Environmental Impact Assessment Report

Volume 2 – Main Chapters

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Chapter 1 – Introduction to the Environmental Impact Assessment Report

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1. INTRODUCTION TO THE ENVIRONMENTAL IMPACT ASSESMENT REPORT

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) is provided on behalf of Knockharley Landfill Limited (hereinafter referred as 'the Applicant') to support a planning application made to Meath County Council (MCC), for a development in Knockharley, Navan, Co. Meath (hereafter referred to as 'the site' or the 'the Proposed Development site'). The site location and planning application boundary are provided in Figure 2-1 and Figure 2-2 in Chapter 2 of this EIAR.

The EIAR has been prepared in accordance with the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018) (as amended) which transpose the requirements of the Environmental Impact Assessment (EIA) Directive (2014/52/EU). This EIAR assesses the potential environmental impacts of the proposed extension to the existing Knockharley Landfill and associated works (hereafter referred to as the 'Proposed Development').

In this chapter of the EIAR, the Proposed Development is introduced, the Environmental Impact Assessment (EIA) process is summarised, and it provides an overview of the methodology used for preparing the EIAR. Details of the competency of the EIAR authors, the consultation undertaken, as well as details of any additional environmental related reports and/or assessments that are required under Legalisation or EU Directives other than the EIA Directive (Directive 2011/92/EU as amended by 2014/52/EU) are herein outlined.

1.1.1 The Applicant

The applicant for the Proposed Development is Knockharley Landfill Ltd., which is the owner and operator of the Knockharley Landfill facility located in Co. Meath. The facility was developed and previously owned and operated by Greenstar Holdings Ltd. (previously known as Celtic Waste Ltd.). The site was acquired by Knockharley Landfill Ltd. in March 2014.

1.1.2 The Proposed Development

A detailed description of the Proposed Development and the development site context is presented in Chapter 2 of this EIAR (Description of the Proposed Development).

1.1.3 Need for the Proposed Development

Over the past two decades, Ireland has significantly reduced its reliance on landfill, with the number of operational sites falling from 126 in 1998 to just three in 2024[1], and municipal solid waste (MSW)[2] landfilled dropping from 91%[3] to 13%[4] in the same period. Despite this progress, landfill remains an essential component of the national waste management system, as not all waste can be recycled or reused. Knockharley landfill, one of the remaining facilities, has become increasingly vital. In 2021, planning permission was granted to increase its annual intake from 88,000 to 396,000 tonnes, covering MSW, construction and demolition (C&D) waste, and incinerator bottom ash (IBA), with provision for emergency contingencies – 44,000 tonnes for all waste streams. In total, the Knockharley Landfill facility is permitted

[1] *Ireland's State of the Environment Report 2024*, pg. 28, prepared by Environmental Protection Agency.
[2] While cognisant that MSW does not comprise all waste streams, we use its figures here because it is well tracked at a national level by the Environmental Protection Agency (EPA) and provides for a clear understanding of general waste trends.
[3] Household, commercial, and street waste.
[4] *Waste Treatment Capacity Analysis Q4 2024 & Projections 2025 Bulletin*, pgs. 5 & 15, prepared by the Regional Waste Management Planning Office.

to accept up to 440,000 tonnes of waste per annum. However, rising population[5], economic growth[6], reduced waste exports[7], and unplanned shutdowns at the country's waste-to-energy (WTE) facility[8] have accelerated the filling of Knockharley's void, now expected to reach capacity by 2029 instead of 2032.

Current MSW landfill demand in Ireland stands at approximately 400,000 tonnes annually[9], with a combined national acceptance capacity of about 458,000 tonnes across three private landfills[10]. This margin is tightening as waste volumes rise and existing landfill permissions expire. Ballynagran landfill in Wicklow[11] is due to close in 2026, and while Drehid in Kildare has received planning permission for increased intake, it lacks the necessary environmental licence[12]. Waste exports—once relied upon to handle surplus MSW—are decreasing due to stricter EU regulations[13] and declining demand from countries like Sweden[14]. The National Waste Management Plan 2024–2030 warns of a treatment capacity shortfall of up to 300,000 tonnes by 2030 if recycling and prevention targets are not fully achieved. With population and economic expansion, even meeting the 2035—of landfilling no more than 10% of MSW[15]—would still require substantial domestic capacity.

Knockharley also plays a critical role in handling increasing C&D waste and IBA, both of which are by-products of Ireland's growing construction sector and reliance on incineration. It is the only landfill currently permitted to manage IBA at a scale of 150,000 tonnes annually and has served as a key facility during national emergencies, such as fires and unplanned WTE outages[16]. These events have sped up the consumption of its void space. With the ability to expand westward and provide an additional 3.14 million tonnes of capacity, Knockharley is well-suited to meet Ireland's future landfill needs. The proposed expansion does not seek to increase annual intake but instead aims to extend the life of the facility sustainably. This approach supports Ireland's circular economy goals by ensuring long-term waste security while continuing efforts to reduce landfill dependency.

1.2 Relevant Legislative Requirement for Environmental Impact Assessment

1.2.1 Relevant Legislation, Policy, and Guidelines

This EIA Report has been prepared in accordance with the most relevant guidance and legalisation, including the following:

- EIA Directive (2011/92/EU) as amended by EIA Directive (2014/52/EU);
- Planning and Development Act 2000 (as amended);
- Planning and Development Act 2024;
- Planning and Development Regulations 2001 (as amended);

[5] *Population Projections, The Flow of New Households and Structural Housing Demand*, pg. 34, prepared by the Economic & Social Research Institute
[6] *European Economic Forecast Autumn 2024*, pg. 92, prepared by the European Commission.
[7] *Waste Treatment Capacity Analysis-Q4 2024 & Projections 2025 Bulletin*, pg. 7, prepared by Regional Waste Management Planning Office.
[8] *Waste Treatment Capacity Analysis-Q4 2024* p. 2 & 6, prepared by Regional Waste Management Planning Office.
[9] *Waste Treatment Capacity Analysis Q4 2024 & Projections 2025 Bulletin*, pg. 8, prepared by the Regional Waste Management Planning Office.
[10] *National Waste Management Plan for a Circular Economy 2024-2030*, pg. 23, prepared by the Regional Waste Management Planning Office.
[11] WCC Planning Reg. Ref. 20/21.
[12] EPA Licence Application Reg No. W0201-03.
[13] *National Waste Management Plan for a Circular Economy 2024-2030*, pg. 23, prepared by the Regional Waste Management Planning Office.
[14] G. Strandberg et al., *Bespoke climate indicators for the Swedish energy sector* – a stakeholder focused approach, Climate Services, Volume 34, 2024.
[15] The Landfill Directive (1999/31/EC as amended by Directive (EU) 2018/850).
[16] *Waste Treatment Capacity Analysis-Q4 2024* p. 6, prepared by Regional Waste Management Planning Office.

Table 1-1 Relevant Part 1 Schedule 5 Thresholds for EIA and determination of requirement of EIA

Development for the Purposes of:	Related Development Details	Exceeds Threshold?
Part 1 – 9. Waste disposal installations for the incineration, chemical treatment as defined in Annex IIA to Directive 75/442/EEC under heading D9, or landfill of hazardous waste (i.e. waste to which Directive 91/689/EEC applies.	The Proposed Development will not include incineration or chemical treatment of hazardous waste. The existing Knockharley Landfill does accept up to 5,000 tonnes of stable non-reactive hazardous waste per annum. The Proposed Development will continue the acceptance of this waste stream The Proposed Development site exceeds the limit, quantity or threshold set out in Part 1 Class 9; therefore, an EIA is mandatory under this Project Class.	Yes – EIA is mandatory under this class.

Table 1-2 Relevant Part 2 Schedule 5 Thresholds for EIA and determination of requirement of EIA

Development for the Purposes of:	Related Development Details	Exceeds Threshold?
Part 2 - 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 Proposed Development includes void space that allows for the continued landfilling of up to 440,000 tonnes per annum. The Proposed Development site exceeds the limit, quantity or threshold set out in Part 2 Class 11 (c); therefore, an EIA is mandatory under this Project Class.	Yes – EIA is mandatory under this class.

1.3 Methodology and Format of the EIA Report

1.3.1 EIAR Main Structure

This EIAR has been laid out using the grouped format structure, the report examines each environmental factor in a separate chapter (the chapters are listed in Table 1-3. These EIAR chapters have been prepared by suitably qualified expert(s) and have considered the construction and operational phases of the Proposed Development under the following headings:

- Assessment Methodology;
- Receiving Environment;
- Characteristics of the Proposed Development;
- Potential Impacts of the Proposed Development;

- Mitigation Measures;
- Monitoring or Reinstatement Measures;
- Residual Effects of the Proposed Development; and
- Cumulative Impacts of the Proposed Development

Interactions between environmental factors will be considered separately in Chapter 15 of this EIAR.

While the EIAR has the focus on the Proposed Development, each specialist chapters also considers the potential cumulative impact (as far as practically possible) of the Proposed Development with the any future development and the cumulative impacts with developments in the locality (including planned and permitted developments).

Table 1-3 EIA Report Structure

EIA Chapter No.	Chapter Title
	Non-Technical Summary
Chapter 1	Introduction to the Environmental Impact Assessment Report
Chapter 2	Description of the Proposed Development
Chapter 3	Alternatives
Chapter 4	Population and Human Health
Chapter 5	Land, Soils, and Geology
Chapter 6	Hydrology and Hydrogeology
Chapter 7	Biodiversity
Chapter 8	Air Quality and Odour
Chapter 9	Climate
Chapter 10	Noise and Vibration
Chapter 11	Archaeological, Architectural and Cultural Heritage
Chapter 12	Landscape and Visual
Chapter 13	Material Assets – Traffic and Transportation
Chapter 14	Material Assets – Utilities and Waste
Chapter 15	Interactions – Interrelationship between the Aspects
Chapter 16	Schedule of Mitigation Measures

1.3.2 EIA Scoping and Consultation Processes

The scope of the EIAR has been defined at an early stage of the design process to ensure that all relevant environmental issues were addressed in the subsequent studies.

To establish the scope, a comprehensive review of the development site's context, including its locality and any previously permitted developments, has been undertaken. This review helped identify the specific matters to be covered within this environmental impact assessment report. By identifying and addressing these issues upfront, the EIAR aims to provide a comprehensive understanding of the potential environmental impacts associated with the Proposed Development.

The structure and presentation of the EIAR is designed to facilitate the dissemination of information to the public and stakeholders. The EIAR is structured in a clear and accessible manner, allowing easy navigation through its content. Additionally, a non-technical summary is provided, which presents a concise overview of the EIAR's main findings and conclusions. The presentation of the information is done in a way that is

understandable to both technical experts and non-experts, enabling a wider audience to grasp the key findings and implications of the assessment.

Public participation in the Environmental Impact Assessment (EIA) process is facilitated through the statutory planning application process. As part of this process, the EIAR is made available to the public, allowing interested individuals and organisations to review and comment on the report. This provides an opportunity for public input, ensuring that a wide range of perspectives are considered before making decisions regarding the Proposed Development.

To further enable public access to the EIAR, information about the report is also made available through the Department of Housing, Planning, and Local Government's EIA Portal. This portal serves as a centralised platform that can be accessed by the public, stakeholders, and regulatory authorities. By utilising this portal alongside the Meath County Council online planning systems, broader public participation and scrutiny, as well as transparency and accountability in the EIA process is enabled.

Ensuring public awareness and involvement is a core objective of the EIAR process in Ireland. By disseminating the information contained in the EIAR, the aim is to make the public and local community aware of the likely environmental impacts of the proposed project prior to the granting of consent. This empowers the public to participate meaningfully in the decision-making process and voice their concerns or provide feedback.

In excess of 200 newsletters were distributed to neighbours, community groups and elected representatives by hand and email on the 21st of November 2025. This included a dedicated email contact. A local TD, a Councillor, Community Groups and nearby neighbours were met individually and were given a walk through the proposal.

Two pre-planning consultation meetings have taken place with An Coimisiún Pleanála. The first meeting took place on 26th February 2025 via Microsoft Teams and a second meeting took place with An Coimisiún Pleanála on 31st July 2025 via Microsoft Teams.

A pre-planning meeting was undertaken with An Coimisiún Pleanála (ACP) on 3rd April 2025 to discuss the proposed development.

A separate pre-planning meeting took place with MCC on 9th July 2025, along with a site walk with MCC's Planning, Environmental and Transport Division on 28th August 2025.

The Applicant has taken on board ACP's and MCC's advice, and as such the above is included within the planning application and captured within *inter alia* the submitted EIAR by AWN.

The Waste Management Act 1996 requires Local Authorities to make a waste management plan either individually or collectively for their functional areas. In 2015, Local Authorities established three Regional Waste Management Planning Offices to develop and implement three regional waste management plans on their behalf. Following an evaluation, it was recommended that a single plan be prepared to replace the existing regional plans.

Due to waste capacity constraints, the Regional waste management planning offices and the Local Government Management Agency organise a waste capacity review meeting each quarter. This meeting is attended the EPA, Department if Climate Energy and the Environment (DCEE) the Local Authorities and private industry. The Applicant is represented at the quarterly waste capacity meetings. These meetings are chaired by Seán Scott, Local Authority Waste Programme Coordinator in a Circular Economy Local Authority Waste Programme Coordination Office in a Circular Economy, Local Government Management Agency,

The Applicant has met with and communicated directly with both Sean Scott and Hugh Coughlan of the Eastern Regional waste management office on the Knockharley project. An extension to Knockharley was

first discussed with Sean Scott and Hugh Coughlan in a meeting in July 2024. In addition, the have been provided with regular project updates since then. The regional waste management planning offices have also facilitated project update meetings with Meath and DCEE.

Consultation with ESB has also taken place with respect to the proposed alterations to the Louth-Woodlands 220 kV Overhead Line which would be required to facilitate the Proposed Development.

ESB confirmed it consented to the to the submission of an application by the Applicant to alter and divert the Louth-Woodlands 220 kV Overhead Line to facilitate a landfill development and extension in a letter to the Applicant on the 17th of July 2024.

1.3.3 Contributors to the EIA Report

The preparation and co-ordination of this EIAR has been completed by AWN Consulting in conjunction with experienced subject matter experts. Each environmental specialist of the Applicant's project team was commissioned having regard to their previous experience in EIA; their knowledge of relevant environmental legislation relevant to their topic; familiarity with the relevant standards and criteria for evaluation relevant to their topic; ability to interpret the specialised documentation of the construction sector and to understand and anticipate how their topic will be affected during construction and operation phases of development; ability to arrive at practicable and reliable measure to mitigate or avoid adverse environmental impacts; and to clearly and comprehensively present their findings.

Table 1-4 below outlines the specific responsibilities of each author(s) and their corresponding EIAR chapter(s). Further information regarding the qualifications and relevant experience of the EIAR team can be found below the table.

Table 1-4 EIA Project Team Qualifications and Technical Chapters

Topic	Main Author Competency Details
Chapter 1 – Introduction	David Doran is a Senior Environmental Consultant with AWN Consulting. David has a MSc in Environmental and Energy Management and is an Affiliate Member of the Institute of Sustainability and Environmental Professionals (AffISEP). He primarily works in the field of Environmental Impact Assessment (EIA) and EIA Report preparation and coordination. Recent projects include the management of commercial, infrastructure, and residential EIARs, EIA Screening Reports, as well as Operational and Resource Waste Management Plans for residential, office, logistics park, and other commercial and industrial developments. David also specialises in construction environmental compliance. Jonathan Gauntlett (BSocSc EnvPl, BBA Econ) of AWN Consulting. Jonathan Gauntlett is a Principal Environmental Consultant in the Environment Team at AWN. He holds a Bachelor of Social Science in Environmental Planning and a Bachelor of Business Administration in Economics from Waikato University, New Zealand. Jonathan has over ten years' experience in environmental compliance, planning, and management of Environmental Impact Assessments, licensing, and urban planning. His recent projects involve Strategic Housing Development including Environmental Impact Assessment Reports (EIAR) and EIA Screening Reports, Strategic Infrastructure Development (SID), and planning applications for Information and Communications Technology (ICT) facilities; Environmental Protection Agency (EPA) Licence applications for biopharmaceutical and ICT facilities. Jonathan's expertise extends to impact assessment, licensing, environmental compliance, and project management. He has experience working in the environmental consultancy, planning, and regulatory fields from Ireland, the UK, and New Zealand.
Chapter 2 – Description of the Proposed Development	David Doran and Jonathan Gauntlett (As above)
Chapter 3 – Alternatives	David Doran and Jonathan Gauntlett (As above)
Chapter 4 - Population and Human Health	Marcelle Jordaan is an Environmental Consultant working on a range of projects including EIA reports, EPA license applications and license compliance, site visits, environmental audits, and regulatory compliance for developments across various sectors. Marcelle holds a BSc in Environmental and Biological Sciences from North-West University in South Africa, with a specialization in Environmental Microbiology.
Chapter 5 - Land, Soils, and Geology	Teri Hayes (BSc MSc PGeol EurGeol, Advanced Diploma Environment & Planning Law) is a Director of AWN. Teri is an environmental consultant (specialist expertise in hydrogeology) with over 30 years of experience managing environmental impact assessment, water resource assessment, contaminated land and licencing projects. Teri has led and contributed to many projects which have successfully achieved planning and licencing. Teri is a member and former President of the International Association of Hydrogeologists (IAH) and is a professional member of the Institute of Geologists of Ireland (IGI) and European Federation of Geologists (EurGeol). Her experience includes expert witness at public hearings, lecturing in EIA and risk assessment and providing expert advice for industry and planning authorities.

