minimise over-ordering. These guidelines also advocate for the implementation of a circular economic model, as illustrated in Figure 15-4, to optimise waste management practices throughout the project lifecycle.

Figure 15-4: Waste and the Circular Economy



Source: EPA

The *Best Practice Guidelines* divide construction and demolition projects into Tier 1 and Tier 2 projects. As the Proposed Development has an aggregate floor space in excess of 1,250m^2 it is considered a Tier 2 project. This therefore requires the creation of a bespoke Resource and Waste Management Plan (RWMP) [145], which will be submitted as a separate report as part of the Planning Permission application.

The waste generated during the construction phase will be managed according to standard waste practices and relevant legislation. On-site management includes collecting and storing waste in appropriate containers with clear labels to facilitate recycling and re-use wherever possible. Licensed waste carriers/handlers will transport the waste off-site for treatment and final disposal, ensuring compliance with environmental regulations and promoting responsible waste management practices throughout the project.

Sources of construction waste will include some or all of the following:

- Construction material cut-offs;
- Materials cut in error;
- Excess construction materials;
- Damaged materials;
- Contaminated materials, if any;
- Packaging and wrapping from materials brought on-site;
- Waste oil from construction equipment; and,
- Canteen and welfare wastes.

The types of waste will include:

- Bricks, concrete, tiles, ceramics, plaster-board etc;
- Cement, gypsum etc;
- Wood, glass, plastic etc;
- Insultation and wiring;
- Bituminous materials – tar, asphalt etc;
- Metallic Waste – cables, pipes etc;
- Paints, varnishes, adhesives, sealants;
- Plastics – packaging etc;
- Food wastes;
- Sanitary waste; and,
- Hazardous waste – oil, contaminated spill kits etc.

No likely or significant impacts arising from waste generated during the construction phase will arise, subject to compliance with all of the stipulated mitigation measures.

15.4.2 Operational Phase

15.4.2.1 Raw Materials

The approximate weight requirements per annum of raw materials for the intended production level at the Proposed Development are set out in Table 15-4 below.

Table 15-4: Total Raw Material Delivery Requirements per Annum

Raw Material	Total (tonnes per annum)
Gypsum Rock	195,000
Paper liner	7,000
Chemical Additives	<100
Glass fibre	100
Recycled Gypsum board	25,000

As the volume of recycled gypsum plasterboard increases the raw gypsum quantity will decrease. GABM Limited will attempt to source materials from local Irish sources. However, gypsum rock will need to be imported from overseas as detailed above.

The impact of the Proposed Development on the raw materials supply will be not likely and not significant.

15.4.2.2 Energy

The Proposed Development will be powered by a combination of natural gas and electricity. However, demonstrating a strong commitment to minimizing its environmental impact, GABM Limited has incorporated several innovative energy-saving and low-carbon features into the plant design.

The average electricity demand for the Proposed Development will be 1,556 kW. The installed electrical power will be 2,075kW.

Photovoltaic panel arrays are proposed on the roof of the Proposed Development. It is estimated that these panels will generate up to ca. 1,105kW.

GABM Limited will purchase some of its energy from external energy companies and this will be supplied via the mains grid.

It is an objective that the Proposed Development will seek to use renewable energy as much as practicable. This will be provided by a combination of the following sources:

- A heat recovery system on the calciner that will be used as space heating in the finished goods warehouse;
- A heat recovery system on the final gypsum board Dryer where heat will be re-circulated into the Dryer; and,
- The photovoltaic (PV) panel arrays.

An electrical substation will be present to the east of the fenced off equipment area, within the electrical area, refer to Section 3.3.5.

The annual gas demand is 12,480,000 m^3. Max hourly gas load will be 1,930 m^3/hr. Peak daily gas requirements will be 37,440 m^3/d.

A gas skid will be located within the fenced off equipment area, north of the Board Warehouse.

The impact on the energy supply infrastructure will not be significant.

15.4.2.3 Waste

The Proposed Development will produce industry-typical waste streams. These will include:

- Waste from the process;
- Waste from the Clean In Place (CIP) systems required to maintain hygiene standards within equipment – out-of-date/unused chemicals, storage containers etc;
- Waste from quality control measures;
- Typical office wastes, including but not limited to:
    - catering wastes;
    - cans/glass;
    - plastics;
    - cardboard/paper;
    - metal/wood;
    - toner/printing wastes; and,
    - general wastes.
- Industry-typical hazardous wastes including but not limited to:
    - sludge arising from the oil interceptors (see Chapter 16);
    - fuel oil, engine oil and other equipment maintenance wastes;
    - fluorescent tubes;
    - batteries;
    - used spill kits;
    - laboratory solvents; and,
    - waste electrical and electronic equipment (WEEE).

Small quantities of hazardous wastes such as florescent tubes, batteries, printer ink cartridges, oil interceptor sludge etc. will be produced at the Proposed Development as with any industrial facility. In addition, the specific processes of the Proposed Development will produce process wastes and waste/spent cleaning chemicals.

All hazardous wastes produced will be stored in suitable containers with bunding where required. Chemical wastes will be stored within a designated secure chemical store.

Table 15-5 below shows national waste figures for 2019 for certain general waste types [153].

Table 15-5: Tonnage Reported for Certain General Waste Types, 2019

General Waste Type	National Total 2019 (tonnes)
Municipal waste from non-household sources	1,466,550
Packaging Waste	1,124,917
WEEE	62,600
Construction and Demolition Waste	8,825,130
Hazardous Waste (ex. contaminated soils)	505,723

These can be compared to the projected estimate of the annual waste figures for the Proposed Development, as shown in Table 15-6.

Table 15-6: Estimated Wastes (Tonnes) Produced at Proposed Development

Waste Type	Predicted Annual Tonnage	Percentage of national total
Non-hazardous waste	200	Ca. 0.002% of sum of non-hazardous waste types in Table 15-9
Hazardous Waste	ca.50	Ca.0.010%

The Proposed Development design includes a storage area on-site which will store collected segregated waste prior to its removal by appropriately licensed waste carriers.

All wastes will be dealt with according to the Environmental Management System (EMS) that will be implemented on-site and in accordance with all relevant waste legislation. All wastes removed from the Site will be handled only by appropriately licensed waste carriers. Records will be kept of each waste consignment, showing the nature and volume / weight of the waste, it's recipient and the final destination and treatment. No waste will go to landfill.

The impact of the Proposed Development on the local waste infrastructure will be not likely and not significant.

15.5 Proposed Mitigation Measures and / or Factors

15.5.1 Construction Phase

General mitigation measures related to construction are outlined in Section 3.4.2.4 above. The following mitigation measures that will be put in place during the construction phase of the Proposed Development will reduce both the demand on raw materials and the volume of waste produced:

- A Resources and Waste Management Plan (RWMP) has been prepared for the construction phase and submitted with this planning application.
- All waste generated during the construction phase will be managed in accordance with the relevant waste management regulations.

- Any waste generated during the construction phase will be removed off-site using an appropriately permitted waste contractor.
- Waste generation on the Site during the construction phase will be properly supervised with designated waste storage and segregation areas.
- Materials required will only be ordered as needed to reduce excess materials resulting in waste unused materials.
- Where excess materials do arise, these will be returned to the supplier where possible.
- Small quantities of hazardous waste arising during construction (e.g., waste oils and lubricants), the waste will be segregated, contained, classified, transported and disposed of by appropriately permitted waste handlers in accordance with all relevant national and international waste legislation.

In view of the mitigation measures listed above, the construction phase will have no significant impact on the supply of construction materials or on the local waste infrastructure.

15.5.2 Operational Phase

15.5.2.1 Raw Ingredients

Gypsum rock, the primary raw ingredient, will be sourced both from overseas, shipped to nearby Belview Port, and from construction sites as waste material, imported to the Site for reuse in the process.

Mitigation measures for delivering materials to the Site are detailed in Chapter 14 Material Assets – Traffic. Dedicated storage areas for gypsum rock will be established as outlined in Chapter 3 along with relevant mitigation measures.

The Proposed Development will use a combination of mains water supply and/or abstracted groundwater along with rainwater harvesting as detailed in Chapter 8.

Other minor raw ingredients include paper, chemicals and fibre glass.

In view of the mitigation factors outlined above, the impact of the Proposed Development on the supply of raw ingredients will be not likely and not significant.