	Iain Williams (BSc, MSc, DIC, P.Geo, C.Geol, Eur.Geol). Iain Williams is a Senior Consultant within the AWN Consulting Environmental Team. He holds a BSc in Geology from Manchester University, a MSc in Mineral exploration from Imperial College London, and an MSc in Environmental Hydrogeology from University of Wales Cardiff. He is an Accredited Professional Geologist with the Geological Society of London, with the Institute of Geologists of Ireland, and with the European Federation of Geologists. He is also included on the Institute of Geologists of Ireland Specialist Register for persons deemed competent to sign off on hydrogeological assessments of landfill and contaminated land investigations. Iain has over thirty years of experience as a geo-environmental scientist in both industrial and consultancy sectors. He specialises in environmental hydrogeology, contaminated land and groundwater assessment, waste classification, construction ground and storm water management, construction and extractive industry environmental management, and extractive industry geology. Rashaqat Ali Siddiqui (BSc, Msc, MIT). Ali is a hydrogeologist with over 6 years' experience in water resource management and impact assessment. He has a Masters in Hydrogeology and is a former Education Secretary of the Irish chapter for the Association of Hydrogeologists (IAH). Ali's specialist area of expertise is water resource management, site investigation and monitoring, contaminated land Assessment, hydrological assessment and environmental impact assessment.
Chapter 6 - Hydrology and Hydrogeology	Teri Hayes, Iain Williams and Rashaqat Ali Siddiqui (As above)
Chapter 7 - Biodiversity	Jared Bennett is a Senior Consultant Ecologist with Scott Cawley Ltd. and is a Qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM). He obtained a Master's degree in Environmental Science from University College Dublin. Since joining Scott Cawley Ltd., he has carried out field surveys on major road schemes for protected species including bat, wintering birds, and marsh fritillary, and is experienced in habitat classification and assessment, having carried out numerous small, medium, and large-scale habitat mapping projects across Ireland. Jared has prepared Ecological Impact Assessment, Appropriate Assessment, and Natura Impact Statement reports. He has confidence using a range of software for habitat mapping (QGIS) and conducting bat call analysis (BatExplorer) and has given internal training of staff for using BatExplorer. Jared currently leads BNG assessment and reporting within Scott Cawley. Jared is the Project Manager for the delivery of the Biodiversity Assessments associated with the Proposed Development. Clíona O'Flaherty is a Senior Ecologist with Scott Cawley. Clíona holds an honours degree in Zoology from Trinity College Dublin and a Master's of Science in Environmental Sustainability from University College Dublin. She has over six years' experience working as a Senior Marine Biologist in the South Pacific with a further several years' experience working in Environmental Consultancy in Ireland. With over three years consultancy experience, Clíona has a wide range of experience in Ecological Impact Assessment, Wildlife Management and Restoration plans for a variety of projects. Since joining Scott Cawley Clíona has carried out field surveys on national infrastructure schemes for protected species including bat, wintering bird, and other mammal species. Clíona has experience contributing to desk studies and report writing for Appropriate Assessments, Natura Impact Assessments, Environmental Impact Assessments, Bat Derogation Licences, and is competent in the use of both desktop and mobile based GIS software.

Chapter 8 - Air Quality and Odour	Dr. Edward Porter (Director of Air Quality) holds a BSc from the University of Sussex (Chemistry), has completed a PhD in Environmental Chemistry (Air Quality) in UCD where he graduated in 1997 and is a Full Member of the Royal Society of Chemistry (MRSC CChem), the Institute of Environmental Sciences (MIEnvSc) and the Institute of Air Quality Management (MIAQM). He specialises in the fields of air quality, EIA and air dispersion modelling. Dr. Jovanna Arndt (Senior Air Quality Consultant) holds a BSc (Hons) in Environmental Science from University College Cork and completed a PhD in Atmospheric Chemistry at University College Cork in 2016. She is a Member of the Institute of Air Quality Management (MIAQM) and specialises in assessing transportation impacts on air quality using dispersion modelling and source apportionment of particulate matter. Jovanna has been involved in assessing air quality impacts from major Highways England road schemes, Clean Air Zones and major rail infrastructure in the form of HS2. She has also provided Air Quality Action Plan (AQAP) and Air Quality Management Area (AQMA) support to several UK councils.
Chapter 9 - Climate	Ed Porter and Jovanna Arndt (As above)
Chapter 10 - Noise and Vibration	Jennifer Harmon (Director) holds a BSc in Environmental Science and a Diploma in Acoustics and Noise Control. Jennifer has worked as a consultant since 2000, specialising in acoustics since 2001. She is a member of the Institute of Acoustics and has extensive knowledge in the field of environmental noise and vibration impact assessment, room acoustics, sound insulation and inward impact assessments. She has worked extensively on all aspects of environmental noise assessments and has developed numerous noise models and mitigation assessments for industrial and infrastructural projects throughout the country.
Chapter 11 - Landscape and Visual	Macroworks – Cian Doughan is an Associate Director in Macroworks who specialise in Landscape and Visual Impact Assessment (LVIA). Established in 1999, Macro Works provide a full suite of LVIA related tools and skills for a broad spectrum of energy, infrastructure and commercial developments. Cian Doughan is an honours graduate of Landscape Architecture from UCD and is now a full corporate member of the Irish Landscape Institute. His main field of interest in landscape Architecture is that of landscape planning and, in particular LVIA. Cian has completed assessments for a wide range of development types across our portfolio, including important water supply projects, as well as a range of wind farm and solar farm applications. Recent work includes Draft Landscape Design Guidelines for Irish Water Infrastructure projects, Ballinagree Wind Farm SID, Croaghaun Wind Farm, numerous Solar Farm developments, in addition to a wide range of infrastructure developments.

Chapter 12 - Archaeological, Architectural and Cultural Heritage	CRDS – Stephen Mandal holds an honours degree in Science (Geology) from Trinity College Dublin (1991) and a PhD in Geoarchaeology, also from Trinity College Dublin (1995). Following two years as a post-doctoral researcher in University College Dublin, he founded CRDS Ltd (established in 1997; incorporated in 1999), archaeological, cultural and architectural heritage consultants. As one of Ireland's leading heritage consultancies for almost 25 years, CRDS has employed over 600 archaeologists, undertaken some of the largest and most significant archaeological excavations throughout Ireland, and has won numerous national and international awards. He has overseen the writing of the Archaeology, Architectural and Cultural Heritage Chapters of in excess of 100 EIARs dating from 1997 to present. This experience covers the island a wide range of development types including small scale developments close to culturally sensitive sites, large scale developments and liner developments including roads, ESBI power lines, railways and cycle paths.
Chapter 13 - Material Assets – Traffic and Transportation	TrafficWise - Julian Keenan is an Engineer in practice and a director of Trafficwise Ltd. holding the degree of Bachelor of Engineering (Hons.) in civil engineering conferred by University College, Galway, in 1990. Mr Keenan is a member of the Institution of Engineers of Ireland and a member of the Chartered Institution of Highways and Transportation and has over 34 years engineering experience, including approximately seven years in local government in the United Kingdom and over 27 years of private engineering consultancy services in Ireland, of which 23 years have been with Trafficwise Ltd. He has specialised in roads design and traffic and transportation planning for approximately 29 years. Consultancy experience includes advising clients in relation to road schemes, residential, commercial, industrial and leisure developments for which the key work involves provision of professional services in the design and appraisal of schemes, including the preparation of planning applications and appeals. Mr Keenan has represented clients at An Bord Pleanála oral hearings for commercial development, strategic infrastructure development and represented landowners and stakeholders in relation to various road schemes and infrastructural works. He has given sworn evidence before the Property Arbitrator, including in relation to road schemes, and has provided expert witness testimony to the High Court.
Chapter 14 - Material Assets - Utilities	Marcelle Jordaan is an Environmental Consultant working on a range of projects including EIA reports, EPA license applications and license compliance, site visits, environmental audits, and regulatory compliance for developments across various sectors. Marcelle holds a BSc in Environmental and Biological Sciences from North-West University in South Africa, with a specialization in Environmental Microbiology.
Chapter 15 - Material Assets – Waste	Chonaill Bradley (Bsc ENV,PG Dip Circ Econ, AssocCIWM) is an associate in the Environment Team at AWN. He holds a BSc in Environmental Science from Griffith University, Australia and a Postgraduate Diploma in Circular Economy Leadership for the Built Environment from the Atlantic Technological University, Galway. He is an Associate Member of the Institute of Waste Management (AssocCIWM). Chonaill has over 10 years' experience in the environmental consultancy sector and specialises in environmental construction compliance, sustainability, resource and waste management.
Chapter 16 - Interactions – Interrelationship between the Aspects	This chapter is drafted with input from all relevant EIA team members, each contributing based on their technical and chapter specific expertise.
Chapter 17 - Cumulative Effects	This chapter is drafted with input from all relevant EIA team members, each contributing based on their technical and chapter specific expertise.

Chapter 18 – Schedule of Mitigation Measures	This chapter is drafted with input from all relevant EIA team members, each contributing based on their technical and chapter specific expertise.

1.3.4 EIAR Assessment Description of Effects

The quality, magnitude and duration of potential effects are defined within each specialist chapter of this EIA in accordance with the criteria provided in the EPA *'Guidelines on the* information to be contained in Environmental Impact Assessment Reports' (2022) as outlined in Table 1-5.

Table 1-5 Description of Effects as per EPA Guidelines (2022)

Effect Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	A change which does not affect the quality of the environment
	Negative	A change which reduces the quality of the environment
Significance	Imperceptible	An impact capable of measurement but without noticeable consequences
	Not Significant	An effect which causes noticeable changes in the character of the environment but without noticeable 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 consistent with existing and emerging 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 the majority of a sensitive aspect of the environment.
	Profound	An impact which obliterates sensitive characteristics
Duration of Effects	Momentary Effects	Effects lasting from seconds to minutes
	Brief Effects	Effects lasting less than a day
	Temporary Effects	Effects lasting less than a year
	Short-term Effects	Effects lasting one to seven years.
	Medium-term Effects	Effects lasting seven to fifteen years
	Long-term Effects	Effects lasting fifteen to sixty years
	Permanent Effects	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone, for example through remediation or restoration

Effect Characteristic	Term	Description
Probability of Effects	Likely Effects	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Type of Effects[17]	Indirect Effects	Impacts 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.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out
	`Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail
	Indeterminable	When the full consequences of a change in the environment cannot be described
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant impact is of greater significance than the sum of its constituents

1.4 Additional Assessments Required

The additional reports and/or assessments required under Legalisation or EU Directives other than the EIA Directive in respect of the Proposed Development are described in this section.

1.4.1 Water Framework Directive (Directive 2000/60/EC)

The Water Framework Directive (WFD) 2000/60/EC aims to protect and enhance the quality of the water environment (both surface water and groundwater) across all European Union member states. The WFD requires all EU member states to classify the current condition or 'status or potential' of surface and groundwater bodies and to set a series of objectives for maintaining or improving conditions so that water bodies maintain or reach 'good status or potential' during the next river basin management planning cycle. Environmental Protection Agency (EPA) and other stakeholders such as planning authorities are the competent authority for implementing the WFD in Ireland. As part of their role, these authorities must consider whether proposals for new developments (other than where exemptions apply) have the potential to:

- Cause a deterioration of a water body from its current status or potential; and/or
- Prevent future attainment of good status or potential where not already achieved.

[17] For the purposes of facilitating the Competent Authority in conducting Environmental Impact Assessment as defined by Annex 1 of the EU Directive, the terms "imperceptible effects", "not significant effects", "Slight effects", and "moderate effects" used within this report, while exhibiting varying degrees of impact, are all considered to be without significant consequence.

As a result, new developments that have the potential to impact on current or predicted WFD status are required to determine whether the project will cause a deterioration of the status of the body of surface water or if it would jeopardise the attainment of good surface water status, having regard to the existing status of the water body as designated in accordance with the Directive.

A WFD Assessment has been undertaken for the Proposed Development, the results of which are presented in Appendix 6.3 of Chapter 6 (Hydrology & Hydrogeology) and is included with the planning application documentation under a separate cover.

1.4.2 Habitats Directive (Directive 92/43/EEC) and Birds Directive (Directive 2009/147/EC)

The main EU legislation for conserving biodiversity is the Directive 2009/147//EC of the European Parliament and of the Council of November 2009 on the conservation of wild birds (Birds Directive); and the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive).

The Habitats Directive is the cornerstone of habitats and species protection in Ireland. The Habitats Directive (92/43/EEC) and the associated Birds Directive (2009/147/EC) are transposed into Irish legislation by Part XAB of the 2000 Act and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) as amended.

The environmental sensitivity of the Proposed Development site in respect of Natura 2000 sites designated pursuant to the Habitats Directive and the Birds Directive have been considered with reference to the applications Appropriate Assessment Screening, which comprises an initial impact assessment of a project; examining the direct and indirect impacts that it might have on its own or in combination with other plans and projects, on one or more Natura 2000 sites in view of the sites' conservation objectives.

The Appropriate Assessment Screening and Natura Impact Statement has been prepared for the Proposed Development by Scott Cawley ecological consultants and is included with the planning application documentation under separate cover.

1.4.3 Flood Risk Assessment

The Floods Directive (Directive 2007/60/EC) establishes a framework for the assessment and management of flood risks, with the aim to reduce the adverse consequences on human health, the environment and material assets.

The Floods Directive requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. The Floods Directive also reinforces the rights of the public to access this information and to have a say in the planning process.

The Floods Directive must be implemented in tandem with the WFD. In Ireland, the OPW is the national authority assigned with the implementation of the Floods Directive, which was transposed into Irish law by the EU (Assessment and Management of Flood Risks) Regulations SI 122 of 2010.

A Stage 1 and Stage 2 Site-Specific Flood Risk Assessment (FRA) has been prepared by AWN Consulting in accordance with the Planning System and Flood Risk Management Guidelines for Local Government (2009). The site-specific FRA has been included as Appendix 6.4 of Chapter 6 (Hydrology & Hydrogeology) and is included with the planning application documentation under separate cover.

Chapter 2 – Description of the Proposed Development

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2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Introduction

The Proposed Development primarily consists of an extension to the existing Knockharley landfill which will allow for the continued landfill operations at the site. The proposed extension will increase the landfill area by approximately 17.68 ha and add an additional 4.12 million m^3 of void space for landfilling.

The existing Knockharley Landfill facility (Industrial Emissions Directive (IED) Licence no. W0146-04), located in Knockharley, Navan, Co. Meath, is located on a c. 135.2 hectare site. The landfill has been developed and operated pursuant to grants of permission by Meath County Council under Planning Register Reference Nos. 01/5006 (An Bord Pleanála Reference No. PL.17.125891), NA60336 (An Bord Pleanála Reference No. PL.17.220331), and An Bord Pleanála under reference Nos. PL.17.PA0009, PL.17.PA0019, PA17.303211 and ABP-32169-25. The red line for the Proposed Development includes the entire existing landfill site as the extension will require modifications of combined services as well as modification to permitted landscaping berms.

The Knockharley Landfill facility as it exists to date (October 2025), as well as current construction works, form the baseline scenario for all of assessment carried out in this EIAR. Permitted development on the site which is not operational or currently under construction does not form part of the baseline scenario. See Section 2.2.3 for further details on these permissions. Table 2.13 illustrates expected timelines of both proposed and permitted development on the site and how these timelines overlap. The impact of these elements which do not form a part of the baseline have been assessed with respect to EIA in their own respective planning applications and will also be considered as a part of the cumulative assessment throughout this EIAR.

This chapter of the Environmental Impact Assessment Report (EIAR) presents a description of the Proposed Development comprising information on the site, design, size and other relevant features of the Proposed Development. The scope of this chapter aligns with the relevant legislation and guidance which comprises the following:

- EIA Directive (2011/92/EU), as amended by the 2014 EIA Directive (2014/52/EU) (herein referred to as the EIA Directive)
- European Commission 'Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report' (2017)
- EPA 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (2022) (herein referred to the as the EPA EIA Report Guidelines 2022).

This chapter summarises the existing site, the Proposed Development, its interaction with elements of the previously permitted but not yet developed extension (ABP PA17.303211)and the existence of the project as set out within the EPA EIA Report Guidelines 2022. This guidance advises that description of the existence of the project should define all aspects of the proposed lifecycle of the facility, including:

- Description of Construction;
- Description of Commissioning;
- Operation of the Project;
- Changes to the Project; and
- Description of Other Related Projects.

This chapter draws on and has been informed by the project design and summarises the key relevant details of the Proposed Development and its lifecycle as it relates to the EIAR. This description is not exhaustive, and as such the EIAR should be read in conjunction with the full application package. The Proposed Development is described in this chapter in terms of those environmental topics that will form the basis of the impact assessment process, the characteristics of the Proposed Development and potential

effects. The specialist assessments reported in this EIAR have been conducted using this description, and the full application package as a guide to the details of the development under consideration.

2.2 Existing Site and Infrastructure

2.2.1 Land Use and Site Context

The Proposed Development site is located within the townlands of Knockharley, Flemingstown and Tuiterath, Navan, Co. Meath and is currently primarily in use as an active landfill. The site is located c. 800m from the N2 National Primary Road and landfill facility has its own private entrance off the N2.

The landfill is primarily surrounded by agricultural land which is the primary land use of the wider region. There are dispersed residential properties in the vicinity of the site, with the nearest residential houses located along the Knockharley road to the immediate north of the site and along the Rathdrinagh/Flemingstown road (L5056) to the east of the site, as well as two sports grounds, the Kentstown Rovers FC pitch to the northwest and Balrath Park football ground to the northeast.

The Knockharley Stream (EPA Name: Flemingstown 08, EPA Code: 08F05) flows west to east through the northern portion of the site and then flows along the eastern boundary of the site where it the travels south /southeast away from the site and joins the Nanny river (EPA Name: Nanny (Meath), EPA Code: 08_757) c. 3km downstream. The Knockharley stream traverses or runs along the boundary of the site for c. 3km. A portion of the Knockharley Stream to the north of the landfill was diverted as part of the permitted ABP-303211-18 application.

The Kentstown Stream (EPA Name: Kentstown 08, EPA Code: 08K18) flow along the southern boundary of the site for c. 90 m before turning south and joining the Knockharley Stream c. 550 m downstream

Figure 2-1, Figure 2-2 and 2-3 below illustrates the existing site and its surrounding areas.