15.5.2.2 Energy

Most of the energy usage is detailed in section 15.3.2 and Chapter 3, 4 and 10.

Nonetheless, the following mitigation measures will apply during the operational phase:

- Regular equipment maintenance resulting in energy efficient operations; and,
- Tracking and reporting of energy use at the Site; which will enable identifying further energy usage reduction opportunities.

Taking into account design measures (on-site electricity generation) and the mitigation measures, the impact of the Proposed Development on the electricity network will be not likely and not significant.

15.5.2.3 Waste

Waste collection points within the Site will have clearly identified separate storage containers for different waste streams.

The waste generated during the operational phase of the Proposed Development will be managed in accordance with the Site's Environmental Policy, EMS and waste management on-site will therefore include:

- The waste hierarchy, with maximum re-use and recycling possible;

- All relevant waste management legislation and best practice; and,
- The Site's Waste Permit.

In view of the mitigation factors outlined above, the impact of the Proposed Development on the waste infrastructure will be not likely and not significant.

15.6 Cumulative and In-Combination Impacts

The supply of gypsum rock was cumulatively assessed in the context of national supply and demand and determined to result in no significant impact.

As the ESB grants connection capacity required in view of cumulative demand, therefore the fact that ESB has granted 2.3MW connection, means that there will be no cumulative impact from the Proposed Development on ESB network.

15.7 Interactions with other Environmental Attributes

The other environmental factors with which this chapter interacts include:

- Chapter 5 – Population and Human Health:
    - Pollution arising from improper or badly planned waste disposal can impact upon human health. Responsible waste management practices, detailed above, ensure the protection of the local and wider population and therefore this can be deemed to be not likely and not significant.
- Chapter 7 – Soils and Geology:
    - The use of aggregates and excavated soils during the construction phase will impact on local geology in terms of extraction.
- Chapter 8 – Water:
    - Pollution arising from improper or badly planned waste disposal can result in water pollution. Responsible waste management practices, detailed above, will protect the hydrological environment.
- Chapter 9 – Air Quality:
    - Improper or badly designed waste management and disposal systems could impact on air quality due to dust. Responsible and suitable waste management and disposal, detailed above, will reduce risk of any potential impacts. These risks have been assessed in Chapter 9 and found to be imperceptible.
- Chapter 14 – Traffic:
    - The supply of raw materials will be a contributor to changes in traffic resulting from the Proposed Development. This is considered as a factor within this chapter when assessing the impact of traffic. The impact of the Proposed Development on local traffic was found to be not significant and therefore the impact of the delivery of raw materials will be not significant.

15.8 Indirect Effects

No indirect effects.

15.9 Residual Effects

Considering the direct and cumulative impacts and mitigation measures, the residual effect on the raw materials supply chains, waste infrastructure and national electricity supply, associated with the Proposed Development will be not likely and not significant.

15.10 Monitoring

15.10.1 Energy

Records will be kept of all equipment maintenance resulting in energy efficient operations; and of energy use at the Site.

15.10.2 Waste

Waste records will be kept during both the construction and operational phases.

Waste records will be kept in regard to waste generated during the construction phase, which will log the amount and type of waste produced, the waste carrier who removes it from the Site and the location and nature of its final destination.

The waste produced and removed from the Site during the operational phase will be recorded and reported as per the requirements of the Facility's Waste Permit.

15.11 Reinstatement

Not relevant.

15.12 Difficulties Encountered in Compiling this Information

At this stage in preliminary design, only indicative quantities of certain materials to be used in the construction of the Proposed Development were available, therefore Table 15-6 is based on broad estimates of key materials only.

16 MATERIAL ASSETS – WATER SUPPLY AND WASTEWATER TREATMENT

16.1 Introduction

This Chapter examines the potential effects of the Proposed Development on the local water and wastewater treatment/delivery infrastructure and details mitigation measures where necessary.

16.2 Methodology

The methodology undertaken for this assessment comprised of the following:

16.2.1 Desk-based Studies

A desk-based review was undertaken of all relevant published information that included the following:

- Relevant legislation that included:
    - European Union (Wastewater Discharge) Regulations 2020 (S.I. 214/2020);
    - Wastewater Discharge (Authorisation) (Environmental Impact Assessment) Regulations 2010 (S.I. 231/2010);
    - Wastewater Discharge (Authorisation) Regulations 2007 (S.I. 684/2007);
    - Dangerous Substances Directive 200/11/ECA.
- All information specific to the Waterford City WWTP was sourced from the Annual Environmental Report (AER) 2022 prepared by Irish Water for Licence D0002-01 [154].
- Construction Industry Research and Information Association (CIRIA) published documents.
- Published planning documentation for adjoining developments.

16.2.2 Consultation

A pre-connection enquiry application for the water supply and for the sewer connection for the Proposed Development was submitted to Uisce Éireann. Uisce Éireann have completed their review of the pre-connection enquiry and provided a 'Confirmation of Feasibility' that confirms that they can provide the requested volume of potable water and also have the capacity to accept the predicted volumes of foul wastewater.

16.3 Receiving Environment

16.3.1 Water Supply

The closest Uisce Éireann treatment facility to the Site is the Mullinabro water treatment plant (WTP). The Ferrybank-Belview Local Area Plan [1] states *'Further upgrading of the water supply will be dependent on phases 2-3 of the Mooncoin Regional Water Supply scheme, a date has not been finalised as yet for these works to commence.'* In addition, it is a development objective:

> *'5B To work in conjunction with Irish Water to promote the ongoing upgrade and expansion of water supply and wastewater services to meet the future needs of the Belview Industrial area and to seek extensions for the water and foul water networks to service the zoned lands sequentially*.'

16.3.2 Wastewater

Gorteens its environs are part of the Waterford City Sewerage Scheme. The closest Uisce Éireann wastewater treatment plant (WWTP) to the Site is the Waterford City WWTP. This facility is licensed under Wastewater Discharge Licence (WWDL) D0022-01.

The Waterford City WWTP provides tertiary treatment of foul water. Table 16-1 below details the permitted Emission Limit Values (ELVs) for the WWTP under WWDL D0022-01 and the average concentrations of those parameters within water discharged from Waterford City WWTP. In the 2022 Annual Environmental Report (AER) [154] it was held as 'compliant' with the conditions of its licence. There were no exceedances of the licence's ELVs.

Table 16-1: Emission Limit Values for Waterford City WWTP Outfall (Licence D0022-01)

Parameter	Emission Limit Values (mg/l)		Monitoring Frequency
	As Licensed	2022 Annul Mean	
pH	9.0	7.54	26 times
Parameter	**Emission Limit Values (mg/l)**		**Monitoring Frequency**
	As Licensed	**2022 Annual Mean**	
cBOD	25	4.07	26
COD	125	22.0	26
Suspended Solids	35	7.83	26
Total Phosphorus (as P)	N/A	0.484	26
Orthophosphate (as P)	N/A	0.233	26
Total Ammonia (as N)	25	2.60	26
Total Nitrogen (as N)	35	8.51	26
Total Oxidised Nitrogen (as N)	35	5.09	26
Conductivity	N/A	2607	26
Fats, Oils and Grease (FOG)	N/A	2.31	3

The WWTP was constructed with a capacity of 82,598m^3/day. Table 16-2 shows the treatment capacity summation for the plant for 2022. It is shown that minimum hydraulic capacity is 9.5% (i.e. that is when the maximum flow occurred in the WWTP), and on average ca. 45.0% of its hydraulic capacity remains. For organic capacity, the minimum remaining is ca. 59.4%, and data on average organic capacity is not available.

Table 16-2: Capacity of Waterford City WWTP

Capacity Type	Built	2022 Max	2021 Average	2020 Available Capacity Min	2020 Available Capacity Average
Hydraulic Capacity (m^3/day)	82,5598	75,416	37,182	Ca. 9.5%	Ca. 45.0%
Organic Capacity (PE)	190,600	113,382	Not available	Ca. 59.4%	Not available

It can be concluded that the current public WWTP is well within capacity and remains well within permitted ELVs.

16.4 Characteristics and Potential Impacts of the Proposed Development

16.4.1 Construction Phase

16.4.1.1 Water Supply

Potable water will be provided for the construction phase via a temporary connection to the public supply network in agreement with Uisce Eireann. In advance of this agreement temporary arrangements will be in place such as using bottled water for welfare facilities.

For other construction requirements such as dust control, stormwater runoff will be collected for reuse and/or abstracted groundwater from the on-site well will be used.

16.4.1.2 Wastewater

Temporary hygiene and washing facilities for the construction workers will be supplied. Foul water from these facilities will be stored for removal off-site by a tanker supplied by an approved contractor.

Wastewater from the construction process and from vehicle washing and other site cleaning (e.g. the washing down of the NSORR) will be managed according to best practice and best up to date available guidance, including that issued from the Construction Industry Research and Information Association (CIRIA) [18] [17]. This will most likely be via a temporary connection to the public sewer or it may be collected and removed from the site by tanker for off-site treatment. This will not give raise to any significant impact.

For further information regarding the impact of the construction phase on the local hydrogeological environment, see Chapter 8.

16.4.2 Operational Phase

16.4.2.1 Water Supply

The Proposed Development has been designed to ensure that ca. 30% of the water used in the manufacturing process will be recycled to reduce the overall process water demand.

The Proposed Development will use a combination of mains water supply and/or abstracted groundwater from an on-site well. It is proposed to install rainwater harvesting at the Site to also provide a source of water for the Site. The roof water run-off will be collected by rainwater downpipes into the rainwater harvesting drainage system. The roof water will be then stored in 3No. overground rainwater harvesting tanks, and they will serve the proposed building when required. The overflow volume of roof water has been considered for the surface water soakaway capacity and the soakaway has been sized accordingly to include all storm water run-off from the roof in extreme rain events. The 3No. rainwater harvesting tanks have a total capacity of 900m^3 of water.

The water demand for the Proposed Development will be ca. 363m^3/day. The proposed water supply will be metred by a bulk meter at the connection point and extend through the Site forming a loop around the perimeter of the building. A boundary box with a water meter will be fitted on the main service line. The proposed watermain will be a 110mm diameter polyethylene pipe and the network includes air valves, sluice valves and hydrants. Double header hydrants will be provided no more than 46m apart and 6m away from the building for firefighting purposes.

The Proposed Development also has designed-in water efficiencies including but not limited to:

- Rainwater harvesting;
- Groundwater abstraction;
- Steam condensate recovery;
- Low-flow taps;
- Water-efficient kitchen equipment;
- Low-capacity WC cisterns; and,
- Low-flow taps to sanitary ware.

Given the agreement with Uisce Éireann, rainwater harvesting, water recycling in the process and the fact that the mains supply will be supplemented by on-site groundwater abstraction, the impact of the Proposed Development on the public water supply will be not significant.

16.4.2.2 Wastewater

Wastewater at the Site will be foul water (from kitchens and staff welfare facilities. All wastewater will ultimately discharge to the Waterford City WWTP. There will be no wastewater generated at the Site from the process.

Foul Wastewater

Foul wastewater was estimated based on a very conservative approach that a total of 40 staff/visitors would be at the facility at the same time, which in reality will not occur. Using Irish Water's rate of 45 litres/person/day for 'office/factory without a canteen'. Foul water will discharge to the foul sewer by gravity feed and be passed directly into the public foul sewer for treatment at the Waterford City WWTP. Irish Water have confirmed they have capacity to accept these volumes of Water.

Considering the small volume of foul wastewater effluent and the remaining hydraulic and organic capacity in the Waterford City WWRP, and Irish Water's acceptance of the volume and proposed quality of wastewater, the impact of the Proposed Development on the Waterford City WWTP is considered to be not likely and not significant.

16.5 Proposed Mitigation Measures and / or Factors

16.5.1 Construction Phase

Irish Water has released guidance for the reduction of water usage within construction projects [155]. The following methods for conserving water will be included where possible:

- Use of brooms rather than water to clean surfaces;
- Waterless/low water systems (e.g. for wheel washes and hygiene facilities);
- Where possible, pre-cast or modular will be used to reduce on-site batching;
- Where possible, water-saving measures such as high-pressure water efficient trigger hoses, percussion taps, twin-flush toilets etc will be in place;

- Water delivery systems will be maintained to prevent leaks and drips;
- Tools will be cleaned in buckets rather than in running water; and,
- Low-water-usage hygiene facilities will be used where possible.

Table 16-3: Water Usage and Savings in Sanitary Facilities

Device	Variation	Water usage (litres/per use)	Saving (litres/use) over standard device
WC - Toilets	Standard	6 - 9.5	N/A
	Low-Flush	3.5	2.5 - 6
	Dual-Flush	4 – 6.5	0 – 5.5
	Cistern Displacement Device	4 – 7.5	2 – 5.5
	Delayed Action Valve	5 – 8.5	1 – 4.5
	Chemical	0	6 – 9.5
Urinal	Standard	3 - 4	N/A
	Low Flush	0 – 1	3 – 4
	Waterless	0	3 – 4
Taps (use per min)	Standard	15 – 20	N/A
	Aerators/low flow	7 – 10	5 – 13 litres/per min
	Spray taps	3 - 4	11- 17 litres/per min

16.5.2 Operational Phase

16.5.2.1 Water Supply

The key mitigation measure has been the design of the Proposed Development and the inclusion of a water reuse and rainwater harvesting and other innovative design measures to reduce the volumes of water that will need to be taken from the public mains supply. In addition, the proposed abstraction of on-site groundwater for use within the Proposed Development will also greatly reduce the demand on the public mains supply. Given the design measures, no further mitigation measures will be required.

Drinking water that will serve the Proposed Development will be sourced directly from the public mains and abstracted groundwater will not be used for this purpose.

16.5.2.2 Wastewater

As per water supply above, potential impacts on wastewater infrastructure were not considered to result in a significant effect due to the low volumes proposed. The on-site infrastructure will be maintained to ensure continued effectiveness.

16.6 Cumulative and In-Combination Impacts

The works that Uisce Éireann will need to undertake to some of their supply and foul network will result in some temporary construction impacts typical for such works. These works will be completed on a linear nature along the pipe network over a short-duration.

The Proposed Development will not generate process wastewater. Minimal amounts of foul effluent will be generated from employee welfare facilities. Therefore, no cumulative impacts on Waterford City WWTP are expected.

Table 16-2 above show that the Waterford City WWTP has capacity remaining to serve the Proposed Development as well as other future users (which are unknown at the time of writing this report), whether commercial or residential.

16.7 Interactions with other Environmental Attributes

Water and wastewater issues arising from the Proposed Development interact with other environmental attributes as follows:

- Chapter 5 (Population and Human Health):
    - Discharges from the WWTP could impact on human health where the hydraulic or organic capacity of the WWTP is exceeded. However, as shown above, there will be no significant impact on the WWTP capacity and therefore impact on human health will be unlikely and not significant.
- Chapter 8 (Water):
    - The impact of the groundwater abstraction supply on the hydrological environment has been assessed in Chapter 8 and was found to be not significant.

16.8 Indirect Effects

No indirect effects from the Proposed Development will arise on the national water or wastewater infrastructure.

16.9 Residual Effects

Considering the direct and cumulative effects and mitigation measures, the residual impact associated with the Proposed Development on the public water and wastewater infrastructure will be not likely and not significant.

16.10 Monitoring

Water usage from the mains and from the on-site abstraction well will be monitored using flow meters, for billing purposes.

16.11 Reinstatement

Not relevant.

16.12 Difficulties Encountered

No difficulties were encountered in undertaking this assessment.

17 INTERACTIONS BETWEEN IMPACTS ON DIFFERENT FACTORS

This chapter of the EIAR summarises the interactions between the environmental attributes as discussed in the previous chapters. The interactions are reversible – e.g.., as biodiversity interacts with water, so water interacts with biodiversity.

An interaction being possible does not mean an interaction will occur.

Population and Human Health / Soils and Geology: Changes in land use could potentially result in contaminated soils, which could impact on human health and wellbeing. This was assessed in Chapter 7, with the conclusion that there was no significant impact on soils and geology and therefore no significant impact on human health.

Population and Human Health / Water: If there was any contamination of groundwater, this would have an impact on the nearby population and human health. This was assessed in Chapter 8, with the conclusion that there was no significant impact due to the low risk of any contamination occurring.