Figure 2-1 Location of Existing Site

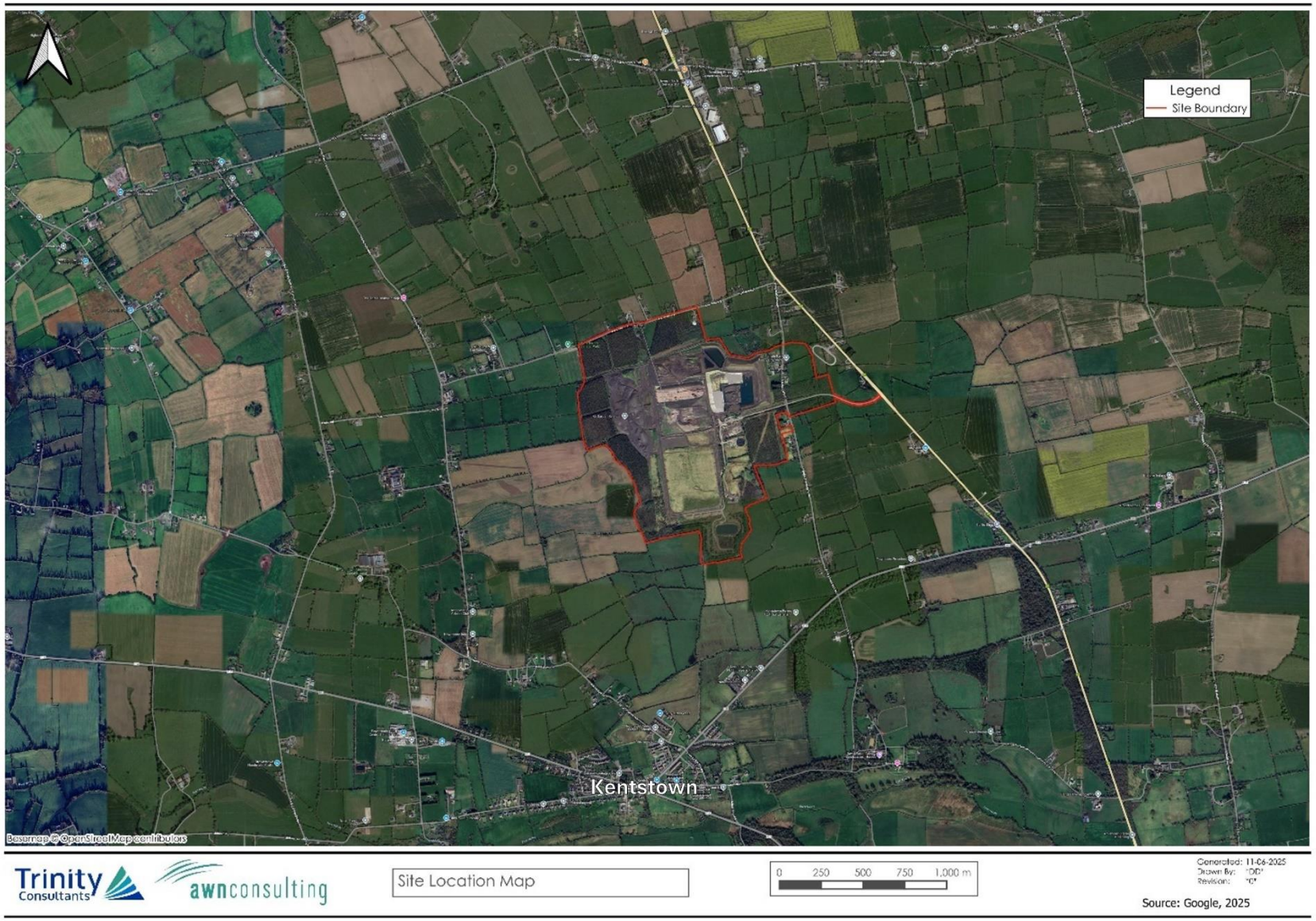
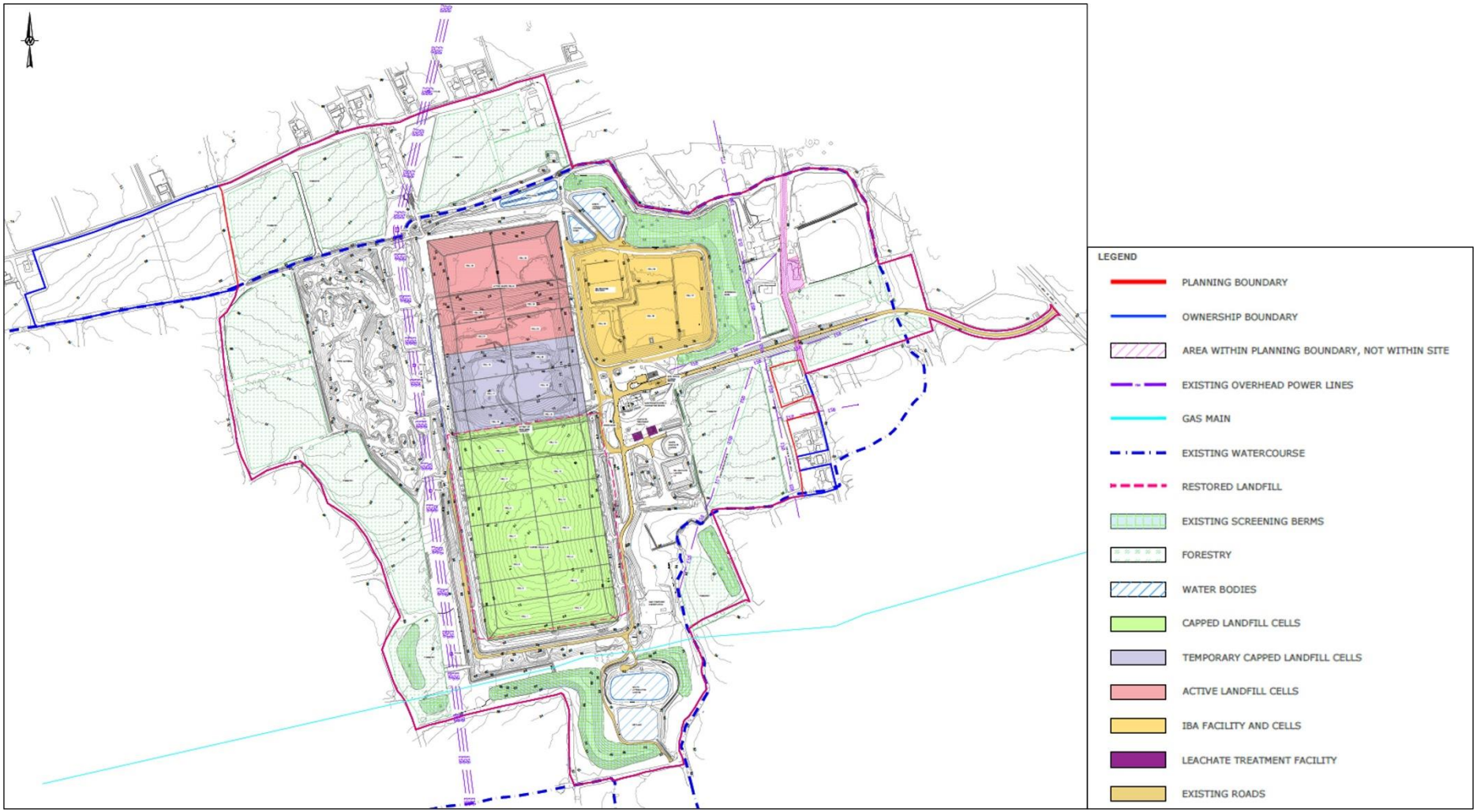


Figure 2-2 Aerial View of Existing Site (Date: May 2025, Source: Google Earth)



Figure 2-3 Existing Site Layout (Source: WSP drawing IE0037029.9627 004)



2.2.1.1 Related Planning History

The landfill was originally permitted in 2001 (Meath County Council (MCC) Reg. Ref. 01/5006) and subsequently additional permissions were sought. The approved permissions are listed here:

- MCC Reg. Ref. 01/5006
  - Construction and operation of an engineered landfill 25ha in area and 15m in height, with an annual waste acceptance of 180,000 tonnes of non-hazardous waste for 14 years.
- MCC Reg. Ref. NA50453
  - Material change of use of a maintenance building to offices.
- MCC Reg. Ref. NA60336 ACP Ref. Ref. PL.17.220331 (2006)
  - Extension of the landfill footprint (c. 2 ha.), an increase in the waste intake volume to 200,000 tonnes per annum, and the removal of the regional restriction on the origin of the waste accepted at the landfill by modifying condition no. 2(a) of permission ref. no. 01/5006 so the facility can accept waste from adjoining waste regions.
- MCC Reg. Ref: NA 70015 (2007)
  - The installation and operation of a gas utilisation plant on a 0.3ha site to generate up to 4.2MW of electricity to export to the National Grid.
- ACP Reg. Ref. PA0009
  - Proposal to increase waste acceptance to 400,000 tonnes per annum.
- MCC Reg. Ref. AA161431 (2017)
  - Extension of duration of grant of permission Reg. Ref. No. 01/5006.
- MCC Reg. Ref. AA180145 (2018)
  - Starrus LFG Ltd applied for permission for solar farm over reclaimed landfill with export capacity of approx. 3MW.
- ACP Reg. Ref. 303211 (2021)
  - Disposal, treatment and recovery of waste
- ACP Reg. Ref. 321769 (2025)
  - Alteration of ACP Reg. Ref. 303211

2.2.2 Existing Landfill

The existing Knockharley Landfill facility is located on a c. 135.2 hectare site. The current ongoing development is as per the ACP Reg. Ref. 303211 permission and allows for the acceptance of c. 440,000 tonnes of waste per year. The existing landfill is estimated to be filled to capacity by 2029. See Table 2-1 below which outlines breakdown of waste streams currently accepted on site.

The existing landfill facility currently consists of:

- 26 No. landfill cells across 7 No. linear Phases for current landfilling and capping upon reaching capacity (cell nos. 1 – 14 have received final capping to date and cells nos. 15 and 16 have been received temporary capping (see Section 2.3.8.1 for further details on capping);
- Incinerator Bottom Ash (IBA) Cells (Cells 27, 28, 29) for storage of up to 150,000 tonnes of IBA until recovery outlets are identified - to the east of landfill cell Nos. 20 and 22;
- IBA Process Building for the recovery of the IBA – is located in at the corner of Cell 29 to the east of landfill cell Nos. 24 and 26;
- IBA Cell 30 is the permitted future "piggy back" cell for the IBA facility, which bridges between IBA cell 29 and the existing waste landfill cells.
- A landfill gas treatment compound located to the southeast of the landfill;
- 2 no. waste leachate lagoons (L1 and L3) located east of landfill cells no. 10 and 12, 3 no. 25m^3 bunded above ground tanks, 2 no. IBCs, 1 no. containerised Reverse Osmosis plant units (C1) on one reinforced concrete bunded slab (Plant Bund) and 6 additional storage tanks on a second reinforced concrete bunded slab;

- A surface water management system; including surface water attenuation pond and wetland to the south of the landfill cells, and surface attenuation pond, wetlands and a holding pond to the northeast of the cells;
- An administration and maintenance buildings (including site office and weighbridge) to the east of the landfill
- North-south running 220kV ESB line close to the western site boundary;
- 2 no. ESB Substations, one importing power to Administration and maintenance buildings, with the other exporting from gas treatment compound;
- Existing site access via the N2 from the east;
- Existing screening berms at the south of the site and screening berm to the immediate east and north of the IBA Cells (No. 27 – 29), see WSP drawing ref: LD.PROJECTWEST 1.1 (EXISTING SCENARIO), submitted with the planning application;
- Car park to the administrative area of the facility; and
- A stockpile of cut material from cell's 19 - 22 located to the west of Cell's 15-22 (i.e. the proposed expansion area).

Table 2.1 Waste Acceptance IED Licence no. W0146-04 Schedule A2

Waste Type		Maximum (Tonnes Per Calendar Year)
Non-Hazardous Waste	Household, commercial, and industrial	285,000
	Bailed Recyclables, and Baled Municipal Solid Waste	
	Soil and Stone	
	Construction and Demolition	
	IBA (incinerator bottom ash)	150,000
Other Waste	Stable, non-reactive hazardous waste	5,000
Total		**440,000**

2.2.3 Permitted Expansion (Not Yet Built)

As noted above, planning permission was granted in 2021 (ACP Reg. Ref. 303211) for development at the landfill site including an increase in height of the permitted landfill cap height, an increase in the tonnage per annum and a number of development works to facilitate the permitted increase in capacity. The planning permission is still being enacted with a number of works ongoing or having recently been completed such as the permitted IBA Facility. The development works which have yet to be completed include:

- A C&D Fines Treatment Facility – recycling of construction and demolition fines (ACP Reg. Ref. 321769 (2025));
  - The C&D Fines Treatment Facility was originally permitted as a Biological Treatment Facility as per ACP Reg. Ref. 303211 but has been amended to a C&D Fines Treatment Facility as per ACP Reg. Ref. 321769. It is expected that the C&D Fines Treatment Facility will commence construction in 2026.
- Leachate Lagoon L2 and L4 (ACP Reg. Ref. 303211 (2021));
  - The Leachate Lagoon L2 and L4 was originally permitted as per ACP Reg. Ref. 303211. Leachate Lagoon L2 and L4 have not been required to date as the nature of waste accepted at the landfill has changed since the previous landfill capacity increase. The amount of putrescible waste accepted at the landfill site has reduced drastically over the past 7 years, driven mainly by increased brown bin usage, as such the extent of leachate generated at the landfill has also reduced, delaying the need to develop the permitted leachate lagoon's L2 and L4. Notwithstanding this, both L2 and L4 will ultimately be required and are extended to commence construction in 2026.

- Leachate Treatment Facility (ACP Reg. Ref. 303211 (2021));
  - Similar to the above, the Leachate Treatment Facility was originally permitted as per ACP Reg. Ref. 303211. The Leachate Treatment Facility has not been required to date as the nature of waste accepted at the landfill has changed since the previous landfill capacity increase. Notwithstanding this, the Leachate Treatment Facility will ultimately be required and are extended to commence construction in 2026.
- Planted Screening Berm at the north and west of the site (ACP Reg. Ref. 303211 (2021)).
  - The permitted capacity increase included the felling of planted forestry along the eastern and western boundaries of the site to accommodate berming (from the landfill void material – currently stockpiled to the west of Cell's 15-22).
  - The full extent of the permitted tree felling and berm development has yet to be carried out.
  - Should the proposed development be permitted, the permitted tree felling area and berm development will be incorporated into the proposed tree felling and berming requirements as set out within the proposed development description.
  - Should the proposed development not be advanced, it is estimated that the permitted works will be carried out in late 2026.

2.2.3.1 Existing Leachate Management System

The existing leachate management system was designed in accordance with the existing IED Licence for the facility (W0146-04), the Landfill Directive (Council Directive (EU) 2018/850 of 30 May 2018 amending Directive 1999/31/EC on the landfill of Waste), the Waste Management Act 1996 (as amended) and with EPA guidance (Landfill Manuals).

Leachate is formed when rain water seeps through the landfill, picking up contaminants like chemicals, organic waste, and heavy metals as it moves through the waste material. This polluted liquid collects at the bottom of the landfill and, if not properly managed, can leak out and pollute the surrounding soil and groundwater.

Leachate that gathers in the base of the existing landfill cells is collected in a leachate collection system comprising slotted drainage pipework, laid in a 'herringbone' fashion within a 500 mm thick leachate drainage layer of granular material laid on the cell floors. Leachate pumps are located in the low points of the cells, and leachate is pumped from side riser sumps to the perimeter leachate collection rising main. The leachate collection rising main discharges to the existing leachate lagoons or tanks.

The existing leachate storage system comprises 2 no. waste leachate lagoons (L1 and L3) located east of landfill cells no. 10 and 12, 3 no. 25m^3 bunded above ground tanks, 2 no. IBCs, 1 no. containerised Reverse Osmosis plant units (C1) on one reinforced concrete bunded slab (Plant Bund) and 6 additional storage tanks on a second reinforced concrete bunded slab.

Different leachate streams are currently generated from the following sources:

- Residual non-stabilised waste in landfill;
- Stabilised and inert waste in landfill; and
- IBA cells (weathering, placement cells and contaminated stormwater runoff).

The leachate management facility currently provides:

- At least 1 month's on-site attenuation storage for all leachate streams using both elevated above ground bunded tanks and below ground floating cover lagoons.
- On-site treatment and / or conditioning of respective leachate streams.
- Tankering loading facilitates for transport of treated and un-treated leachate to wastewater treatment plants.

Any treatment carried out on site is subject to EPA approval. See Section 3.36 of the IED Licence (W0146-04) for the facility for further detail on leachate management.

The current tanker loading facility facilitates the collection of treated or untreated leachate from the lagoons and tanks on-site within the leachate treatment facility. This allows the filling of two tankers concurrently. Each tank / lagoon has a valved discharge pipe that terminates in the tanker loading area at a manifold.

The vacuum tanker or similar drives into the tanker loading area and a flexible pipe connects the tanker to the manifold. Typically, a vacuum in the tanker facilitates removal of effluent from respective tanks.

The tanker loading area retains and connects to the in-situ below ground drainage system to accommodate, as required, spills and runoff from this area which are discharged to the in-situ leachate lagoon for subsequent treatment and or transfer off site to a waste water treatment facility.

2.2.3.2 Existing Landfill Gas Extraction

The existing landfill gas extraction management system was designed in accordance with the existing IED Licence for the facility (W0146-04), the Landfill Directive (Council Directive (EU) 2018/850 of 30 May 2018 amending Directive 1999/31/EC on the landfill of Waste), the Waste Management Act 1996 (as amended) and with EPA guidance (Landfill Manuals).

Landfill gas is extracted from all active and filled cells via vertical and horizontal gas wells. Gas wells are constructed from the cell floor upwards as waste is placed in each cell. Additional bored gas wells are constructed in each cell to aid gas extraction upon reaching a predetermined filling height. Gas extraction commences from each cell once sufficient waste has been placed above the leachate stone drainage layer to prevent air infiltration into the gas extraction system. In addition, short-term use of driven extraction pipes ('pin wells') are used as a temporary gas collection measure, close to the working face. A slotted horizontal gas collection pipe also is installed at the top of the cell side-slopes to intercept any gas travelling up the cell embankments.

Landfill gas is fed via both temporary over-ground and permanent below-ground HDPE pipes to a 355 mm HDPE gas ring main located outside the perimeter of the waste cells. The ring main transfers landfill gas from the cells to the landfill gas compound via two condensate knock-out pots located 'upstream' of the compound.

All capped cells to date, have a permanent gas collection system connected to the ring main.

Capping works for the other landfill phases will involve the installation of more condensate knock-out pots, permanent well heads and below ground pipes to enable management of the landfill gas field.

The landfill-gas compound is located east of the landfill footprint and north of the surface water lagoon.

The landfill gas treatment infrastructure consisting of enclosed flares and landfill gas utilisation engines are in the landfill gas compound. Currently, there are four engines on site. Two engines are run continuously as lead engines, these have a capacity of 1,000 m^3/hr, with no supplementary flaring.

Two back up engines of 800 m^3/hr capacity each are installed on site, however one is currently out of commission. There are 3 no. enclosed flares in the landfill gas compound, two duty and one back up. The two duty flares provide flaring capacity of 2,500 m^3/hr and 1,500 m^3/hr. The back-up flare is 1,500 m^3/hr.

See Section 3.33 of the IED Licence (W0146-04) for the facility for further detail on landfill gas management.

2.2.4 Existing Utilities

2.2.4.1 Existing Surface Water Drainage

Surface water on the site is managed via an existing surface water pipeline network, swales and surface water attenuation ponds and wetlands which is illustrated in Figure 2-4 below.

Swales are vegetated channels over which flows are conveyed at low non-erosive velocities to store and convey run-off and remove any collected pollutants. The existing swales drain collected rainwater run-off from capped areas of the landfill and the perimeter of the landfill footprint, IBA cell footprint and embankments surrounding the cells. These swales are of approximate depth 600 mm with a bottom width of 1000 mm and side slopes of 1 in 3. The swales were constructed in accordance with CIRIA C698, Site Handbook for the Construction of SUDS. As the landfill cells develop further, the surface water swales will continue to be constructed around the landfill footprint and embankments.

Surface water from the landfill footprint is drained via the main landfill perimeter swale to a purpose-built storm water attenuation pond and constructed wetland to the south of the site – known as the southern attenuation pond and wetlands. Surface water runoff from roads and hard standing areas discharge to a surface water trunk main collection pipe. This surface water trunk is located on the eastern side of the perimeter access road and runs between the administration building to the southern surface water attenuation pond. This below ground pipe main varies from 225 mm diameter up to 750 mm diameter. There is also a 450 mm diameter spur from this pipe main to the north of the permitted (yet to be constructed) C&D Fines Treatment Facility building which runs from east to west and turns north to receive runoff from the main site access road. The pipe discharges to an existing attenuation pond and wetland at the south of the site, via a Class 1 bypass proprietary oil/water separator. This petrol interceptor treats any accidental discharge of hydrocarbons within stormwater run-off prior to stormwater run-off discharging to the attenuation pond and further treatment provided by a wetland.

Surface water from the IBA cells and adjacent screening berm to the east is drained via the perimeter swales adjacent to these features to a purpose built attenuation pond, holding pond and wetlands to north of the IBA cells and to the northeast of the existing landfill footprint – known as the northern attenuation pond, holding pond and wetlands.

The attenuation ponds and wetlands were designed to manage the runoff from the development for up to a 1 in 100-year design return period storm event. The outflow from the southern attenuation pond and wetlands discharges into the local drainage network at the south-eastern corner of the site, while the outflow from the northern attenuation pond, holding pond and wetlands is to the local water course/drainage network at the north-eastern corner of the site.

The southern attenuation pond has a total storage volume of 20,369 m^3 - total dead storage volume of 13,481 m^3 and a total live storage volume of 6,888 m^3.

An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

The northern attenuation pond and holding pond have a total storage volume of 16,953 m^3 – total dead storage volume of 9,032 m^3 (7,047 m^3 and 1,985 m^3, respectively), and a live storage volume of 7,921 m^3 (6,317 m^3 and 1,604 m^3 respectively). The two ponds are hydraulicly connected, with a large diameter pipe, and function as a single attenuation system.

The outflow from the northern attenuation pond discharges at a maximum rate of 69 l/s and 109 l/s during a 1:1 and 1:100 AEP event, respectively.

An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

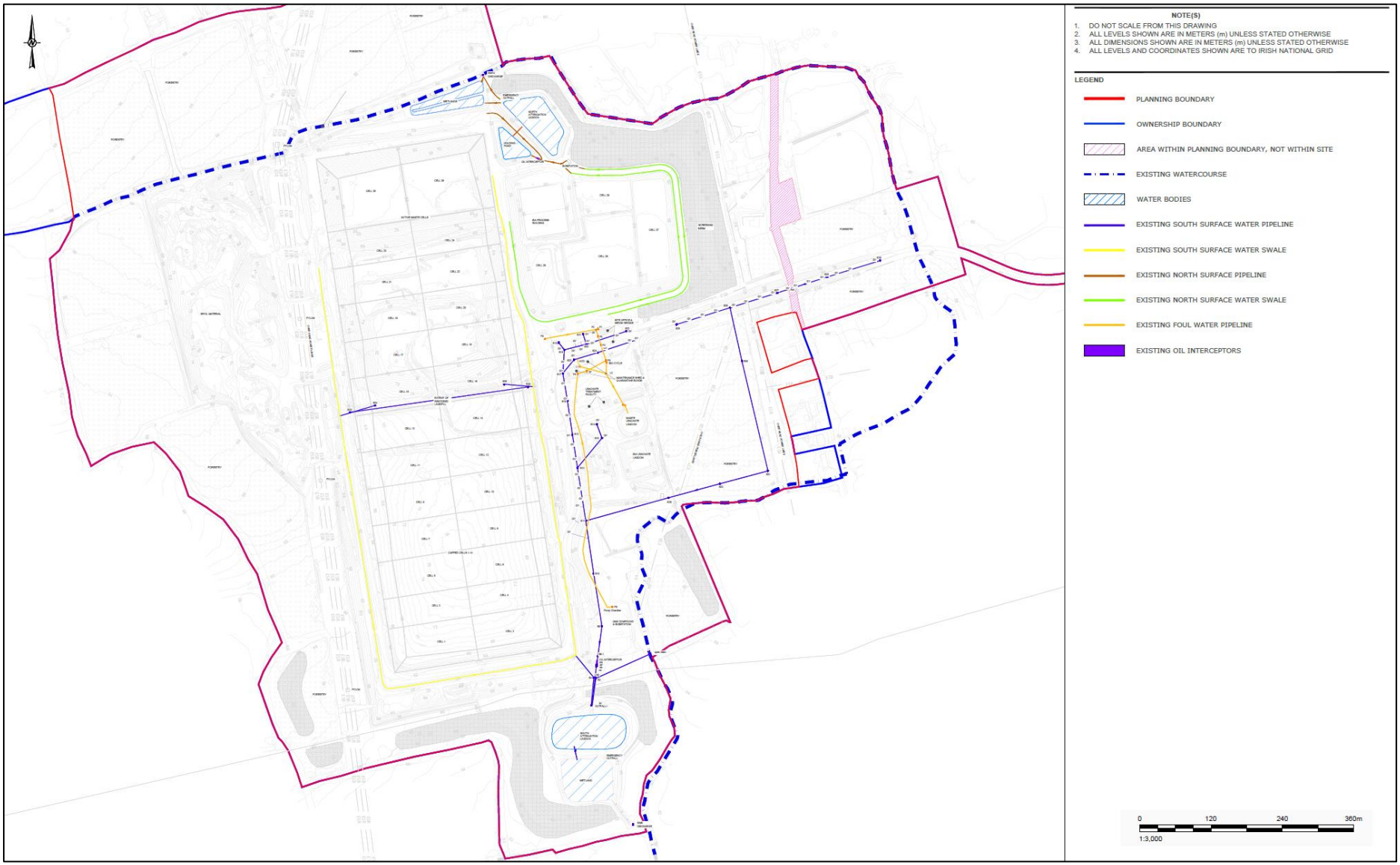
The storm water attenuation ponds (north and south) are lined with a composite barrier, comprising a HDPE membrane and a 1.0 m clay basal layer with a permeability of 1 x 10-9 m/s, which is the same

specification as the landfill cell clay barrier. The constructed wetlands (north and south) comprises a shallow clay-lined pond both naturally colonised and planted with appropriate species.

As per the IE Licence (W0146-04), currently there is continuous monitoring equipment on each pond inlet and on the discharge point of the northern surface water management infrastructure which monitors parameters on a continuous frequency as required by Schedule C.2.2 Monitoring of Emissions to Water, of the IE Licence.

Composite samplers have been installed at emission points SW09 and SW10 prior to discharge occurring to the Knockharley Stream. These are continuously monitored to ensure receiving water quality is maintained.

Figure 2-4 Existing Surface and Foul Water Network (WSP drawing ref: IE0037029.9627 017)



2.2.4.2 Existing Other Utilities

A number of utility services are located within the site area. Existing overhead power lines are present at the following locations:

- 220 kVA running north south and adjacent to the western boundary of the existing landfill footprint
- 20 kVA running north south on the eastern boundary parallel to the existing local road with spurs to:
  - An ESB substation exporting power from the landfill gas compound to a 20kVA line
  - An ESB substation importing power to the administration building

The 20 kV line provides electricity to the local community as well as supplying the existing landfill site.

There is an existing Gas Networks Ireland (GNI) gas pipeline running west to east through the south of the site just south of the existing landfill footprint and north of the existing surface water attenuation pond. There is no existing and there is existing and there is no proposed connection to this infrastructure.

The existing gas and power lines are shown in WSP Drawing ref: IE0037029.9627 004.

Telecommunications are provided to the local community and also service the main administration buildings onsite. A source of potable water for use in the canteen, welfare facilities and for general site cleaning is sourced from the mains supply. This water source also provides water to a fire hydrant onsite.

There is no foul sewer service in the area. All foul effluent generated from administration welfare facilities is collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

Surface water run-off drains over land and via a network of forestry and man-made drainage ditches to tributary streams of the River Nanny.

Runoff from the landfill facility developed as of 2017 drains via an operating drainage system from the landfill facility and is directed towards the southern storm water attenuation pond and afterwards to a constructed wetland before it is discharged to the Knockharley Stream.

2.2.5 Existing Development Site and Risk of Major Accident / Disasters

2.2.5.1 Control of Major Accident Hazards involving Dangerous Substances and Seveso Establishments

The Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. 209 of 2015) or 'COMAH' regulations define the "consultation distance" as a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment, including potentially significant consequences for developments such as residential areas, buildings and areas of public use, recreational areas and major transport routes.

Establishments are either lower tier establishments or upper-tier COMAH sites with above threshold quantities of dangerous substances present, and to which the provisions of the COMAH regulations apply. The Proposed Development does not meet or exceeds the thresholds for either lower or upper tier.

The Health and Safety Authority (HSA) list of Notified Seveso Establishments has been reviewed to identify if the Proposed Development falls within the consultation distance of any nearby Seveso Establishments. The closest Notified Seveso Establishments to the Proposed Development is the Lower Tier establishment Grassland Agro, Slane, Co, Meath, located c. 7 km north of the site. The Proposed Development site is not within the consultation distance of the Grassland Agro site, and therefore due to the separation distance there is no interaction with the Proposed Development at this location.

Therefore, there are no implications for major accidents or hazards at the Proposed Development site.

2.2.5.2 Landslides, Seismic Activity and Volcanic Activity

In general, risk of landslides in Ireland is considered to be low, as the country is not located in a region with high seismic activity or large mountain ranges. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff landslides and falls lead to recession of the cliffs. Landslides have occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The landslide susceptibility map (GSI spatial map viewer) identifies areas which are subject to landslides and is measured from low to high. The landslide susceptibility map considers the location of landslides and what causes them (slope, soil type and the impact of the flow of water). Based on the GSI spatial map viewer, the Proposed Development site is not in an area susceptible to landslides, with a GSI Landslide Susceptibility Classification of Low.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics, Dublin Institute for Advanced Studies, has been recording seismic events in Ireland since 1978 (www.dias.ie). This network consists of several seismometers that are located throughout Ireland. Seismic activity and earthquake risk in Ireland are generally considered to be low. This is because Ireland is located on the western edge of the Eurasian Plate, which is a tectonic plate that is not known for its seismic activity. However, earthquakes can still occur in Ireland, although they are typically small and have little impact. There is a very low risk of seismic activity to the Proposed Development site.

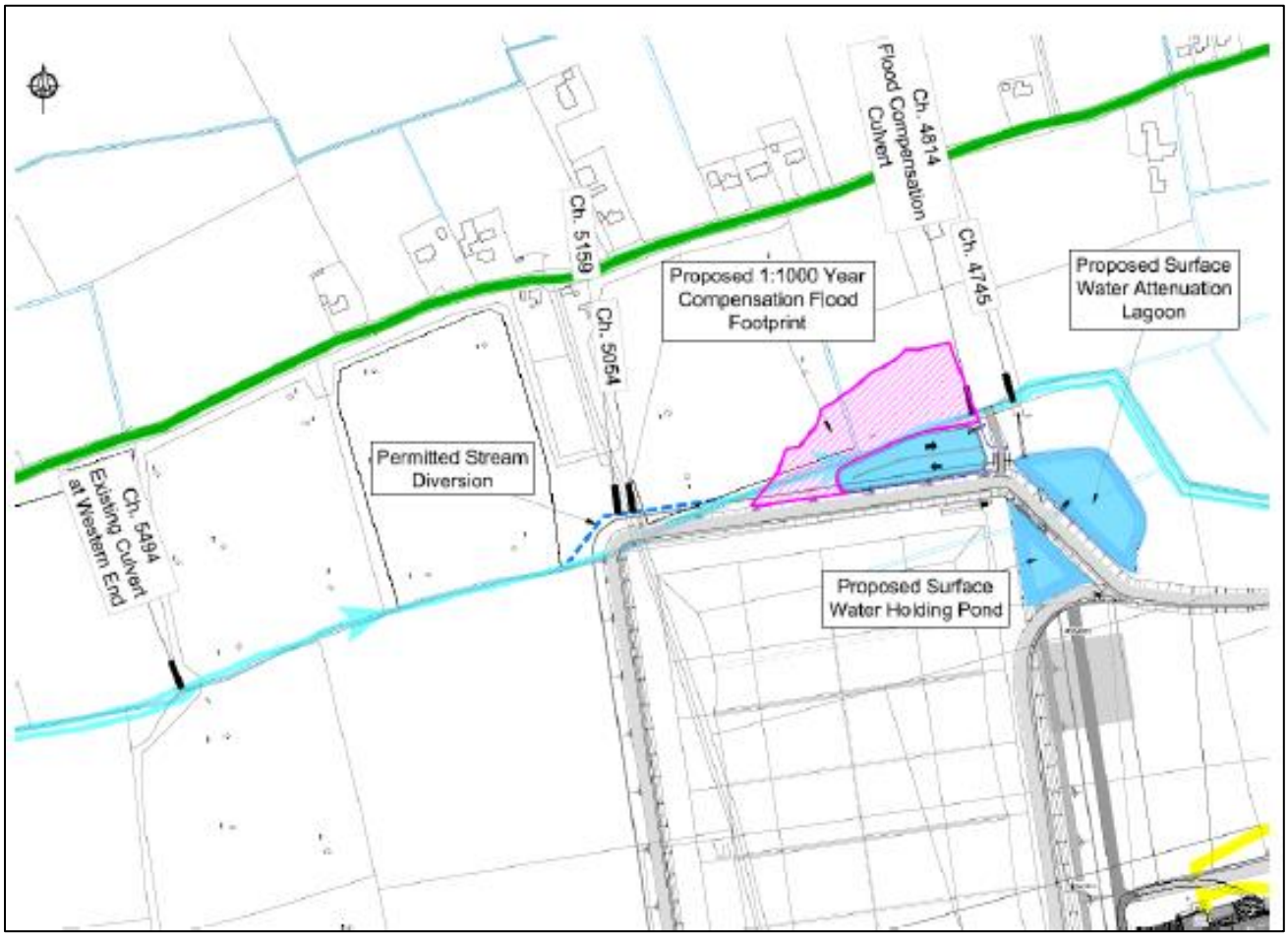
There are no active volcanoes in Ireland so there is no risk from volcanic activity.

2.2.5.3 Flood Risk / Sea Level Rise

A site-specific Flood Risk Assessment (FRA) has been undertaken by AWN (2025), and included with the planning application documentation, in accordance with the requirements of the Department of the Environment Publication "The Planning System and Flood Risk Management guidelines for Planning Authorities (FRMG) published in November 2009. The OPW CFRAM online mapping and the Meath County Development Plan 2021-2027 (Volume 4: Strategic FRA, 2021) were used to consider the risk of flooding to the Proposed Development site.

As noted in the FRA, the OPW mapping portal (www.floodinfo.ie) includes mapping showing the proposed layout is located primarily in Flood Zone C, however Flood Zone A (1% AEP event) and Flood Zone B (0.1% AEP event) are also present on the site. The mapping was developed by hydraulic modelling during the CFRAM projects undertaken for the OPW and is in line with the Meath County Development Plan 2021-2027 Strategic FRA. A Flood Zone B area is indicated in the permitted landfill area, associated with the existing northern attenuation pond as well as a Flood Zone A in its southern area associated with the existing wetland. However, part of the Flood zone B is now covered by the cell 25-26, therefore the extent of this zone may be obsolete. The Flood Risk Assessment prepared by the applicant as part of the ACP Reg. Ref. 303211 application estimated a 1:1000-year compensation flood footprint that replaces the Flood Zone B initially estimated by the CFRAM projects.

Figure 2-5 Existing Flood Footprint associated with Flood Zone B in the Northern Area (Source: Knockharley Landfill Ltd., 2018)



As indicated in the FRA, there is a medium risk from fluvial flooding on the site, given that the likelihood is 'possible' and the consequence is 'medium'.

The past flood events map created by the OPW does not present historical flood locations associated with the proposed development site. Small areas of indicative pluvial flooding are noted at the site and these areas are currently addressed by the existing surface water drainage in the landfill. The risk of pluvial flooding is therefore considered to be low.

The proposed layout is outside any coastal/tidal influence and the risk of coastal flooding can be considered low.

The Geological Survey Ireland (GSI) Groundwater Viewer shows no groundwater flooding events within the development site. The risk of groundwater flooding can be considered low.

Following the required Justification Test (since the vulnerability of this landfill is considered to be "High Vulnerable"), it is concluded that no residual risk is foreseen as the proposed development is not expected to affect the existing hydrological, morphological and hydraulic conditions that define the aforementioned Flood Zones, nor will the Knockharley Stream conveyance or the floodplain.

The northern attenuation pond has been already designed to provide storage for the 1:100 AEP event and any flow above the 1:100 AEP level is conveyed through an emergency spillway provided to safely pass any exceedance flows. The northern attenuation pond has sufficient capacity to allow for the proposed landfill extension.

The southern attenuation pond has been designed to provide long-term storage whose discharge has been designed to convey the 1:100 AEP event. The current attenuation capacity provided by the southern attenuation pond will need to be increased (See Section 2.3.4) to allow for the proposed landfill extension. Additionally, modifications to the discharge pipes will be required. An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

The Proposed Development works includes the diversion of the existing Knockharley Stream to facilitate the extension of the existing landfill footprint. The diverted stream will be open stream with the exception of the road crossing for the existing access which will require a culvert to allow the road to passover.

According to the Hydraulic Assessment carried out by WSP, the proposed culvert will have capacity to convey the design flood flow (1% annual exceedance probability or 1 in 100-year flow without significantly changing the hydraulic characteristics of the watercourse) with sufficient freeboard. The available freeboard at the culvert during the 1% AEP event, inclusive of climate change (calculated as 0.96 m). It has been confirmed by modelling that the flood risk in the catchment area for the 1% AEP + climate change will increase as a result of the presence of the proposed new culvert.

2.2.6 Industrial Emissions Licenced Facilities

The existing Knockharley Landfill facility has an existing IED Licence (W0146-04) issued by the EPA. The facility is required to comply with specific licence conditions, including monitoring and reporting on their emissions (such as emissions into the air, water, and soil), to ensure that they do not pose a risk to human health or the environment.