Population and Human Health / Air Quality: Poor air quality can affect human health, both in terms of pollutants such as dust and the products of combustion from boilers and the dryer. Dust can also arise during the construction and operational phases. This was assessed in Chapter 9, with the conclusion that there was no significant impact from pollutants.

Population and Human Health / Climate: The impact of the Proposed Development on climate in terms of the impact on population & human health, climate change and GHG emissions is an important consideration for human health and a pleasant living environment. This was assessed in Chapter 10, with the conclusion that there would be no impact on climate change effects that could affect human health.

Population and Human Health / Noise and Vibration: High levels of noise or vibration can have an effect on human health. This was assessed in Chapter 11, with the conclusion that the impacts would be controlled and within typical limit values.

Population and Human Health / Landscape and Visual Assessment: The enjoyment of the local landscape can be affected by unsuitable development, which can have a visual impact. This was assessed in Chapter 12, with the conclusion that there would a moderate but not significant impact on landscape and that visual impact would be not significant.

Population and Human Health / Material Assets - Traffic: High levels of traffic can have an impact on health and the lives of the local population. The impact of traffic was assessed in Chapter 14 with the conclusion that the impact on the local area would be imperceptible. The impact on human heath will therefore be imperceptible.

Population and Human Health / Material Assets - Natural Resources, Energy and Waste: Waste volumes can impact on the local population. This has been assessed in Chapter 16 with the conclusion that the impact is not likely and not significant.

Population and Human Health / Material Assets - Water Supply and Wastewater: Excessive demand on water supply could impact on the supply available to the local population. Discharges to the WWTP that cause it to exceed its hydraulic or organic capacity could impact on human health if it causes the WWTP to exceed its ELVs. This was assessed in Chapter 16, with the conclusion that there would be no significant impact on the WTTP.

Biodiversity /Soils and Geology: Changes to the land and/or soil arising from the Proposed Development could impact the underlying ecological conditions, thus impacting on biodiversity. Excavations and temporary stock-piling of soils could impact on ecological conditions. Such changes to land and/or soil could disturb invertebrates within the soil. This was assessed in Chapter 7, with the conclusion that the impact on soils and geology was not significant.

Biodiversity / Water: Contamination if nearby waterbodies in the vicinity of the Site could result in a deterioration in water quality negatively impacting aquatic habitats and species. This was assessed in Chapter 9, with the conclusion that there would be no significant impact on the ecological status of surface waters.

Biodiversity / Air Quality: Poor air quality can negatively impact ecosystems and organisms. This was assessed in Chapter 9 with the conclusion that there would be no significant impacts on biodiversity arising from air quality.

Biodiversity / Climate: Increased GHGs and the resulting climate change impact on habitat and surroundings and are important considerations in terms of flora and fauna health and environmental sustainability. This was assessed in Chapter 6 and Chapter 10 with the conclusion that GHG emissions from the Proposed Development would have no impact on climate change effects that could impact biodiversity.

Biodiversity / Acoustics: Fauna can be sensitive to acoustic disturbances. This was assessed in Chapters 6 and 11, with the conclusion that there would be no significant change to ambient noise levels at priority habitats. Therefore, there will be no significant impact on biodiversity arising from acoustics.

Biodiversity / Landscape and Visual Assessment: Changes to existing landcover could impact on local flora and fauna. This has been assessed in Chapters 6 and 12, with the conclusion that the Proposed Development will have a slight, positive residual impact on local biodiversity.

Soils and Geology / Water: Should there be any soil contamination, there could be a negative impact on the underlying aquifer (groundwater) and surface water quality. Chapter 7 concluded that there would be no significant impact on soils and geology. Soil erosion or siltation could also impact on surface water quality, and thus have further impacts on biodiversity. This was assessed in Chapter 9, with the conclusion that there would be no significant impact on surface water quality.

Soils and Geology / Landscape and Visual: The construction phase will require changes to landform and levels. Soil excavation will also take place as part of this phase.

Soils and Geology / Material Assets - Natural Resources, Energy and Waste: Aggregates will be imported during the construction phase, impacting on the immediate national supply of these materials. This impact was assessed in Chapter 15, with the conclusion that the impact was not significant.

Water / Material Assets – Natural Resources, Energy and Waste: Improper or badly planned waste storage and disposal can result in water pollution, which can then have further effects on human health and biodiversity. Due to the mitigation measures in place (Chapters 8 and 15), this is very low risk and deemed to be not significant.

Water / Material Assets - Water Supply and Wastewater: Groundwater abstraction will have an impact on the local hydrogeological environment. This has been assessed in Chapter 8 with the conclusion that there is no significant impact.

Air Quality / Material Assets – Traffic: Traffic causes particulate and gaseous emissions which impact on air quality and can therefore have further effects on human health and biodiversity. This was assessed in Chapter 9 with the conclusion that the impact of traffic on air quality would be imperceptible.

Climate / Material Assets - Traffic: Carbon emissions from traffic – both on-site traffic and off-site deliveries and staff movements - have the potential to increase overall GHG emissions. This was assessed in Chapter 10 with the conclusion that GHG emissions associated with the Proposed Development were not significant.

Acoustics / Material Assets - Traffic: Traffic noise will arise during both the construction and operational phases of the Proposed Development. This can then have further impacts on human health and biodiversity. This was assessed in Chapter 11 with the conclusion that the impact of traffic on noise levels was negligible.

Landscape and Visual Impact / Cultural Heritage: The changes in landscape and visual impact arising from the Proposed Development will necessitate the placing of soil within the zone of notification of a monument, which could impact on the cultural heritage of the area. This risk has been assessed in Chapter 13 and found to be not significant.

Material Assets - Traffic / Material Assets - Natural resources, Energy and Waste: The provision of natural resources and the collection of waste will contribute to the level of traffic arising from the Proposed Development. This has been assessed in Chapter 14 with the conclusion that the impact is not significant.

Table 17-1 below provides a matrix of the above interactions.

Table 17-1: Matrix of Interactions

Description	Population & Human Health	Biodiversity	Soils and Geology	Water	Air Quality	Climate	Noise and Vibration	Landscape and Visual	Cultural Heritage	Material Assets – Traffic	Material Assets – Waste & Natural Resources	Material Assets – Water and Wastewater
Population & Human Health		X	√	√	√	√	√	√	X	√	√	√
Biodiversity	X		√	√	√	√	√	√	X	X	X	X
Soils and Geology	√	√		√	X	X	X	√	X	X	√	X
Water	√	√	√		X	X	X	X	X	X	√	√
Air Quality	√	√	X	X		X	X	X	X	√	√	X
Climate	√	√	X	X	X		X	X	X	√	X	X
Noise and Vibration	√	√	X	X	X	X		X	X	√	X	X
Landscape and Visual	√	√	√	X	X	X	X		√	X	X	X
Cultural Heritage	X	X	X	X	X	X	X	√		X	X	X
Material Assets - Traffic	√	X	X	X	√	√	√	X	X		X	X
Material Assets – Natural Resources	√	X	√	√	√	X	X	X	X	X		X
Material Assets – Water and Wastewater	√	X	X	√	√	X	X	X	X	X	X	

18 SCHEDULE OF COMMITMENTS

Table 18-1 and Table 18-2 outline the environmental commitments which will be undertaken as part of the Proposed Development during both the construction and operational phases.