Table 2.1 below shows the closest IPC and IED Licenced facilities to the Proposed Development site according to the EPA (2025).

It is important to note that the proximity of a licensed facility does not necessarily mean that the Proposed Development will be impacted by their emissions. However, it is essential to consider these sites as part of the existing environment and to consider and understand the potential for cumulative impacts or other interactions with the Proposed Development at this location.

Table 2.2 EPA Licenced facilities nearby to the Proposed Development site

Registration number	Name	Category	License type	Distance (km) & Direction
W0146	Knockharley Landfill	Industry	IED Licence	0.0 km
W0140	Starrus Eco Holdings Limited (Slane)	Industry	IED Licence	1.0 km north
P0811	Dawn Meats Ireland Unlimited Company	Industry	IED Licence	2.5 km northwest
P1104	Mr. Shane Reynolds	Industry	IED Licence	2.9 km southwest
P0456	Marry Pig Farms Limited	Industry	IED Licence	3.5 km south
P1192	Runways Information Services Limited	Industry	IED Licence	3.5 km southeast
P0887	Mr David Murray	Industry	IED Licence	3.6 km east
P0917	Mr. Ivan Reynolds	Industry	IED Licence	4.1 km southwest

2.3 Characteristics of the Proposed Development

2.3.1 Extension of Landfill Footprint

The Proposed Development comprises the phased extension of the existing landfill footprint through the construction of ten (10 no.) additional engineered landfill cells, including the 'Piggyback Cell'. When the permitted and proposed landfill cells are capped (see Section 2.3.8), the Piggyback Cell will infill the void space between the permitted landfill cells 9 – 26 and the proposed landfill cells 31 – 39. This extension will increase the landfill area by approximately 17.68 ha and provide approximately 4.12 million m^3 (3.32 million m^3 of additional constructed void space with further void space of 807,000 m^3 for the 'Piggyback Cell') for the continued disposal of non-hazardous waste and limited quantities of hazardous waste, thereby extending the operational lifespan of the facility. The total footprint of landfill will be 109 ha. The breakdown per cell in shown in Table 2.3 below.

Table 2.3 Waste Cell Constructed Void Volumes (M^3 and T)

Infrastructure	Waste Cells Constructed Void Volume M^3	Waste Cells Constructed Void Volume (T)
Cell 31	288,773	317,650
Cell 32	261,538	287,692
Cell 33	353,740	389,114
Cell 34	314,983	346,481
Cell 35	369,778	406,756
Cell 36	304,180	334,598
Cell 37	506,916	557,608
Cell 38	403,793	444,172
Cell 39	513,758	565,134
Cell 40 "Piggyback"	807,000	887,700
Total	**4,124,459**	**4,536,905**

The design of the proposed landfill extension will be fully integrated with the existing landfill layout and will adhere to the same engineering, environmental protection, and operational standards currently in place. The proposed expanded landfill body will have a final post settlement contour height of 85 mOD (aligning with the existing permitted post settlement contour height of the active landfill).

As part of the Proposed Development, permission is also sought to continue the acceptance of waste at the facility until such time as the expanded landfill void is fully filled, i.e. it is proposed to continue the acceptance of 440,000 tonnes of waste per annum (up to 435,000 tonnes per annum of non-hazardous wastes and acceptance of up to 5,000 tonnes per annum of stable non-reactive hazardous waste) as is currently permitted at the facility. The quantum of non-hazardous waste - comprises up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables.

Overall, the waste acceptance profile under the Proposed Development reflects a continuation of current practices and does not introduce any new waste streams or significant changes to the facility's operational scope. The development is intended to ensure ongoing national and regional capacity for the environmentally sound disposal of residual waste.

The waste types to be accepted are:

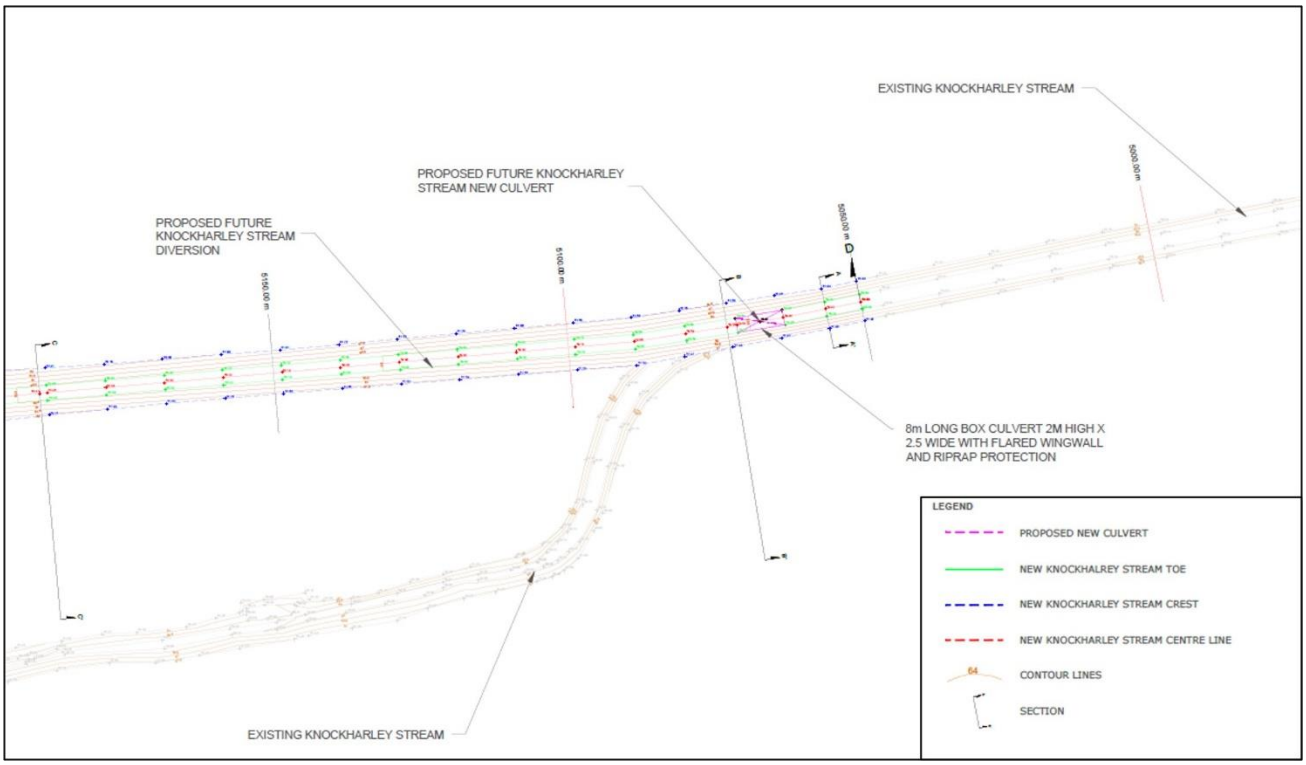
- Non-hazardous residual municipal solid wastes of household, commercial and industrial origin, which will have undergone various degree of pre-treatment from separate 'black bin' collection to biological treatment in the form of stabilised residual fines, as well as residual municipal solid waste (MSW) from other sources such as unauthorised landfill remediation and/or repatriated wastes;
- Non-hazardous incinerator bottom ash (which is currently accepted at the facility).
- Non-recyclable bulky wastes, where bulky wastes are broadly considered as larger wastes which do not fit in household/commercial bins e.g. mattresses, furniture etc.
- Non–hazardous soils and stones and other C&D wastes.
- Street sweepings and similar cleansing wastes.
- 'Individual' volumes of non-hazardous industrial wastes from various industries such as food preparation, chemical processes, thermal processes, metal treatments, health care (non-hazardous) and water/wastewater treatment industries, all of which are currently accepted at the facility.
- Stable non-reactive hazardous waste
- Baled recyclable waste (contingency storage)
- Baled MSW (contingency storage)

2.3.2 Knockharley Stream Diversion

As part of the extension of the landfill footprint, the diversion of the Knockharley Stream and the establishment of a new culvert along this diversion is required to facilitate a new access road crossing over the stream.

The proposed culvert will be a concrete box culvert which will be installed over an 8m section of the Knockharley Stream as illustrated in Figure 2-6 below.

Figure 2-6 Details of Stream Diversion and Culvert



The culvert will be buried to a minimum depth of 0.5 m below the stream bed and that the gradient in the culvert should not exceed 3%. The material used to embed the culvert is assumed to be similar to that of the existing stream bed.

Form	Size (m) (H:W)	Length (m)	US Invert Level (m)	DS Invert Level (m)	Slope
Box Culvert	2 m x 2.5 m (0.5 embedded below ground level)	8	59.52	59.46	0.008

Construction of the proposed culvert will be subject to the approval of the Office of Public Works (OPW), under Section 50 of the Arterial Drainage Act, 1945.

2.3.3 Relocation of Powerlines

As part of the Proposed Development, the relocation of an existing 220 kV overhead ESB powerline is required. This high-voltage powerline currently traverses the western boundary of the existing landfill site and would conflict with the footprint of the proposed landfill cell extension.

The Proposed Development will realign this overhead line within the wider site boundary. The relocation works will involve the decommissioning and removal of three (3 no.) existing 220 kV transmission towers that currently pass through the site.

In their place, seven (7 no.) new 220 kV towers will be installed along a revised alignment that maintains appropriate clearances from the landfill infrastructure and complies with ESB Networks statutory requirements. The new towers will each be between approximately 20.06 m and 26.175 , in height, see ESB drawing ref: PG567-D004-708-001-000 and PG567-D004-711-001-000, and WSP draw ref: 297705 Con-ESB-Sec submitted with the planning application (final height subject to detailed design by ESB Networks and site-specific constraints). All tower heights are detailed in Table 2.4 below.

Table 2.4 ESB Towers Type and Height

Tower	Height (Overall Height)	Type
T1	19m (21.06m)	Angle Mast
T2	22m (23.175m)	INT Mast
T3	19m (21.06m)	Angle Mast
T4	22m (23.175m)	INT Mast
T5	19m (21.06m)	Angle Mast
T6	25m (26.175m)	INT Mast
T7	19m (21.06m)	Angle Mast

The relocation works will be carried out in close coordination with ESB Networks and in compliance with all relevant health and safety legislation, electrical infrastructure guidelines, and environmental best practice. All works associated with the decommissioning of the existing towers and the construction of the new alignment will be subject to appropriate environmental management measures to avoid or minimise potential impacts on nearby sensitive receptors, habitats, or existing utilities.

2.3.4 Surface Water Network

The current surface water infrastructure system on the landfill site is split into two catchments, the northern catchment system, which includes a holding pond and the northern attenuation pond, and the southern catchment system which includes the southern attenuation pond. The Proposed Development will continue to drain to both these catchments for surface water management.

The following table notes the areas of the two catchments at the closure scenario (assuming Proposed Development is granted) for the site.

Table 2.5 Northern and Southern Catchment Area - Closure Scenario

Catchment	Capped/Landfill Area (ha)	Hardstanding Area (ha)	Greenfield Area (ha)	Area within planning boundary that does not report to ponds (ha)	Total Area (ha)
Northern	23.60	4.44	16.77	23.67	68.48
Southern	29.13	8.35	27.13	4.04	68.65
Total Site Area (ha)					137.13

Grassed swales have been proposed to provide treatment and convey surface water from the landfill to the attenuation ponds. One continuous swale will be constructed around the newly proposed landfill cell perimeter. A portion of this swale will direct surface water towards the northern attenuation pond and a portion will direct surface water towards the southern attenuation pond. See WSP drawing ref: IE0037029.9627 017A submitted with the planning application.

All swales will be 600 mm deep, with 1:3 side slopes and a bottom width of 1 m. There may be some minor tweaks to the dimensions of the swale laid out above which will take place at detailed design stage.

The northern attenuation pond and holding pond have a total live storage volume of 7,921 m^3 (6,317 m^3 and 1,604 m^3 respectively). The total storage volume required to attenuate the 1:100 AEP event is 7,901 m^3, therefore the Northern Attenuation Pond and the Holding Pond will be sufficient to accommodate the design storage volume, however modification will be required to the discharge pipe arrangements. The two ponds are hydraulicly connected, with a large diameter pipe, and will function as a single attenuation system.

The Southern Attenuation Pond has a total live storage volume of 6,888 m^3. The total storage volume required to attenuate the 1:100 AEP event is 9,464 m^3. The current attenuation capacity provided by the Southern Attenuation Pond will need to be increased from approximately 6,888 m^3 to the proposed total capacity of approximately 12,700 m^3. Additionally, modifications to the configuration of the outlet pipes will be required.

A 10% increase in the precipitation depth has been incorporated into the design to allow for climate change, based on section 3.12 of the Greater Dublin Regional Code of Practice. Consideration was also given to Flood Risk Management, Climate Change Sectoral Adaptation Plan (CCSAP), prepared by the OPW under the National Adaptation Framework, which recommends an increase of 20% in extreme rainfall depth for the Mid-Range Future Scenario (MRFS). However, given the short time-frame over which active closure will occur, and the relatively short facility life-time, application of this more extreme climate change allowances in design was considered excessively conservative.

A high-level analysis of storage requirements during post-closure has been undertaken to confirm that the High-Range Future Scenario 30% increase in extreme rainfall can be accommodated in the proposed attenuation ponds.

2.3.4.1 Knockharley Stream Diversion

The Proposed Development works includes the diversion of the existing Knockharley Stream. It is proposed to realign the river to the north of the current channel to facilitate the extension of the existing landfill footprint. The diverted stream will be open stream with the exception of existing access road crossing which will require a culvert to allow the road to passover. A separate Section 50 consent is being sought from the Office of Public Works (OPW) for the culverted portion of the watercourse, in accordance with the requirements of the Arterial Drainage Act 1945 (as amended).

Consultation has taken place with Inland Fisheries Ireland (IFI) regarding the design of the stream diversion and culvert. IFI conducted a site visit on 8th May 2025 as part of the consultation and following the visit issued correspondence to note they were satisfied with what was being proposed. Requirements

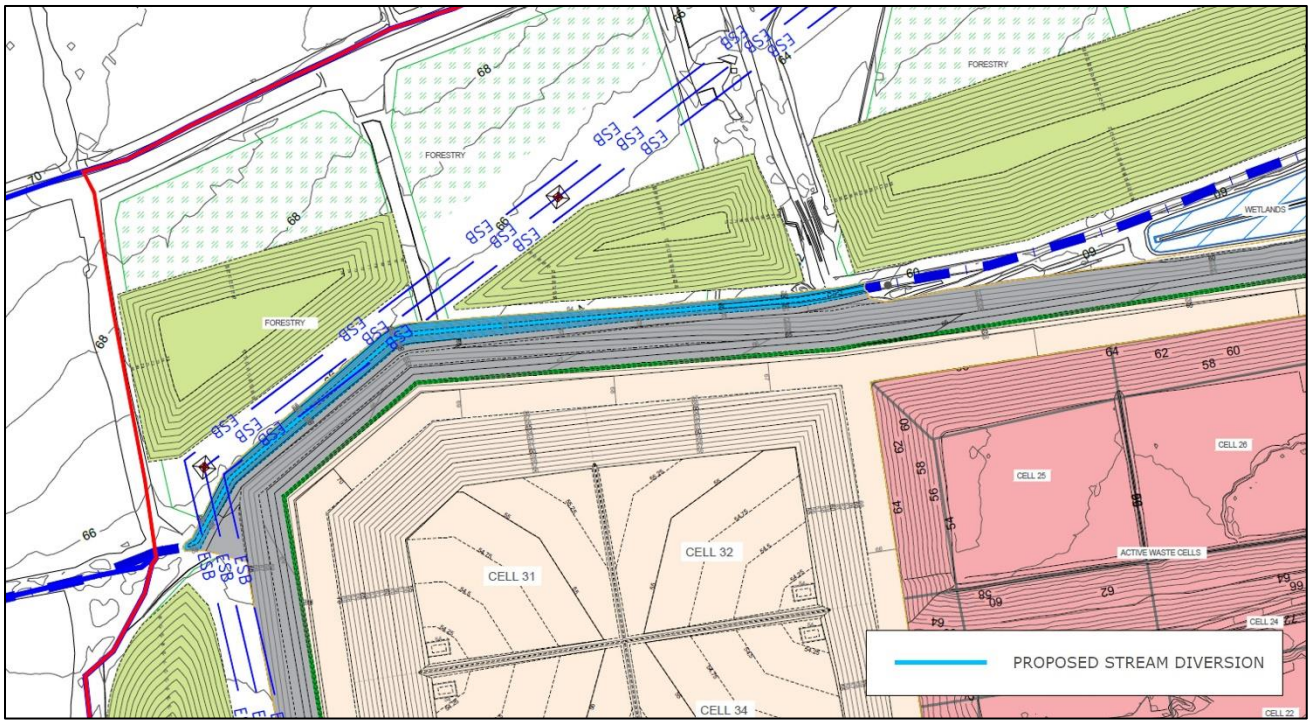
for the culvert construction were agreed on and incorporated into the design. Specifically, that the culvert will be buried to a minimum depth of 0.5 m below the stream bed and that the gradient in the culvert should not exceed 3%. The material used to embed the culvert will be similar to that of the existing stream bed.

A Culvert Hydrologic and Hydraulic Assessment has been prepared by WSP (2025) and submitted with the planning application documentation. The report summarises the methodologies employed and outcomes from the completed hydrologic and hydraulic assessment.

The design of the diversion aims to preserve the existing hydrological function of the stream and will not result in any significant changes to flow regime, connectivity, or water quality. The open channel sections will be designed to mimic natural conditions and will incorporate geomorphological features such as, pools and riffles where feasible, along with appropriate bed and bank materials to promote aquatic and riparian habitat.

Figure 2-7 below illustrates the proposed stream alignment.

Figure 2-7 Proposed Stream Diversion



2.3.5 Site Landscaping and Berm Development

As part of the Proposed Development, a comprehensive site landscaping and berm development strategy will be implemented to visually integrate the landfill facility into the surrounding landscape, mitigate potential visual and acoustic impacts, and contribute to the long-term restoration and ecological enhancement of the site. See the Landscape Drawings prepared by Macroworks and the Biodiversity Management Plan prepared by Scott Cawley, submitted with the planning application

Berms will be formed through the reuse of excavated soils arising from the construction of landfill cells. This approach supports the principles of resource efficiency and sustainability by reducing the requirement for off-site disposal of excavated material and minimising the need for importation of fill.