18.1 Construction Phase

Table 18-1: Schedule of Commitments – Construction Phase

Commitment
Pre-construction
• A detailed Resource and Waste Management Plan (RWMP) will be submitted to Kilkenny County Council for approval in advance of construction commencing; • A detailed Construction Environmental Management Plan (CE&WMP) will be submitted to Kilkenny County Council for approval in advance of construction commencing; • A dust monitoring during the construction phase will be agreed with Kilkenny County Council as part of the CE&WMP prior to construction works commencing; • A Natura Impact Statement (NIS) has been prepared and will be submitted to the Kilkenny County Council as part of the planning application; and, • A Dust Management Plan (DMP) will be prepared by the appointed contractor for the Site and submitted to Kilkenny County Council for written agreement prior to commencement of construction.
Construction General
Methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the works. • Access into the Site to construct a new temporary construction entrance and a temporary construction compound will be constructed by excavating and stock-piling topsoil, followed by the importation of stone to form the compound. The compound will have space to facilitate the following: • Ca.60 car-parking spaces; • Ca.4 double-stack office/meeting cabins; • Ca.2 welfare cabins; • Ca.10 secure storage containers; • 1 security hut and, • The Site manager shall ensure that all personnel working on-site are trained and aware of the mitigation measures detailed within the EIAR. Construction works will be restricted to normal business hours, The hours of construction work are intended to be: The hours of construction work are intended to be: ○ Mon – Fri: 7am – 6pm; and, ○ Saturday: 8am – 2pm. • Safety goalposts will be erected near any overhead wires; and, • A wheel wash will be constructed at the main construction access.
Biodiversity
General Construction Measures: • All activities will comply with all relevant legislation and best practice to reduce any potential environmental impacts. The mitigation measures detailed within this EIAR and the NIS will be fully adhered to; • An ecological clerk of works (ECoW) will be appointed for the duration of the project;

- The ECoW will either deliver or provide the resident engineer with sufficient environmental information to deliver a Site induction to all personnel working on-site. All personnel working on-site will be trained and made aware of the mitigation measures detailed within this EIAR, the CE&WMP and NIS;
- The ECoW will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works, to ensure that all of the works are completed in line with the mitigation measures detailed within this EIAR, the NIS and the CE&WMP;
- If protected or notable species are encountered during the operations at the Site, the ECoW will be contacted for advice;
- Protected and notable species posters will be erected on the Site notice board and maintained throughout the duration of the works; and,
- In advance of works, all Site personnel will receive a toolbox talk regarding notable and protected species. Everybody working on-site must understand the role and authority of the ECoW.

Protection for Retained Hedgerows / Treelines

- A protective fence will be erected around retained trees, prior to the commencement of materials or machinery being brought onto Site, removal of soil or any form of construction. The area within this fencing will form the construction exclusion zone (CEZ) and it will be always afforded protection. No works will be undertaken within this zone that causes compaction to the soil, severance of tree roots or damage to tree canopies;
- The fence is to be sited in accordance with the Tree Impact & Protection Plan submitted as part of the Planning Application;
- Details of the minimum distance for fencing from trees can be found in the Tree Schedule submitted as part of the Planning Application;
- The area within this fencing will form the CEZ and it will be always afforded protection. No works will be undertaken within this zone that causes compaction to the soil, severance of tree roots or damage to tree canopy;
- Details of the minimum distance for fencing from trees can be found in the Tree Schedule submitted as part of the Planning Application;
- The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the CEZ. For a proposal of this nature, a number of fencing/protection solutions will be required including the Heras 151 system of fencing, timber boards and hessian sacking wrapped in chestnut cleft pale;
- The fences will have signs attached to it stating that it defines a CEZ and that no works are permitted beyond it and will remain in place for the duration of the works to prevent accidental disturbance and define the limits for construction vehicles and other construction staff;
- The protective fencing may only be removed following completion of all construction works; and,
- The following principles will be adopted by site personnel within the CEZ during construction, to ensure protection of retained trees:
    - No level changes;
    - No excavations;
    - No fires;
    - No use of herbicides; and,
    - No storage of materials, machinery or access for construction workers.

Site Compounds & Facilities

- Site compounds and facilities will be located outside of all Root Protection Areas (RPAs) and CEZs as identified on the Tree Impact and Protection Plan (TIPP).

Site Cranes and Machinery

- The location of machinery equipment will be sited outside of RPAs to avoid soil compaction.

Pollution Control

- Any storage or mixing station located outside of the construction exclusion zone will be located in a place that minimises the risk of contaminated runoff entering to prevent adverse physiological impacts

on trees that may result from contact with rooting environments. This may be achieved by using a non-permeable membrane on the ground, surrounded by sandbags or sawdust to contain any spillage.

Temporary Ground Protection

- Where it is not practical to protect RPAs by use of protective fencing, BS5837 allows for the fencing to be set back and the soil shielded by ground protection. A range of methods can be used including retaining existing hard surfaces or structures that already protect the soil, installing new temporary surfaces, or a combination of both. Whatever the choice of method, the end result must be that the underlying soil remains undisturbed and retains the capacity to support existing and new roots;
- If fences are to be set back on a temporary the following specifications are recommended for use as temporary ground protection to protect roots and soil;
- For pedestrian traffic, a plywood board with a minimum thickness of 40mm will be laid on a minimum of 100mm deep woodchip, with geotextile membrane beneath;
- For small plant machinery with a gross weight of up to 2 tonne, interlinking aluminium or composite tracks with sufficient load bearing capacity will be laid on a minimum of 150mm deep woodchip, with geotextile membrane beneath;
- For heavy machinery with a gross weight of up to 3.5 tonne, interlinking aluminium or composite track with sufficient load bearing capacity will be laid over a minimum layer of 200mm deep woodchip, with a geotextile membrane beneath;
- For weights above 3.5 tonne a specialist temporary ground protection will be used that is capable of both supporting the required loads whilst providing protection to RPAs;
- Any temporary protective surfaces must remain in place until all construction activity is finished;
- Upon completion of construction works, the temporary ground protective measures will be removed working backwards from on top of the system. This will need to be done carefully ensure that there is no excavation or compaction of the original surface or change in ground levels; and,
- Once this material has been removed vehicular access to this part of the site will not be permitted.

Working within the Root Protection Area

- All excavation must be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air such as an Air Spade may be an appropriate alternative to hand digging, if available;
- All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of small roots, including fibrous roots, will be retained if they can be displaced temporarily or permanently beyond the excavation without damage;
- If digging by hand, a fork will be used to loosen the soil and help locate any substantial roots. Once the roots have been located the trowel will be used to clear the soil away from them without damaging the bark. Exposed roots that are to be removed will be cut cleanly with a sharp saw or secateurs 100-200mm behind the final face of the excavation; and,
- Roots temporarily exposed must be protected from direct sunlight, drying out and extreme temperatures by appropriate covering. Roots greater than 25mm in diameter will only be cut in exceptional circumstances. Roots greater than 100mm in diameter will only be cut after consultation with the project arboriculturist.

Upgrading Existing Surfaces

- Where upgrading of existing hard surfaces is required, the preferred option will be to leave the surface in place and install the new surface specification on top;
- If the retained surface is impermeable, it may be appropriate to remove or puncture sections to create a more favourable environment for roots beneath, before the new surface is laid, through consultation with the project arboriculturist;
- Where the existing surface is to be removed or upgraded, the surface layer will be excavated down the existing subbase and the new surface specification installed on top, to prevent any damage to roots beneath;
- It is recommended that where possible, new and upgraded hard surfaces should be porous (e.g. permeable brick paving, porous resin bound aggregate or tarmac) to allow the flow or water and

oxygen to roots. Wet concrete will only be poured if an impermeable geotextile fabric has first been installed to prevent soil contamination from toxic leachate; and,

- New surfaces and upgraded surfaces will be set back from the base of stems by a minimum of 500mm to allow space for future growth and minimise the risk of distortion with new surface.

Services Routes

- All services and utilities will be installed within existing service routes and where possible outside of RPAs;
- Where installation of utilities or services is required within RPAs, working practices will be adopted in accordance with the National Joint Utilities (NJUG) 10, Vol 4, Issue 2, 2007 *'Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees'*;
- In accordance with 4.1.3 of NJUG 10 2007, acceptable techniques in order of preference include: a) Trenchless; b) Broken Trench; and c) Continuous Trench. Trenchless methods involve the use of thrust boring machinery, whilst broken and continuous trench methods require that excavations within RPAs are carried out using hand tools only; and,
- For a proposal of this nature, broken or continuous trench methods are the most appropriate and should be employed as per NJUG 10, to prevent any damage to tree roots or disruption to soil rooting environments.

Soft Landscaping

- To avoid damage to existing tree roots and prevent soil compact, any machinery used to remove the existing surface and ground vegetation for purposes of soft landscaping (e.g. seeding new lawns or laying turf) should be sited outside of RPAs. If this is not possible, hand tools must be used;
- The removal of the surface layer with RPAs must not exceed 50mm, to prevent exposure and damage of tree roots beneath;
- Soft landscaping works must not involve raising or lowering of the existing ground level within any RPA as this can starve roots of oxygen and cause irreversible physiological damage to trees;
- The use of rotavators within RPAs is prohibited; and,
- Any level changes outside RPAs must be graded to marry existing soil levels within RPAs.

Protection of Bats during the Felling of Mature Trees

- In advance of construction commencing, updated bat inspections will be required to confirm the presence / absence of roosting bats within the trees that will be removed as part of the Proposed Development;
- The felling of trees with suitable roosting features will be carried out under the supervision of the ECoW and will be felled using hand tools only;
- The ECoW will visually inspect the trees following the felling for the presence of bats;
- Felled trees should be pushed gently to allow potential bats within to become active;
- Felled trees should then be left in place for at least 24 hours to allow bats to escape before removal offsite;
- If bats were to be found to be roosting within the trees, further measures will be considered in order to protect bats against disturbance and the NPWS will be consulted for advice and a derogation licence will be obtained, if required; and,
- The management and removal of trees at the Site will be undertaken in a systematic way to ensure that retained trees will not be damaged by the works.

Protection Measures for Amphibians

- No waterbodies or drainage ditches were noted within the vicinity of the Site which would provide suitable breeding habitat for amphibians. However, the grassland habitats on-site and within the wider area may be suitable for amphibians during the terrestrial phase of their lifecycle;
- Should any amphibians be discovered on Site during the construction phase of the Proposed Development;

- The ECoW will be consulted for advice; and,
- Any works that have the potential to impact on amphibians will cease until appropriate mitigation measures have been identified and established.

Protection Measures for Breeding Birds

- Given the presence of barn swallow nesting within the agricultural shed, prior to demolition works a suitably qualified ECoW will inspect the shed and other buildings to ensure that there are no active nests;
- The demolition of the on-site buildings will take place outside the breeding bird seasons (1st March to 31st August);
- Vegetation clearance works will take place outside the breeding bird season (1st March to 31st August). This is as per Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amended) Act 2000, which states that the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated lands or hedgerows or ditches will be restricted during the besting and breeding seasons for birds and wildlife;
- In the event that demolition or vegetation clearance works need to be undertaken within the main breeding season, the following measures will be implemented:
  - The project ECoW will consult with the NPWS;
  - Prior to vegetation clearance on the Site, the project ECoW will inspect the Site; and,
  - In the unlikely event that birds nest within the active working area during the works, all works will cease with immediate effect and will not resume until the project ECoW has been consulted.

Protection Measures for Non-Volant Mammals during Construction

- Prior to the commencement of construction on the Site, consultation with the NPWS regarding the outlier badger sett and updated surveys must be undertaken. The survey area will cover the Site and an area extending to 150m around areas where blasting or piling work is required;
- Should the outlier badger sett or any other setts still be in use and identified as being active, a sett closure licence will be required from the NPWS prior to commencement of construction on the Site;
- Appropriate mitigation measures will be implemented in line with the NRA '*Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes'* [22] and an artificial badger sett will be provided for within the vicinity of the Site at least six (6No.) months in advance of any sett closures. Further details are outlined in Section 6.6.1;
- As per NRA '*Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes'* [22]:
  - There will be no heavy machinery used within 30m of sett entrances;
  - Lighter machinery will not be used within 20m of sett entrances;
  - Light works including clearing of scrub or vegetation will not be undertaken within 10m of sett entrances; and,
  - During the breeding season (December to June) no works will be undertaken within 50m of the sett entrance, nor blasting or pile driving within 150m of the sett entrance.
- Where deep excavations will be required on-site, appropriate measures to protect mammals from ingress will be installed;
- Should construction works be required outside of daylight hours during the site clearance works, the appointed project ecologist will be consulted as required;
- The buildings and loose piles of woody debris on-site will be cleared in a systematic way under the supervision of the ECoW; and,
- If unidentified burrows or setts are identified within the works area during construction, works will cease within the area and the project ECoW will be contacted for advice.

Biosecurity Measures for Invasive Species

- All vehicles, machinery and any other equipment that may be used for the works will be washed and cleaned as required prior to being used on the Site to prevent the import of plant material / seeds;
- Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed;
- Any vehicles and machinery that are not clean will not be permitted entry to the Site;
- All materials to be imported to the Site including additional planting will be sourced from a reputable supplier and records of all material / supplies to the Site will be maintained;
- In advance of works, all site personnel will receive an induction regarding invasive species; and,
- Everybody working on-site must understand the role and authority of the ECoW managing the issue of the non-native species

Lands and Soils

Soil Management:

- Temporary berms will be constructed around stockpiles to prevent run-off during rain events;
- Stockpiles will be dampened down during dry periods to prevent wind dispersion;
- The stockpiles will be clearly segregated for reuse in berms; and,
- All stockpiles will be maintained a minimum distance of 20m from drainage ditches.

Oil/Fuel Storage/Refuelling

- All plant and machinery will be serviced before being mobilised to the Site;
- All oil stored on-site for construction vehicles will be kept in a locked and bund protected area;
- Bunds for the storage of hydrocarbons and chemicals will have a holding capacity of 110% of the volume to be stored. In addition, an emergency spill kit with oil boom, absorbers, etc., will be kept on-site in close proximity to any fuel storage tanks or bowsers for use in the event of an accidental spill;
- Preventative maintenance and relevant maintenance logs will be kept for all on-site plant and equipment;
- Drip trays will be used for fixed or mobile plant such as, pumps and generators in order to retain oil leaks and spills;
- Refuelling of plant and machinery will be completed in a controlled manner using drip trays (bunded container trays). Fuel containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile containers;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- All deliveries to on-site oil storage tanks will be supervised. Records will be kept of delivery dates and volumes;
- Only designated trained operators will be authorised to refuel plant on-site;
- The Site manager shall ensure that all personnel working on-site are trained and aware of the mitigation measures detailed within the EIAR; and,
- Procedures and contingency plans will be set up to deal with emergency accidents or spills.

A procedure will be drawn up, which will be adhered to during the refuelling of on-site vehicles. This will include the following:

  - Fuel will be delivered to plant on site by a dedicated tanker or in a delivery bowser dedicated to that purpose;
  - In the case of a bowser, the driver or supervising foreman will check the delivery bowser daily for leakage;
  - The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur;
  - Where the nozzle of a fuel pump cannot be placed fully into the tank of a machine then a funnel will be used; and,

- Each area of work will have a designated fuelling area. Section foremen shall identify these areas to their plant operatives.

- Every equipment associated with the storage of fuel on site will be designed and installed to relevant standards; and,
- All valves will be of steel construction and the open and close positions will be clearly marked.

Concrete Handling During Construction

- All concrete pours will be planned with risk assessment to avoid any impacts;
- Full washing out of trucks will occur at the dedicated area (i.e. batching plant);
- Water supply points, if required, will be agreed with the appointed Contractor in advance of the works;
- Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that all joints between panels achieve a close fit or that they are sealed;
- Chemicals used will be biodegradable where possible;
- Any spillages will be cleaned up immediately and disposed of correctly;
- Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening;
- Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete;
- Surplus concrete will be returned to the batch plant after completion of a pour; and,
- Designated wheel wash areas will be provided at each phase exit point for the duration of the construction works.

Water

Spills and Accidental Release During Construction

- Appropriate class 1 bypass petrol/oil separator and silt traps will be installed for the protection of surface water and groundwater;
- Fuels, lubricants and hydraulic fluids for equipment used will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice;
- Prior to any works commencing, all construction equipment will be checked to ensure that they are mechanically sound, to avoid leaks of oil, fuel, hydraulic fluids and grease;
- Adequate spill kits including absorbent booms and other absorbent material will be maintained onsite;
- All contractor workers will be appropriately trained in the use of spill kits;
- Any spillage of cementitious materials will be cleaned-up immediately;
- The use of concrete pours for various elements of the precast concrete pile structures including pile caps, ground beams and the ground floor slabs/yard slabs will have the potential to impact groundwater. Where possible, use pre-cast or modular to reduce on-site batching;
- Any sediments impacted by contamination will be excavated and stored in appropriate sealed containers for disposal off site in accordance with all relevant waste management legislation; and,
- There will be no direct discharges to the any of the surface water drainage systems within the vicinity of the Site during the construction phase.

Earthworks

- As much as practicable works will not take place within or immediately adjacent to the drainage ditches during heavy rainfall events or immediately after a heavy rainfall event.
- Any areas of bare soil along or immediately adjacent to the drainage ditches will be:
    - Covered with a sediment control fabric immediately following the works. This fabric will be of a type which also allows the establishment of new vegetation;
    - Reseeded within the next growing season; and,
    - Inspected regularly until new vegetation is established.
- All stockpiles will be kept a minimum distance of 20m from drainage ditches.