The berms will be located along site boundaries to provide effective visual screening of operational areas from nearby receptors, including residential dwellings and local roadways. The berms will also serve to reduce the transmission of noise and dust beyond the site boundary.

Table 2.6 below. Of note, a single 10 m high screening berms is permitted at the western boundary of the site with a total volume of 513,107 m^3. (as per ACP: Reg Ref: ABP-303211-18). The Proposed Development intends on altering this permitted design of the western berms and instead includes development of 3 individual berms (Berm 10, 11 and 12 as indicated on Figure 2-8 below) with a total proposed volume of 310,228 m^3.This equates to a reduction of 202,879 m^3 from the permitted western berm. As per Table 2.6 below, the total proposed berm volume is 627,682 m^3. This is 101,820 m^3 greater than the current permitted and not constructed berm volume.

The proposed northern berms(Berm 1, 2 and 3, see Figure 2-8 below) will range between 10 - 14 m in height. The proposed western boundary berms (Berms 10, 11 and 12) height will range from 9 – 12 m high. The proposed eastern boundary berms (Berms 5 and 7) will be to a maximum height of 6 m. The haul roads for construction will be in or immediately adjacent to berm footprint.

Following construction, berms will be covered with a layer of topsoil and seeded with appropriate grass and wildflower mixes to encourage vegetation establishment, soil stabilisation, and habitat development. Where appropriate, native trees and hedgerows will be planted or on at the foot of the berms to further enhance biodiversity and contribute to the site's long-term restoration objectives. See the Landscape Strategy prepared by Macroworks and the Biodiversity Management Plan prepared by Scott Cawley, submitted with the planning application.

During the operational phase, a total of 6.63 ha of native woodland and 0.63 ha of native riparian vegetation will be planted along the realigned Knockharley Stream. During the reinstatement phase, a further 1.6 ha of native woodland planting will also be established. In total, 8.86 ha of native woodland will be established as part of the Proposed Development works during the operational and reinstatement phases.

The wider landscaping plan will also include enhancement of existing vegetation, planting of native species, and the creation of habitat corridors to support local wildlife. Landscaping works will be carried out in accordance with best practice guidance and any conditions attached to planning permission or the EPA waste licence.

Figure 2-8 Proposed, Permitted and Existing Landscaping Berm Layout

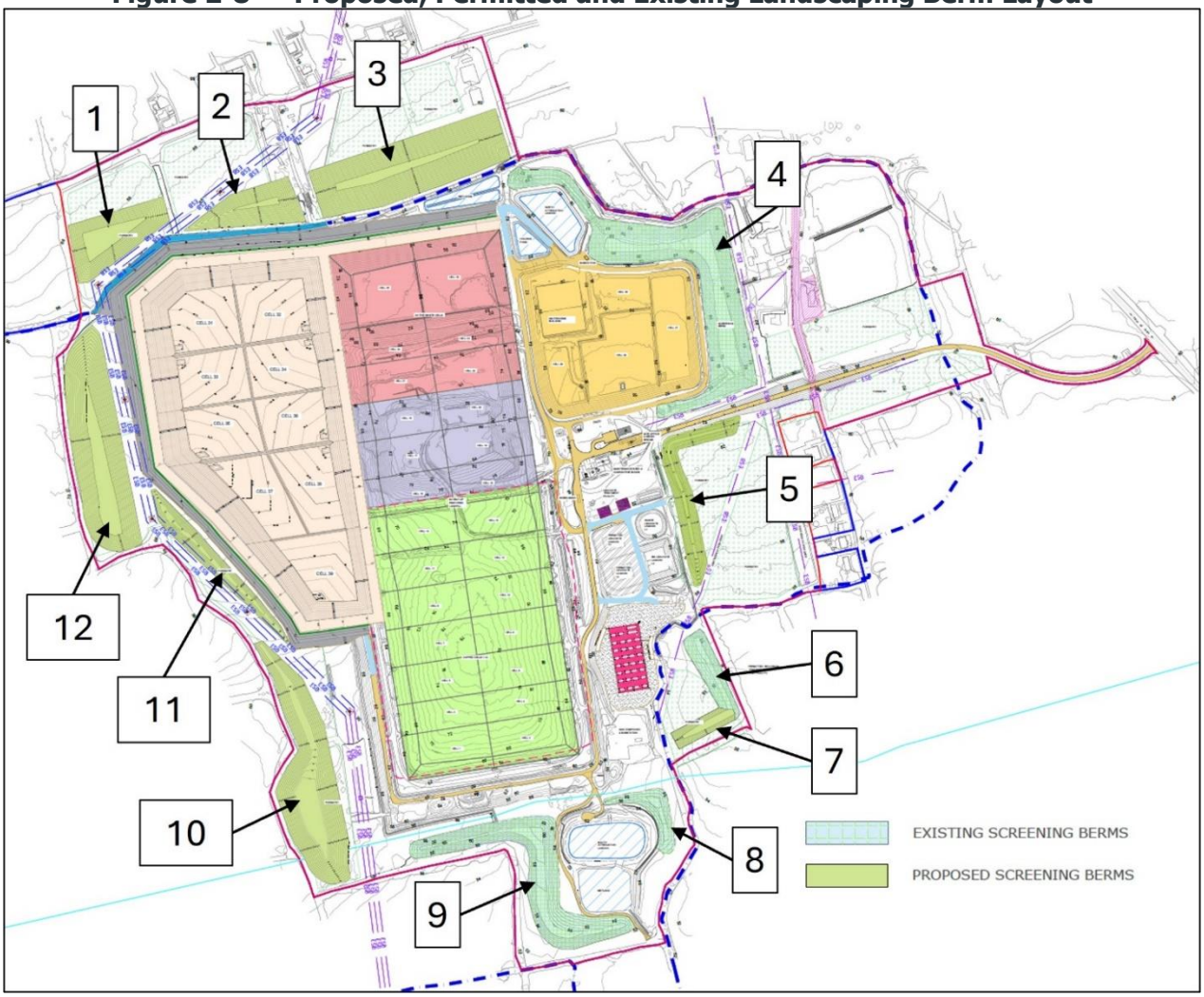


Table 2.6 Proposed and Permitted Berm Volumes

Berm Number	Status	Permitted and Not Constructed Berm Volumes (m^3)	Proposed Berm Volumes (m^3)	Proposed v Permitted Balance
1	Proposed	-	52,938 m^3	+ 52,938 m^3
2	Proposed	-	38,651 m^3	+ 38,651 m^3
3	Proposed	-	191,790 m^3	+ 191,790 m^3
4	Permitted and Constructed	-	-	-
5	Proposed (partially permitted)	12,755 m^3	26,708 m^3	+ 13,953 m^3
6	Permitted and Constructed	-	-	-
7	Proposed	-	7,367 m^3	+ 7,367 m^3
8	Permitted and Constructed	-	-	-
9	Permitted and Constructed	-	-	-
10	Permitted and Partially Constructed (proposed alteration)	513,107 m^3	133,774 m^3	- 202,879 m^3
11	Permitted and Not Constructed (proposed alteration)		21,962 m^3	
12	Permitted and Not Constructed (proposed alteration)		154,492 m^3	
Total		**525,862 m^3**	**627,682 m^3**	**+101,820 m^3**

2.3.6 Landfill Gas Management System

The landfill gas management system for the proposed landfill cells will follow the same methodology as previously employed on site.

Landfill gas will be extracted from all active and filled cells via vertical and horizontal gas wells. Gas wells will be constructed from the cell floor upwards as waste is placed in each cell. Additional bored gas wells will be constructed in each cell to aid gas extraction upon reaching a predetermined filling height. Gas extraction commences from each cell once sufficient waste has been placed above the leachate stone drainage layer to prevent air infiltration into the gas extraction system. In addition, short-term use of driven extraction pipes ('pin wells') will be used as a temporary gas collection measure, close to the working face. A slotted horizontal gas collection pipe also will be installed at the top of the cell side-slopes to intercept any gas travelling up the cell embankments.

Landfill gas will be fed via both temporary over-ground and permanent below-ground HDPE pipes to an 355 mm HDPE gas ring main located outside the perimeter of the waste cells. The ring main transfers landfill gas from the cells to the existing landfill gas compound via two condensate knock-out pots located 'upstream' of the compound.

A gas booster pump will be required to enable the captured gas to reach the gas compound.

Capping works for the proposed landfill phases will involve the installation of more condensate knock-out pots, permanent well heads and below ground pipes to enable management of the landfill gas field.

See Section 3.33 of the IED Licence (W0146-04) for the facility for further detail on landfill gas management.

2.3.7 Leachate Management System

The leachate management system for the proposed landfill cells will follow the same methodology as previously employed on site.

Leachate that gathers in the base of the proposed landfill cells is collected in a leachate collection system comprising slotted drainage pipework, within a 500 mm thick leachate drainage layer of granular material laid on the cell floors. Leachate pumps will be located in the low points of the cells, and leachate will be pumped from side riser sumps to the perimeter leachate collection rising main. The leachate collection rising main will discharge to the existing leachate lagoons or tanks on site. To manage the additional leachate generated by the Proposed Development, 2 no. containerised Reverse Osmosis plant units are proposed which would be stationed on reinforced concrete bunded slabs (Plant Bund) and 12 no. additional storage tanks (6 no. per Reverse Osmosis plant unit) which would also be stationed on reinforced concrete bunded slabs.

See Section 3.36 of the IED Licence (W0146-04) for the facility for further detail on leachate management.

2.3.8 Completion and Landfill Capping

Upon reaching full capacity, each of the proposed landfill cells will be progressively capped in accordance with the facility's waste licence and relevant environmental and engineering standards. The capping process is a critical component of the landfill lifecycle and serves multiple functions, including minimising rainwater infiltration, controlling landfill gas emissions, improving visual integration with the surrounding landscape, and facilitating final restoration and aftercare.

2.3.8.1 *Residual non-stabilised waste temporary capping*

As per the current practice on site, the active area of the landfill will be covered with daily cover. The near-horizontal working platform will be covered with soil and woodchip and the slope of the working face will be covered with synthetic cover sheets at the end of each working day.

Daily soil/woodchip covers will be installed as areas of the landfill reach respective lift heights. These cover systems are used to minimise odour nuisance, facilitate gas extraction, contain litter, discourage scavenging birds and to provide a working platform for vehicles.

Temporary synthetic low-permeability covers (intermediate capping) will be installed as areas of the landfill reach full height.

Temporary synthetic covers are designed to facilitate odour control, to minimise leachate generation and to allow differential settlement to occur prior to installing the final landfill cap. These practices will continue for future residual non-stabilised waste inputs.

2.3.8.2 *Stabilised and inert waste temporary capping*

Capping systems over stabilised and inert wastes will adopt similar approaches albeit that odour and landfill gas will not be generated.

2.3.8.3 *Permanent engineered cap*

The final permanent engineered cap makeup will be in accordance with the existing IE Licence (W0146-04) for the site and is subject to EPA approval. The proposed expanded landfill body will have a final post settlement contour height of 85 mOD (aligning with the existing permitted post settlement contour height of the active landfill).

A fully engineered cap will be placed over all wastes within 12 months of wastes reaching the pre-settlement final contours. This cap will comprise an under liner geocomposite for management of gas

and/or leachate, a 1 mm fully welded LLDPE liner, sub-surface drainage layer, subsoil layer and topsoil layer. The overall thickness of the soil layers will be 1 m in accordance with the requirements of the licence.

Surface drainage swale outfalls will convey storm runoff from the permanent cap to one of two surface water attenuation ponds, to the north or south of the site, respectively. Please refer to Section 2.2.3.1.

Permanent capping will take place on a phased basis as landfill cells are filled. Phasing is discussed further in Section 2.4.7.

Landscaping on the cap will comprise an amenity / meadow grass. Following completion of the cap, the landfill will enter the aftercare phase, which will be undertaken in accordance with the IE Licence (W0146-04) and Closure, Restoration and Aftercare Management Plan (CRAMP) for the facility.

2.3.9 Industrial Emissions License

As part of the Proposed Development, a review of the existing IED licence will be undertaken with the EPA to ensure that the licence appropriately reflects the changes associated with the extension of the landfill footprint, including:

- The increased landfill footprint and additional void capacity;
- The continued acceptance of the existing waste streams;
- The construction of new infrastructure (e.g. landfill cells, screening berms, and capping systems);
- Management of leachate and landfill gas
- Any updated environmental protection measures or monitoring requirements.

The licence review process will include the submission of updated technical documentation to the EPA, including revised site plans, environmental impact assessments, and operational details.

The Proposed Development will at all times be operated in full compliance with the facilities IED Licence.

2.4 Description of Construction Phase

This section outlines the key activities associated with the construction phase of the proposed landfill extension at the Knockharley Landfill. The construction works will be implemented in a phased and controlled manner, in accordance with best practice construction and environmental management standards, to ensure the protection of the surrounding environment and local communities.

Construction works will primarily involve the development of new landfill cells, associated infrastructure (including surface water management systems, gas and leachate collection systems), internal roads, screening berms, and ancillary works. The construction phase will also include the relocation of the existing 220 kV ESB overhead powerline that currently traverses the site, as well as the implementation of landscape and environmental mitigation measures.

While the nature of a landfill facility means that some construction activities are ongoing throughout the operational life of the site (e.g. progressive cell development and capping), the proposed extension will require a defined programme of enabling works and initial infrastructure development prior to the acceptance of waste into the new landfill void.

All construction activities will be carried out under the supervision of suitably qualified personnel and in compliance with relevant planning conditions, the existing Industrial Emissions (IE) licence (W0146-04), and the facility's Environmental Management System (EMS). Measures will be in place throughout the construction period to manage potential impacts such as noise, dust, traffic, and surface water runoff, and to safeguard human health and the environment.

Subsections below provide further detail on the sequence and scope of construction activities, estimated programme and duration, materials management, and environmental mitigation measures to be employed during the construction phase.

2.4.1 Summary of Main Works

The construction phase of the Proposed Development at Knockharley Landfill will be carried out in a phased, systematic manner to ensure that operational continuity throughout the works. While the detailed construction programme will be finalised prior to commencement, this section provides a high-level overview of the key construction activities that are relevant to the Environmental Impact Assessment and associated mitigation planning.

The construction works include a combination of enabling infrastructure, landfill cell development, and landscaping and capping activities. These works will take place within and adjacent to the footprint of the existing landfill, which is an operational facility regulated under Industrial Emissions Licence W0146-04. The construction phase will also overlap with ongoing permitted activities at the facility, including cell filling and berm construction under ACP Reg. Ref. 303211. See Section 2.4.9 for further details.

A summary of the key construction activities is presented in the tables below and described in more detail in the following subsections:

- **Table 2.7**: Summary of Key Enabling Works
- **Table 2.8**: Summary of Landfill Cell Development

These works will be undertaken in accordance with the facility's existing and updated Environmental Management Plans and Construction Environmental Management Plans (CEMP), and will incorporate all necessary mitigation measures to prevent significant adverse effects on the receiving environment.

Table 2.7 Summary of key enabling works

Activity	Description of Activity
Site preparation Works and Establishment of Construction Services	The site compound for the Proposed Development will be located adjacent to the existing site compound on site. See Section 2.4.2 below for further details. A site compound will provide office, portable sanitary facilities, equipment storage, parking etc for contractors for the duration of the works. The site compound will be fenced off for health and safety reasons so that access is restricted to authorised personnel only. All areas under construction will be fenced for security and safety purposes and temporary lighting supplied, as necessary. All required enabling works and surveying and setting out for structures, archaeological investigation (if required) etc. are carried out.
Forest Clearence	Overall, in terms of vegetation removal, there will be some c. 20 ha of existing forestry and vegetation removed within the site, of which 7.1 ha is already permitted as per ACP SID Reg. ref 303211. Therefore, the proposed development includes for the removal of some c. 12.9 ha of existing forestry and vegetation within the site. Timber will be managed in accordance with best practice forestry removal and reuse principles.
Stream Diversion	A section of the Knockharley Stream will be diverted northwards to facilitate development. This will require the creation of a new engineered stream channel designed to mimic the natural hydrological and ecological functions of the existing watercourse.

Activity	Description of Activity
Powerline Relocation	An existing 220 kV ESB overhead powerline, including 3 no. existing 220 kV towers, will be decommissioned and removed. A total of 7 no. new towers (approx. 21.06 to 26.175 m in height) will be installed in revised locations to facilitate the landfill layout. All works will be completed by ESB Networks.
Earthworks and Excavation	This phase will include site clearance, vegetation removal, and site levelling prior to the major excavation works and cell development In total, 1.77 million m^3 of soil and stone will need excavated to facilitate the proposed extension of the existing landfill footprint and all ancillary works. Approximately 1.3 million m^3 will be reused on site – see Table 2.10 for further details. c. 420,133 m^3 of material will need to be removed off site for appropriate reuse, recycling or disposal. There will be a requirement for bulk removal of soil and stone from the site during excavation works. It is proposed that the 10m high permitted screening berms permitted by ACP Ref: 303211) are amended. It is proposed that the western berms will now range between 9 – 12 m in height and consist of 3 no. individual berms rather than once continuous berm (which facilitates the relocation of powerlines on site). The proposed northern berms will range between 10 - 14 m in height. The proposed eastern boundary berms will be to a maximum height of 6 m. Haul roads for construction will be in or immediately adjacent to berm footprint. Installation of granular fill for haul roads and footpaths will be complete on an ongoing basis as required.
Landscaping	Replanting and new planting of 8.86 ha of newly created native woodland (during the operational and reinstatement phases) to off-set loss of commercial forestry in the proposed development footprint at the following locations: ► Planting around the perimeter of screening berms (following construction of berms) ► Planting on the perimeter of landfill cells (decommissioning stage) ► Other areas of the site as they become no longer required during the construction, operational or decommissioning stages. An additional 4.04 ha of woodland planting will need to take place off site to fully compensate the loss of 12.9 ha of woodland planned as part of the Proposed Development.

Table 2.8. Summary of landfill cell development

Activity	Description of Activity
Progressive Cell Development	Cell construction will be undertaken in discrete phases over the operational lifespan of the extension. The construction and grading of side slopes and the installation of base liners will be completed incrementally as demand requires.
Cell Development Excavation and Earthworks	It is currently envisaged that the 10 no. landfill cells will be excavated on a phased basis over a 17 year period. Waste cell filling will take place in tandem as the construction of cells are complete. See Section 2.4.4 for further details. In total, 1.77 million m^3 of soil and stone will need excavated to facilitate the proposed extension of the existing landfill footprint and all ancillary works. There will be a requirement for bulk removal of soil and stone from the site during excavation works.