Air Quality

Site Management

- A Dust Management Plan (DMP) will be prepared for the Site and agreed upon by the Local Authority;
- The name and contact of person(s) accountable for air quality and dust issues during the Construction Phase will be circulated to receptors in close proximity to the Site;
- HGVs leaving the Site must traverse through the wheel wash;
- A logbook record of any exceptional incidents that cause dust and/or air emissions, either on- or off-site will be maintained. Any action taken to resolve the situation will be recorded in a logbook; and,
- A logbook record of complaints will be maintained and made available to the local authority on request;

Monitoring

- Regular inspections will be carried out in line with the DMP around the boundary of the Site; and,
- The frequency of the Site inspections will increase during;
    - High dust generating activities onsite; and,
    - Prolonged dry or windy conditions, particularly in the case of earthworks.

Site Preparation

- Runoff of water or mud from Site will be avoided as far as practicable;
- Dusty materials that are to be used onsite but are temporarily stored will be covered;
- Stockpiles will be covered, seeded or fenced to prevent wind whipping;
- Fencing, barriers and/or scaffolding will be kept clean and free of dust;
- Materials that have the potential to produce dust will be removed from Site as soon as possible unless being re-used onsite. If dust producing material is being used onsite, it will be covered or wetted to prevent wind whipping; and,
- Dust generating activities will be located away from receptors, where possible.

Operating vehicles

- The use of diesel- or petrol-powered generators will be avoided, where possible;
- Traffic to and from the Site will be managed to avoid congestion where possible; and,
- Vehicle engines will be switched off when stationary.

Waste Management:

- No burning of waste will be permitted onsite.

Construction

- Sand and other aggregates will be stored in enclosed or bunded areas unless required for a particular purpose;
- Scabbing/roughening of concrete surfaces will be avoided;
- Bulk cement or other dried powder material will be delivered in enclosed trucks;
- A water supply will be available onsite for the suppression of dust capable of reaching all parts of the Site;
- Clean-up equipment will be kept available in the event of any dry spillages and clean-up will occur as soon as practicable; and,
- Drop heights from handling equipment will be minimised across all activities.

Earthworks

- Stockpiles will be stabilised as soon as possible;

Track-out

- Vehicles entering and leaving the Site will be covered to prevent material escape during transport;
- Dry sweeping of large areas will be avoided;
- Implement a wheel-wash system that HGVs shall use prior to leaving the Site; and,
- Record all inspections of haul routes any actions taken in a site logbook.

Demolition

- The inside of buildings will be soft stripped, where applicable, before demolition; and,
- Effective water suppression will be used during demolition operations.

Climate

In order to minimise transport GHG emissions during the construction phase the following mitigation measures will be put in place:

- Where possible, materials for construction will be sourced locally;
- All excavated soil will be reused onsite;
- Transport service where practicable will be provided for construction workers arriving to the Site during the construction phase of the Proposed Development;
- Idling of engines will be reduced for onsite plant;
- Where possible waste generated during the construction phase will be reused or recycled; and,
- Where continuous site lighting is required, it will be low energy.

Noise and Vibration

- In advance of the construction phase commencing the appointed contractor will submit a CE&WMP to the Council for approval. The following commitments that are outlined within BS5228 will be specified in the CE&WMP:
    - Plant and HGVs will be turned off/powered down when not in use;
    - Drop heights of incoming materials will be reduced where possible;
    - Soil embankments will be developed early during the construction phase;
    - A project liaison officer will be appointed to communicate with locals regarding noisy works, their duration and organising construction phase noise monitoring;

- There will be strict controls on construction hours to prevent noise works occurring early morning or into the evening period;
- Hoarding and enclosures will be positioned around noisy works and/or plant as required to ensure compliance with construction noise limits; and,
- A response procedure for noise complaints and noise breaches will be established.

The Contactor will ensure these commitments, required to manage construction stage noise emissions, will be in place and all workers on the Site are kept aware of them through onsite toolbox talks.

Vibration

As discussed in section 11.4.3 above, the distance of the receptors from the main point of construction activity determines that there will be no likely significant effects by vibration. As a result, no mitigation measures regarding vibration have been committed to.

Landscape and Visual

- Perimeter berms ca. 3m in height will be built along the specified boundaries of the Site.
  - Landscape planting will be undertaken in accordance with the Landscape Plan.
  - The berms will be planted with native woodland tree species and grass seedling, including a range of age classes and typical heights to generate woodland belt.
- Combination of bolstered hedgerow and new hedgerow will be placed along the southern and western boundaries.
- The cladding of the facility will include the post-mitigation colour scheme as detailed within the accompanying engineering drawings.

Cultural Heritage

Risk of inadvertent impact on hitherto unknown buried archaeological material can be mitigated by pre-development geophysical survey followed by archaeological test-trenching:

- A geophysical survey of the Site could indicate potential subsurface archaeological features or deposits on the Site;
- Archaeological test-trenching may be necessary to clarify the nature of any anomalies identified in the geophysical survey. Alternatively, a testing strategy might involve a comprehensive coverage of the site or a combination of this and specific emphasis on anomalies (possible archaeological features) identified in the geophysical survey;
- The archaeological testing must be carried out under licence to the National Monuments Service of the Department of Housing, Heritage & Local Government; and,
- The surviving ruined outbuildings of 'Suir View' farm, comprising of two standing vernacular structures, must be cleared of vegetation and a survey of the surviving remains carried out.

Material Assets – Traffic

- All workers vehicles will park on the site to avoid obstruction to the operation of the public roadway, and this will be strictly enforced. A vehicle compound for construction staff will be created within the site boundary.
- GABM Limited will adhere to a routing policy to ensure all movements are made via the strategic road network to avoid HGVs passing through residential areas as far as is practical;
- GABM Limited will employ a policy of safety and environmental awareness for all HGV drivers accessing the Site.

Material Assets – Natural Resources and Waste

Waste

- A Resources and Waste Management Plan (RWMP) has been prepared for the construction phase and submitted with this planning application and will be updated prior to construction;

• All waste generated during the construction phase will be managed in accordance with the relevant waste management regulations; • Any waste generated during the construction phase will be removed offsite using an appropriately permitted waste contractor; • Waste generation on the Site during the construction phase will be properly supervised with designated waste storage and segregation areas; • Materials required will only be ordered as needed to reduce excess materials resulting in waste unused materials; • Where excess materials do arise, these will be returned to the supplier where possible; and, • Small quantities of hazardous waste arising during construction (e.g., waste oils and lubricants) will be segregated, contained, classified, transported, and disposed of by appropriately permitted waste handlers in accordance with all relevant national and international waste legislation.
Material Assets – Water and Wastewater
Water Supply & Wastewater • There will be a connection to the groundwater well for the estimated 12-14 months of construction in order to serve construction works with welfare facilities. For potable water, clean drinking water will be provided whilst the connection is being developed; • Temporary hygiene and washing facilities for the construction workers will be supplied. Foul water from these facilities will be stored for removal offsite by a tanker supplied by an approved contractor; • For other construction requirements such as dust control, stormwater runoff will be collected for reuse and/or abstracted groundwater from onsite wells will be used; and, • Wastewater from the construction process and from vehicle washing and site cleaning will be managed according to available guidance, e.g. CIRIA.
Water Usage Reduction The methods for conserving water onsite will follow the relevant Irish Water guidance for the reduction of water usage within construction projects, which include: • Using of brooms rather than water to clean surfaces, where possible; • Waterless/low water systems (e.g. for wheel washes and hygiene facilities); • Where possible, pre-cast or modular will be used to reduce onsite batching; • Where possible, water-saving measures such as high-pressure water efficient trigger hoses, percussion taps, twin-flush toilets etc. will be in place; • Water delivery systems will be maintained to prevent leaks and drips; • Tools will be cleaned in buckets rather than in running water; and, • Low-water-usage hygiene facilities will be used where possible.

18.2 Operational Phase

Table 18-2: Schedule of Commitments - Operational Phase

Commitment
General
The Proposed Development will operate under all relevant statutory consents, specifically a Waste Permit.
Fire and Explosion Fire prevention, detection and fire-fighting facilities will be present at the Site, including: • Fire alarm as per BS 5839 / IS 3218;

- A Fire Hydrant system;
- Double header hydrants will be provided no more than 46m apart and 6m away from the building;
- Fire Hose reels; and,
- Fire sprinklers.

In addition to these water systems the facility will have the following:

- Hand-held fire extinguishers at key locations.

Biodiversity

Badgers

- As part of the Proposed Development an artificial badger sett will be constructed within the vicinity of the site. The location of this will remain confidential for its protection and discretion;
- This artificial badger sett will be constructed six (6No.) months in advance of the sett closure of the outlier badger sett; and,
- The design and construction of the artificial badger sett will be in line with the guidelines set out by the NatureScott guidelines and agreed upon with the NPWS prior to seeking a sett closure licence.

Bats

- Artificial bat boxes will also be erected on suitable trees within the Site;
- The bat boxes will be located in / close to linear features such as treelines and will be placed a minimum of 2m above the ground;
- The number and location of these bat boxes will be specified by an ecologist during the construction phase and their locations will be submitted to the planning authority; and,
- These will be annually inspected and the results of which will be provided to the Planning Authority.

Lighting

- Following the installation of the lighting associated with the operational phase of the Proposed Development, a suitably qualified and experienced ecologist will undertake a further Site inspection to inspect the lighting patterns and lux levels along the hedgerows / treelines on the Site and the findings will be presented to the planning authority.

Birds

- A variety of bird nest boxes designed to attract a variety of nesting bird species will be erected on suitable trees within the Site; and,
- General bird boxes designed to cater for a variety of species will be used, the number and location of which will be specified by an ecologist;

Different bird species require difference entrance sizes as outlined below:

- The circular 26mm entrance hole suits blue, marsh, coal, and crested tit and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole;
- The circular 32mm entrance hole will attract great, blue, marsh, coal and crested tit, redstart, nuthatch, collared and pied flycatcher, wryneck, tree, and house sparrow;
- The 45mm entrance hole will attract starling;
- Open-fronted bird boxes with a hole will be placed ca. 2-4m off the ground, whereas open-fronted bird boxes will be placed lower than 2m among dense vegetation where predators will not easily see it; and,
- Open-fronted nest boxes will attract robins, wrens, pied and grey wagtail, song thrush and blackbirds.

Additionally, given that barn swallows were confirmed breeding within the Site, swallow / swift boxes will be installed in appropriate locations around the Site. The locations and number of these boxes will be provided to the Planning Authority.

Mammals

- There will be a requirement for security fencing along the northeastern boundary of the Site where Site access will be possible from the road;
- The 'access gates' will be suitably located at points along the perimeter fence in order to ensure connectivity for small mammals such as rabbits, badgers and foxes; and,
- Additional mammal gates will also be located along identified mammal runs to ensure that these establish routes are not disrupted. Figure 6-10 provides an example of a mammal gate.

Land and Soils

During the operational phases of the Proposed Development, the facility will operate under a waste permit and as best practice, the following mitigation measures will be employed to prevent any potential impact on soils and geology:

- The integrity and water tightness of all tanks, bunding structures, containers and underground pipes and their resistance to penetration by water or other materials carried or stored therein will be tested and demonstrated by GABM Limited prior to the commencement of production activities. This testing will be carried out by GABM Limited at regular intervals;
- An adequate supply of suitable absorbent materials will be kept on-site to deal with any spills; and,
- Loading and unloading of materials will be carried inside the warehouse within an area protected against spills and runoff in accordance with relevant EMS procedures.

Water

- The design of all drainage and bunding will be undertaken in accordance with relevant best practice guidelines.

Stormwater Discharge

- Stormwater collected on-site will undergo continuous testing as per best practise;
- The settlement tank and oil interceptor will be service and maintained, including the removal of sediments offsite periodically by a permitted contractor to a licensed facility, to prevent the release of finer sediment into the drainage ditch; and,
- There is no requirement for process water drainage as there is no process waste generated from the development.

Process Wastewater Discharge

There will be no direct discharge of process wastewater into the receiving environment.

Air Quality

The following factors relating to air pollutant minimisation and control will be part of the project design:

A Dust Management Plan (DMP) will be prepared for the Site and agreed upon by the Local Authority. The DMP will be implemented primarily during the Operational Phase of the Proposed Development but will also incorporate aspects of the Site preparation phases.

General mitigation measures will include:

- Keeping a record of any potential dust or air quality complaints;
- If such complaints occur, then identify the cause(s) and take appropriate actions;
- Maintain good communication with neighbouring sites; and,
- Record any exceptional circumstances which may give risk to higher than predicted emissions either on-site or offsite.

Mitigation measures for minimising the potential air quality impacts from the stacks will include:

- Design measures:
    - the stacks will be of sufficient height to allow for the dispersion of emissions (specified by the manufacturer and engineering drawings);
    - All dust emission points will have filters;

- The bag filter on the air emission point from the calciner equipment will have a bag burst detection system which prompts automatic shutdown of the process; and,

- Ensure regular maintenance of all emission points on-site to ensure efficiency in operation.

Following the implementation of mitigation measures, any potential impacts on ambient air quality in terms of total particulates are considered not likely and not significant.

Climate

- The Operational Phase of the Proposed Development is expected to span over an indefinite number of years.

Noise and Vibration

The following operational measures will be in place as part of the Proposed Development:

Noise associated with the Operational Phase of the Proposed Development will consist of different areas as presented in Table 11-14 in Chapter 11.

The Proposed Development will be a commercial facility, that will operate 24/7/333 on a three-shift basis as outlined in Section 3.

The following measures will be in place as part of the Proposed Development:

- All plant (fixed and mobile) will be maintained to a high standard to reduce any tonal or impulsive sounds;
- On-site vehicles will be equipped with white noise/broadband sirens to minimise noise during reversing activities;
- Preventative maintenance programme will be in place for all plant and equipment on the Site and for the maintenance of all roads within the Site; and,
- All plant will be throttled down or switched off when not in use, where practicable.

The Proposed Development has been assessed and determined that no likely and significant acoustic effects will arise in relation to operational noise. The above operational management of the Site will further control noise and enable an early identification and investment to ensure noise control is central to the ongoing future operations for the Proposed Development.

Vibration

There are no proposed sources within the design that will result in the creation of operational vibration at the Proposed Development boundaries. Therefore, the proposed future operation will not have a likely and significant vibration effect at NSRs.

Landscape and Visual

It is recognised that the maintenance of all of the new planting will be very important to ensure that it becomes fully established to achieve the required screening objectives.

In addition, regular maintenance of the façade will be undertaken to ensure the post mitigation colour scheme is maintained.

Cultural Heritage

- There are no proposed mitigation measures during the operational phase.

Material Assets – Traffic

- Delivery and collection hours are likely to be 6am to 10pm Mondays to Fridays, excluding the port unloading campaigns, ca. 8No. campaigns (24hour events) per annum;
- Delivery traffic will utilise the strategic road network as much as possible to reduce trips through residential areas as far as is practical; and,
- All HGV drivers accessing the Proposed Development will be required to comply with a policy of safety and environmental awareness.

Monitoring:

- Routing policy will be monitored on an on-going basis to minimise delays and impacts at key junctions.

Material Assets – Natural Resources, Energy and Waste

Energy

- A heat recovery system on the calciner that will be used as space heating in the finished goods warehouse;
- A heat recovery system on the final plasterboard Dryer where heat will be re-circulated into the Dryer;
- Ca. 30% of water utilised in the process will be captured for reuse;
- The rooftop photovoltaic (PV) panel arrays will be present;
- An electrical substation will be present to the east of the fenced off equipment area, within the electrical area, refer to Section 3;
- The annual gas demand is 12,480,000 m^3. Max hourly gas load will be 1,930 m3/hr. Peak daily gas requirements will be 37,440 m3/d;
- A gas skid will be located within the fenced off equipment area, north of the Board Warehouse; and,
- An Environmental Management System (EMS) will be implemented on-site.

Material Assets – Water and Wastewater

Water

Mains water supply from Mullinabro water treatment plant (WTP) in the Mooncoin Water Supply Area for potable and process water.

Process water will be supplemented by rainwater harvesting tanks (900m^3) and abstraction from the on-site groundwater well.

Wastewater

- Foul wastewater will discharge to the Waterford City WWTP.

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