Activity	Description of Activity
	Construction and grading of the side slopes will be complete on an ongoing basis. Once the site has been excavated to the required levels, additional earthworks will include levelling and laying a clay liner the base of the cells and side slopes.
Landfill Support Construction	Once cells are excavated to base level, the following layers will be constructed: ► A composite barrier system comprising an underliner drainage system to control groundwater; ► A clay liner; ► A HDPE drainage liner; and ► A drainage stone layer will be placed above the HDPE barrier within which collection pipework will facilitate leachate removal. Side slopes will be overlain with a protection geocomposite or similar, to protect the liner during waste placement. Refer to Section 2.4.4 below.
Surface Water, Leachate, Landfill Gas Connections	New infrastructure developed as part of the landfill extension will be connected to the existing systems, in accordance with approved design specifications and licence requirements. The capacity of the southern attenuation pond is being expanded from 6,888 m^3 to 12,700 m^3

2.4.2 Site Preparation Works and Establishment of Construction Services

The Proposed Development is located on the Knockharley landfill facility site, and primarily consists the expansion of this facility. There is ongoing construction on the landfill facility site under another permitted planning application (ACP Reg. Ref. 303211). This work entails excavation of landfill cells and ancillary works associated with this permission.

The site preparation works and establishment of construction services related to the proposed development encompass several essential tasks. These include organising staff, setting up temporary facilities, acquiring equipment, materials, and establishing construction systems. During this phase, the staff will receive comprehensive training in health, safety, and environmental practices to ensure a secure working environment.

Existing third-party services and utilities will be identified, marked, and necessary warning posts erected, especially for overhead cables present on the site.

Initial establishment works involves setting up a protective barrier around the construction zones using fencing materials that are designed to restrict unauthorised access. Security fencing around the site helps control who can enter the construction area and prevents and accidents.

As construction on the site is ongoing under permitted permissions, there is an existing site compound located within the site boundary. The site compound for the Proposed Development will be located beside the existing offices where provision will be made for parking, material set down and welfare facilities. The existing IBA building and permitted cell development will be complete by end 2025, following this the construction stage of the Proposed Development will be managed from the existing IBA development site compound.

The site construction compound serves as the central hub for various activities and functions during the construction of a project. It is a temporary setup that provides essential welfare facilities and space for workers, equipment, materials, and administrative needs. The following elements will be required for the Proposed Development:

- Security and Access Control: The compound will have security measures in place to control access and ensure the safety of workers, equipment, and materials. Adequate site security will be maintained throughout the contract period.
- Offices and Meeting Rooms: The compound will include office spaces for project managers, engineers, and administrative staff. Meeting rooms are providing for holding discussions, presentations, and planning sessions.
- Walkways: Segregation will be employed on site to separate pedestrians from heavy equipment. Fenced off pedestrian walkways will be provided close to the site offices.
- Welfare Facilities: Welfare facilities are designed to provide comfort and basic amenities for workers. This will include restrooms, showers, drying rooms, changing rooms, and break areas.
- Plant Storage and Machinery Storage: Construction equipment and machinery are stored in designated areas within the compound.
- Materials Storage: Construction materials, such as cement, and other supplies are stored in organized areas within the compound. Proper storage helps prevent damage to materials and ensures they are readily accessible when needed.
- Parking: Adequate parking spaces are provided for workers' vehicles, construction vehicles, and equipment that are not in use. On public roads adjacent to Proposed Development, the parking of construction vehicles on footpaths, grass verges and double-parking will be prohibited.
- Designated Waste Storage Areas: Segregated waste storage areas will be identified within the compound to properly store different types of construction waste, such as debris, packaging materials, and hazardous substances. If hazardous materials are present they will be contained to prevent leaks or spills.

2.4.3 Site Clearence Works

The preparation of the Proposed Development site will initially entail the clearance of c. 25.2 ha of habitat removal comprising of c. 12.9 ha of woodland, as well as spoil and bareground and recolonising bareground.

The proposed landfill extension location is currently used to store material excavated in the construction of permitted landfill cells on the site. This material will be moved from the landfill extension location and use to form the proposed berms on the site.

2.4.4 Construction of Landfill Cells

In total, 1.81 million m^3 of soil and stone will need excavated to facilitate the proposed landfill expansion and all ancillary works - this figure includes c. 414,854 m^3 of stockpiled material on the area where the proposed cell construction is to take place. 1.44 million m^3 of material will be retained on site for the construction of embankments, berms, capping and use as clay liner. It is currently envisaged that the 9 no. landfill cells will be excavated on a phased basis over a 17 year period.

As the construction phase is over 15 years and under 60 years, construction phase impacts will be described as ***long-term*** throughout this EIAR in line with the EPA EIA Report Guidelines 2022.

The total quantities of cut and fill on site to allow the proposed development to proceed are noted in Table 2.9 and Table 2.10 below.

Table 2.9. Total cut on site

Cut Soil	Volume (m^3)
Cell Construction Cut Volume	1,331,548
Knockharley Stream Diversion Volume	7,386

Cut Soil	Volume (m^3)
Lower Road Cut Volume	1,071
Existing Stockpiles Volume	414,854
South Attenuation Pond Extension	52,640
Total Cut volume	**1,807,499**

Table 2.10. Total fill on site

Fill Soil	Volume (m^3)
Non Permitted Screening Berms North Volume	339,416
Permitted Screening Berms Permitted Volume	288,266
Lower Road Fill	46,375
Capping Volume (Proposed Cells)	301,977
Cell Construction Fill Volume	120,689
Clay Liner - Volume Cells and South Attenuation Pond Extension	168,443
Clay Liner Volume - South Attenuation Pond Extension	12,943
Capping Volume (Existing Cells)	162,325
Total Fill Soil	**1,440,434**

The total quantity of material which will be required to be exported off site is 367,065 m^3. It is currently anticipated that Regulation 27 (commonly referred to as "Article 27") of the European Communities (Waste Directive) Regulations 2011 as amended will be utilised to manage all excavated material which requires removal from the Proposed Development site.

This material will be taken to authorised recovery/backfilling sites, such as Tara Mines (Boliden) or other similar facilities. The Applicant has engaged with Tara Mines (Boliden) and there is currently capacity at this site for the volume of soil to be removed, however soil removal is subject to the approval of a Regulation 27 By-Product Notification, which has not been register with the EPA at the time of writing (December 2025) and also subject to capacity at the time.

Following excavation of soil and stone to the specified depth, the proposed landfill cells will be constructed in a similar manner as the cells which have been constructed under the permitted permissions and in line with the current IED Licence (W0146-04) for the existing facility.

2.4.4.1 Formation

This will involve bulk excavation of the in-situ material to the formation elevation for the base and embankments. A portion of the embankments will require a level of filling of material to achieve the formation elevation, in total this will be c. 120,689 m^3 of material.

The majority of the material to be excavated is dark grey to black, boulder clay and will be deemed suitable for reuse in the current works, and future cells, as clay liner material, following screening. In addition, minor amounts of silts, sands and gravels may be present in the excavated material. The surplus material shall be stockpiled and used for the construction of berms, restoration, landfill capping and daily cover, as appropriate.

Following excavation to the formation level, the footprint will require trimming, grading and compaction prior to the placement of the compacted clay liner layers on the base and embankment slopes. The final excavated surfaces shall be trimmed and rolled to provide a clean, even and firm foundation to permit the movement of construction vehicles without causing rutting or other deleterious effects. Compaction of the underlying soil materials shall be in accordance with Table 6/4 Methods 2 and 3, as appropriate, in accordance with Clause 12 of the TII Earthworks Specification for National Roads, series 600 – September 2024.

A minimum of 4 passes of a minimum 10 tonne vibratory roller is required for the underlying soils.

Soft spots and areas of unsuitable materials identified shall be excavated and replaced with suitable material placed and compacted and / or shall be improved in-situ via compaction or the installation of appropriate geosynthetics.

2.4.4.2 Base

The proposed design for the landfill extension incorporates 9 no. cells with the bases grading towards the sumps located at the outer corner of each cell. Cell bases vary in area between c. 9,050 m^2 and c. 11,028 m^2 and are located approximately 15 m below the crest and grade at 1(V):100(H) and 1(V):150(H) towards the sump. Cell base elevations are approximately 55 mOD at the high internal corners and approximately 54.0 mOD at the low external corner where the sump is located.

WSP drawings "Proposed Site Cross Section AA & BB" and "Proposed Site Cross Section CC, DD & EE" shows sections through the cell bases.

2.4.4.3 Embankments

The embankment upstream side-slopes shall be battered at no steeper than 1(V):2.75(H) with a final crest width of approximately 16.5 m. Embankment crest elevations along the west side of the landfill for cells is approximately 65.5 to 71 mOD, east side of the landfill is approximately 62.75 to 66.5 mOD, south side of the landfill is approximately 62.75 to 65.5 mOD and north side of the landfill is approximately 66.5 to 69.25 mOD.

For the construction of the cells, the existing ground elevation shall be graded, compacted and profiled to provide a suitable working platform for the construction of the embankment. The existing ground shall be assessed by proof-rolling with soft spots identified, excavated and remediated with suitable fill material compacted in appropriate layers.

Suitable fill material shall be sourced from the bulk excavation of the proposed landfill cells. The general fill shall be placed in maximum 300 mm layers and compacted by a minimum of 4 passes of a 10-tonne vibrating smooth drum roller.

An anchor trench measuring 0.6m wide x 0.6m deep shall excavated on the crest of the embankment, offset by 1 m.

The embankment crest elevations grade gently at approximately 1(V):400(H) from the western embankment to the north of the eastern embankment (existing Embankment) and 1(V):70 (H) from western embankment to the south of the eastern embankment (existing Embankment) with the highest point on the western embankment and the lowest point on the southeastern embankment. This gentle grading facilitates the draining of condensate from the gas ring main via a drip leg system and to facilitate surface water movement.

WSP drawings "Proposed Site Cross Section AA & BB" and "Proposed Site Cross Section CC, DD & EE" shows sections through the perimeter embankments.

2.4.4.4 Bunds

Bunds are proposed to be constructed at 12 no. discrete locations, as per below:

12 no. bunds, typically 2 no. within each cell. These bunds comprise a minimum 1 – 1.5 m high bund above the cell base elevation with a 0.5 m wide crest and sides slopes of 1(V):2(H). The bund crest is at a level elevation of c. 56.5mOD which leads to an increase in bund height as the cell base elevation decreases.

The bund shall be constructed of compacted clay liner material with a maximum hydraulic conductivity of 1×10^{-9} m/s, above the 1 m depth of compacted clay basal liner and trimmed to grade.

WSP drawing "Proposed Site Cross Section CC, DD & EE" shows a section through the bunds.

2.4.4.5 Lining System

2.4.4.5.1 General

Suitably experienced civil engineering earthworks and lining system personnel will be employed to construct the lined areas for waste disposal. The works shall be overseen by a suitably experienced civil engineering consultant and by suitably qualified and experienced CQA personnel.

Installation of 2 mm HDPE geomembrane liner for the base, slopes and bunds, overlain by the determined protection geotextile, will be carried out following the completion of the compacted clay liner.

2.4.4.5.2 Design

As with the other existing landfill cells at Knockharley and in accordance with Condition 3.29.1 of the licence, a composite lining system comprising of a minimum of 1 m depth of compacted clay with a maximum hydraulic conductivity of 1×10^{-9} m/s, a 2 mm thick HDPE geomembrane and a geotextile protective layer is proposed for the cell bases, bunds and embankment upstream side slopes.

The grade of protection geotextile, compatible with the leachate drainage stone procured, will be determined by Cylinder Test prior to the start of the Works.

The composite lining system for the cell bases and over the inter-cell bunds shall comprise a smooth 2 mm HDPE geomembrane overlain by a protection geotextile. The geosynthetic materials shall be secured at the downstream toe of the inter-cell back bund via a gravity anchor.

The composite lining system for the embankment upstream side-slopes shall comprise a double-textured 2 mm HDPE geomembrane overlain by a protection geotextile. The geosynthetic materials shall be secured in an anchor trench at the crest.

The lining system arrangement will be as per Section 3.29 of the IE Licence.

2.4.4.5.3 Compacted Clay Liner

The proposed material to be used to construct the compacted clay liner (CCL) is the indigenous clay soil found at the site. The bulk excavation, approximately 1.77 million m^3, should provide an adequate supply of boulder clay from the footprint of the landfill cells. A portion of selected excavated material will be screened to provide clay liner material for the cells.

The clay to form the mineral element of the composite lining system will meet the following requirements:

- Hydraulic Conductivity < 1 x 10-9 m/s (BS1377:1990:Part 6);
- Plasticity Index 10-30 (BS1377:1990:Part 2);
- Percentage fines (particles < 0.075 mm) > 20% (BS1377:1990:Part 2);

- Percentage gravel (particles > 4.76 mm) < 30% (BS1377:1990:Part 2);
- Maximum Particle Size – 50 mm, with a well graded distribution; and
- Moisture Content - between – 2% and + 3% of optimum moisture content based on laboratory compaction tests.
- Previous testing of the boulder clay present on site has determined the following:
- The dry density of each lift shall be greater than 2,000 kg/m3.
- The moisture content of the clay during compaction shall be between 7 and 13 percent to achieve maximum dry density and the permeability criteria.
- It is noted that the screened material on site is particularly susceptible to drying out and the Contractor shall ensure that suitable plant is readily available on site to moisture condition the material.

The clay shall be placed and compacted using vibratory rolling equipment in the positions and to the profiles shown on the drawings. The glacial till material shall be placed in four layers not exceeding 300 mm loose depth (no greater than 250 mm when compacted) and shall be compacted to at least 95% of the Standard Proctor maximum dry density. The fill shall be placed level and evenly and shall be maintained at all times with a sufficient camber and an even surface.

The moisture content shall be strictly controlled to within the range of -2% to +3% optimum moisture content determined by the Standard Proctor method. If further borrow source permeability testing indicates a wider range will provide the required permeability with an adequate level of confidence, the engineer may amend these limits. If necessary, water shall be added, or the fill shall be spread to dry, to achieve the required moisture content.

A Construction Quality Assurance / Construction Quality Control (CQA/CQC) testing programme of the CCL shall be undertaken in accordance with the EPA's Landfill Design Manuals and will include:

A level survey of the formation level and the completed levels of the CCL:

- Verification of the perpendicular thickness of the CCL;
- Standard Proctor Testing on samples taken from the proposed stockpiles / sources of clay;
- Field Nuclear Density Gauge (NDG) tests on each lift;
- Triaxial permeability tests on core samples taken;
- Particle Size Distributions Testing on samples taken;
- Moisture Content Testing on samples taken; and
- Atterberg Limits Testing on samples taken.

A CQA Plan shall be prepared in advance of the proposed works and independent construction quality assurance carried out in accordance with the EPA Landfill Site Design Manual. A CQA / CQC validation report shall be prepared following the works as required by Condition 3.20.5 of the IE Licence.

2.4.4.5.4 Geomembrane

A 2 mm thick HDPE geomembrane (double textured on side slopes and smooth on the cell base and bunds) shall be installed above the compacted clay liner. The double textured liner shall extend a minimum of 1.5 m onto the cell floor from the toe of the upstream side slopes. The installation of the HDPE geomembrane will be subject to strict CQA in accordance with the EPA's Landfill Design Manual.

The area to be lined shall be compacted to provide a dry, firm smooth unyielding foundation to the satisfaction of the CQA Engineer. All bases, bunds and slopes to be lined within the proposed landfill cells shall be profiled to the grades and elevations as shown in the drawings submitted with the planning application.

The supporting surface slopes and foundation to accept the liner shall be stable, smooth and free of foreign and organic material, rocks larger than 18 mm, any angular rocks, sharp objects, or any other projections that might damage the lining.

Geomembrane liner panels shall be installed in accordance with a detailed Panel Layout Plan prepared by the contractor and submitted to the CQA Engineer for approval before laying commences. The Panel Layout Plan should show the proposed starting point and direction of working. Panels shall be placed so that seams lie parallel to the steepest gradient of the side slopes to minimise tensile stresses on the welded seams. No horizontal seams shall be allowed on the side slopes.

Prior to the placement of any geomembrane material, the personnel qualification records for the welding operators shall have been submitted to and approved by the CQA Engineer.

The geomembrane shall be secured in an anchor trench at the crest of the embankment slopes. The anchor trench shall be excavated parallel to the crest of the slopes and backfilled with clay material placed and compacted in layers not exceeding 150 mm deep, following completion of all seaming on each panel and after installation of the protection geotextile. The anchor trench shall be located approximately 1.0 m behind the slope crest and no loose soil or geomembrane off-cuts shall be permitted to underlie the geomembrane in the trench. The trench is designed to ensure retention of the liner against the design load whilst permitting the liner to pull out before its tensile strength is exceeded.

A leak location survey will be carried out following placement of the leachate drainage stone layer in the lined cell bases. A report will be issued following the survey.

2.4.4.5.5 Protection Geotextile

A protection geotextile shall be placed above the HDPE geomembrane liner. The grade of the geotextile required will be dependent on the leachate stone size, grading and angularity procured for the Works, and will be determined using the Cylinder Test in accordance with the EPA Landfill Site Design Manual and LFE 2 - Cylinder testing geomembranes and their protective materials, UK Environment Agency..

The geotextile protection layer will be the first line of defence to the mechanical puncture of the HDPE geomembrane. Sandbags only, will be employed as ballast for the side slope lining system.

The protection geotextile panels shall be thermally bonded together. The CQA Engineer and the lining personnel shall pay particular attention at seams to ensure that no earth cover or waste material is inadvertently inserted beneath the geotextile.

2.4.5 Leachate Collection and Extraction System

A herringbone leachate collection slotted pipe network shall be installed on each of the cell bases which will flow to a leachate collection sump for extraction by a side slope riser pipe.

WSP drawing ref: IE0037029.9627 019B, submitted with the planning application, illustrates the proposed leachate collection system, which will be similar to that in previously constructed cells, which incorporates a 500 mm thick drainage stone blanket, in accordance with Condition 3.29.1 of the IE Licence. The drainage stone shall have a minimum hydraulic conductivity of 1×10^{-3} m/s and be pre-washed, uncrushed, granular, rounded stone (16 mm to 32 mm diameter grain size).

The main elements of the proposed system are described below:

- Leachate will flow in the cell bases towards a drainage stone filled pump sump located at the low corner of the cell as shown on the Drawings. The base of the pump sump shall contain a 200 mm deep A393 mesh reinforced concrete slab;
- Leachate drainage pipes shall be 160 mm OD HDPE PE100 SDR11 slotted Feeder Pipes and 250 mm OD HDPE PE100 SDR17 slotted Collector Pipes (or equivalent approved by the Engineer) installed in a herringbone system within the leachate drainage stone layer. Minimum slot widths shall be 5-7 mm and minimum slotted area shall be 17%;

- Install the minimum 500 mm depth Leachate Drainage Layer, with a minimum hydraulic conductivity of 1 x 10^{-3} m/s, over the protection geotextile on the cell bases and in the leachate collection sumps;
- One 560 mm OD HDPE PE 100 SDR11 solid pipe and one 160 mm OD HDPE PE 100 SDR11 solid pipe shall be placed on the side slopes of the new lined embankments; these pipes will be used as the cell side slope leachate extraction riser and transducer riser respectively;
- The side slope risers will run to the leachate collection sump and be fusion butt welded / single section for the length of the slope. A solid long radius bend shall then connect the 560 mm OD solid pipe riser to a minimum 2m length of 560 mm OD HDPE PE 100 SDR11 slotted. Minimum slot widths shall be 5-7 mm and minimum slotted area shall be 17%;
- The side slope risers shall be supported by reinforced concrete Headwalls constructed at the crest of the embankments and anchored to the reinforced concrete base slab of the leachate sump. The reinforced concrete headwalls shall offset from the crest of the embankments and centred on the sumps for the proposed landfill cells;
- An additional layer of protection geotextile shall be placed beneath the side slope riser pipes. Submersible pumps and pressure level sensors will then be installed in these side slope risers;
- Rigid vertical leachate extraction / monitoring wells, 1.2m ID slotted precast concrete rings encapsulate with leachate drainage stone and supported on the reinforced concrete base slab located within the sump bases of the cells, shall be raised corresponding to increasing elevation of placed and compacted waste to allow for a secondary future leachate extraction system if needed;
- The proposed method of monitoring leachate levels at the base of the landfill will be pressure transducers installed within the sump at the location of the pump. The pressure transducers will be connected to the KLL existing SCADA system; and
- A service trench shall contain 4 x 150 mm ducts to transmit power and data and 2 x 160 mm OD leachate ring main pipes. The service ducting shall be 150 mm OD uPVC ducting (to match existing ducting on site) and the leachate ring main pipe shall be 160 mm OD HDPE PE100 SDR11 (to match existing leachate ring main pipe on site).

In addition to these works, a concrete slab(s) will be constructed to facilitate the 2 no. proposed containerised Reverse Osmosis plant units and 12 no. proposed additional storage tanks, which are required for treatment and storage of leachate generated by the Proposed Development.

2.4.5.1 Leachate Recirculation

The benefits of leachate recirculation include faster stabilization of the landfill and enhance gas production.

It is proposed that leachate recirculation will be employed for all cells.

A sidewall extraction well for leachate recirculation in the permitted landfill facility has been approved by the EPA for use at the landfill cells 1-12 on site and it is planned to implement a similar approach subject to EPA approval.

2.4.6 Landfill Gas Management Infrastructure

During cell construction, the perimeter gas collection pipework will be extended from the in-situ above ground system on-site. Horizontal and vertical gas collection pipework will be installed during construction and during filling of the cells. A gas booster pump will be required to enable the captured gas to reach the gas compound.

Gas extraction at the Knockharley Landfill is accomplished by utilisation of engines and flares owned and operated by Bioverda Power Systems Ltd, located in the gas compound to the east of Cell 2.

Currently, there are four engines on site. Two engines run continuously as lead engines, one engine provides back-up, and one is currently out of commission.

The current gas yield be managed by two engines with no supplementary flaring. Standby capacity is provided by one 2,500 m^3/hr flare and two 1,500 m^3/hr enclosed flares.

Vertical manhole ring gas extraction wells, atop the leachate drainage layer, shall be installed in each cell of the Proposed Development. These vents will be extended progressively upwards as waste is deposited in the cells.

The design philosophy for final gas extraction assumes a vertical well spacing of 25m. Subsequent vertical wells will be installed either as vertical manhole rings, once the waste depth exceeds 5.0m, or retrospectively drilled at the same spacing once the waste has reached its designed elevation.

Initial gas extraction during well placement will be via the side-slope risers until such time as leachate elevations within the cells prevent extraction. Thereafter, the extraction of landfill gas will be from vertical wells.

The gas extraction pipelines will be placed above ground and will tap into the primary gas ring main that is located above ground offset from the crest of the embankments.

The gas extraction wells arrangement and details are shown on Drawings IE0037027.9697-KLLW-0021.

2.4.7 Ancillary Works

2.4.7.1 Knockharley Stream Diversion

A diversion to the Knockharley Stream is required to facilitate the Proposed Development.

The new channel will be excavated and established as agreed with Inland Fisheries Ireland (IFI), in line with IFI guidance *'Guidelines on protection of fisheries during construction works in and adjacent to waters'* (2016) and with the mitigation outlined in this EIAR.

Excavators will dig down to a predetermined depth and a desired safe slope for the banks will be established within the new channel. The diversion will require the 7,386 m^3 of material to be excavated. Stone from the old channel will be placed in the new channel to mimic the existing conditions. The stream will then be diverted into the new channel. All specifications are subject to agreement with IFI.

2.4.7.2 Increase capacity of Southern Attenuation Pond

To facilitate the proposed landfill extension, there will be a requirement for additional capacity in the southern attenuation pond prior to final capping of the proposed landfill. This will entail the excavation of 52,640 m^3 of material.

The extended southern attenuation pond will be lined as per the previous specifications of the existing attenuation pond which comprise a]composite liner consisting of at minimum a basal soil clay layer of at least 1m in thickness with a permeability of less than $1x10^{--9}$-overlain by a 2mm thick high density polyethylene (HDPE) layer unless otherwise agreed in advance with the EPA.

The proposed design of the liner system for the extended southern surface water attenuation pond shall be submitted for approval by the EPA, prior to installation, in accordance with Schedule E: Specified Engineering Works, of the IE licence.

2.4.7.3 Litter Fencing

Litter netting is required to be installed along the crest of the cell embankments as shown on Drawings IE0037027.9697-KLLW-0006.

The new installation shall match the existing litter netting specification, comprising of 6m high nets fixed to treated timber posts by stainless steel cables at the top, middle and bottom of the poles. The bottom section of the netting shall be placed circa. 300 mm below the ground level to prevent litter from escaping under the netting. The timber posts, ca. 300 mm in diameter shall extend approximately 2 m into the embankments, shall be encased by granular material and shall be offset 1 m from the anchor trench.

2.4.8 Construction Access, Roads and Parking

The site is located c. 800m from the N2 National Primary Road and landfill facility has its own private entrance off the N2. This entrance will be utilised during the construction of the Proposed Development to facilitate the movements of both staff and construction vehicles entering and exiting the site

The existing wheel wash at the site will continue to be utilised during the construction phase of the proposed development to prevent any dirt being carried out into the public road. A road sweeper will be employed as required to keep the public road around the site clean.

Carparking is to be provided on site. Construction personnel will be encouraged to walk, cycle, or use public transport, and information on local transport services will be published on site.

2.4.9 Construction Phasing and Duration

Subject to a successful grant of planning, it is intended for the works to commence in 2026.

The Proposed Development is anticipated to be completed (from construction to capping of final cells) with in c. a 21 year period.

The operational capacity of the Landfill, i.e. acceptance of waste for landfilling, is expected to cease in 2043.

The timelines for construction are current best estimates and are used for the purposes of the EIAR. Depending on demand for landfilling the project timelines may vary.

The Proposed Development will be constructed over seven phases. Each phase will overlap with waste cell filling taking place in tandem as the construction of cells are complete.

Table 2.11 below outlines the anticipated phasing timelines for each cell.

Table 2.12 below indicates the work that will take place during each of the seven construction phases.

Table 2.13 below illustrates how the construction, operation and capping of the Proposed Development will overlap with the existing works on site.

Table 2.11. Construction Programme, Waste Cell Filling and Capping Years for each Proposed Cell

Infrastructure	Construction Programme (Post Planning Permission) Years	Waste Cells Filling (Post Planning Permission) Years	Capping Years
Cell 31	0 - 2	3 - 4	6 - 7
Cell 32	0 - 2	3 - 4	6 - 7
Cell 33	3 - 4	4 - 7	9 - 10
Cell 34	3 - 4	4 - 7	9 - 10
Cell 35	6 - 7	7 - 10	12 - 13

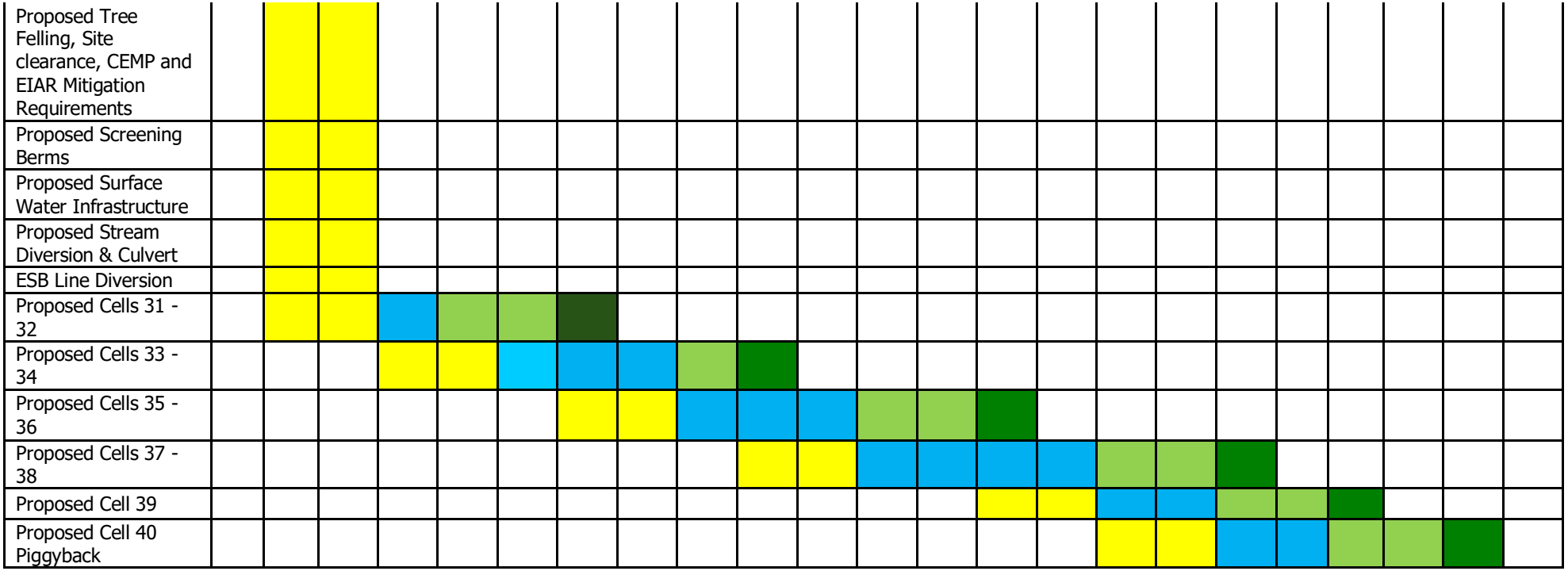
Infrastructure	Construction Programme (Post Planning Permission) Years	Waste Cells Filling (Post Planning Permission) Years	Capping Years
Cell 36	6 - 7	7 - 10	12 - 13
Cell 37	9 - 10	10 - 14	16 - 17
Cell 38	9 - 10	10 - 14	16 - 17
Cell 39	13 - 14	15 - 16	18 - 19
Cell 40 "Piggyback"	16 - 17	17 - 19	19 - 21
Total	**0-17**	**3 - 19**	**6 - 21**

Table 2.12. Construction Phasing (Construction of Cells and Capping)

Phase	Infrastructure	Construction Programme (Post Planning Permission) Years	Capping Years (Post Planning Permission) Years
Phase 1	Tree Felling, Site clearance, Relocation of 220 kV overhead ESB powerline, CEMP and EIAR Mitigation Requirements	0 - 2	
	Screening Berms	0 - 2	
	Surface Water Infrastructure	0 - 2	
	Stream Diversion & Culvert	0 - 2	
	Cells 31 - 32	0 - 2	
Phase 2	Cells 33 - 34	3 - 4	
Phase 3	Cells 35 - 36	6 - -7	
	Cells 31 - 32		6 - 7
Phase 4	Cells 37 - 38	9 – 10	
	Cells 33 - 34		9 – 10
Phase 5	Cell 39	13 - 14	
	Cells 35 - 36		12 - 13
Phase 6	Cell 40 Piggyback	16 - 17	
	Cells 37 - 38		16 - 17
Phase 7	Cell 39		18 – 19
	Cell 40 Piggyback		19-21

Table 2.13. Expected timeline of the Proposed Development (Permitted and Proposed)

Construction																						
Landfilling/Operations																						
Temporary Capping																						
Capping																						
20XX	**'25**	**'26**	**'27**	**'28**	**'29**	**'30**	**'31**	**'32**	**'33**	**'34**	**'35**	**'36**	**'37**	**'38**	**'39**	**'40**	**'41**	**'42**	**'43**	**'44**	**'45**	**'46**	**'47**
Years (as per phasing)		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Existing Landfill Cells																							
Existing Cell 15																							
Existing Cell 16																							
Existing Cell 17																							
Existing Cell 18																							
Existing Cell 19																							
Existing Cell 20																							
Existing Cell 21																							
Existing Cell 22																							
Existing Cell 23																							
Existing Cell 24																							
Existing Cell 25																							
Existing Cell 26																							
Permitted IBA Facility / IBA Cells																							
IBA Facility Building																							
Permitted IBA Cell 27																							
Permitted IBA Cell 28																							
Permitted IBA Cell 29																							
Permitted IBA Cell 30 (no plan to construct)																							
C&D Waste Facility																							
Leachate Lagoon																							
Ext. Attenuation Pond																							
Proposed Project West Expansion																							



Note: Remediation/Landscaping occurring alongside decommissioning (with exception of ongoing operations).

2.4.10 Construction Staffing and Working Hours

It is anticipated that the construction of the facility will be completed during normal construction hours i.e. 8:00 to 18:30 Monday to Friday, and 8:00 to 14:00 on Saturdays. No construction activities shall be carried out on Sundays or Public Holidays. Deviation from these times shall only be permitted in exceptional circumstances where prior written approval has been received from the planning authority and the EPA.

There will be no change to the current staffing on site. Site staff will include; management, engineers, construction crews, supervisors and environment health and safety personal.

2.4.11 Construction Equipment and Materials

The key civil engineering works will involve the excavation of soil material. There will be a requirement for deliveries of imported engineering fill / aggregates, and other construction materials, such as clay and HDPE liner. Other construction activities will include site storage of fuels for construction vehicles.

Key construction equipment will include excavators, bulldozers, articulated haul trucks, motor graders, compactors/rollers.

Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination. Liquid materials will be stored within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage.

Where possible it is proposed to source general construction materials from the local area to minimise transportation distances. Specialised ICT equipment, if required, will likely be imported.

Construction materials will be brought to site by road. Construction materials will be transported in clean vehicles. Lorries/trucks will be properly enclosed or covered during transportation of friable construction materials and spoil to prevent the escape material along the public roadway.

A 'Just In Time' delivery system will operate to minimise storage of materials on site.

2.4.12 Construction and Environmental Management

An Outline Construction Environmental Management Plan (CEMP) has been prepared by WSP and submitted with the planning application. This will be updated by the appointed construction contractor prior to the construction phase of the Proposed Development and will include all the mitigation measures set out within this EIAR. The construction contractor will update this CEMP on an on-going basis to include any additional mitigation required to ensure compliance with any subsequent planning conditions relevant to the Proposed Development. It will also set out in detail the overarching vision of how the construction contractor of the Proposed Development will manage the site in a safe and organised manner.

Traffic management and road signage will be in accordance with the Department of Transport: Traffic Signs Manual - Chapter 8: Temporary Traffic Measures and Signs for Road Works and in agreement with MCC. Construction traffic management and mitigation measures to minimise the impacts associated with the construction phase upon the peak periods on the surrounding road network are set out in Chapter 13 –Traffic and Transportation of this EIAR. A Construction Traffic Management Plan will be included in the CEMP prepared by the construction contractor.

The CEMP will document all mitigation measures in this EIAR to ensure implementation of procedures to control pollution and nuisances arising from site clearance and construction activities. Pollution and nuisances will be prevented where possible and managed in accordance with best environmental protection practices.

The CEMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager, Resource Manager and Ecological Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures.

2.4.12.1 Construction Dust Management

Chapter 8 (Air Quality) of this EIAR includes construction stage dust mitigation measures. The suite of measures is designed to control dust at the construction site to ensure that no significant nuisance occurs at nearby receptors, and has been informed by international best practice guidance documents. The mitigation measures will be implemented in full during the construction works. For further information, refer to Chapter 8 (Air Quality).

2.4.12.2 Noise and Vibration Management

Chapter 10 (Noise and Vibration) defines construction noise thresholds with reference to BS 5228 (i.e. BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014) for noise and vibration control on construction and open sites, which offers detailed guidance on the control of noise and vibration from demolition and construction activities.

2.4.12.3 Resource and Waste Management Plan (RWMP)

Chapter 14 (Waste Management) of this EIAR contains a detailed description of waste management relating to construction of the Proposed Development. A site-specific Resource & Waste Management Plan (RWMP) is included as Appendix 14.1 of this EIAR. This RWMP will be implemented to ensure best practice is followed in the management of waste from the Proposed Development.

There will be soil excavated to facilitate the proposed extension. It is estimated that a total of c. 1.79 million m^3 of topsoil, subsoil, and stones will be excavated to facilitate the Proposed Development.

It is expected that a quantity of the excavated material will be used on site for the following purposes:

- 120,689 m^3 material will be used for establishing landfill embankments;
- 168,443 m^3 of clay material will be used as a clay liner in the construction of the landfill cells;
- 12,943 m^3 of clay material will be used as a clay liner in the construction of the southern attenuation pond;
- 627,682 m^3 will be used in the construction of the proposed berms on site; and
- 301,977 m^3 will be used for final capping on site.

In total, 1,431,977 m^3 of the excavated material will be reused on site over the lifetime of the project. Therefore 367,065 m^3 of material will need to be removed from site for appropriate reuse, recovery and / or disposal.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and sewage sludge from welfare facilities provided on site. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

It should be noted that until final materials and detailed construction methodologies have been confirmed it is difficult to predict with a high level of accuracy the construction waste that will be generated from the construction of the Proposed Development as the exact materials and quantities may be subject to some degree of change and variation during the detailed design and construction process.

2.4.13 Construction Phase Vulnerability to Major Accidents and Disasters

2.4.13.1 Control of Major Accident Hazards involving Dangerous Substances and Seveso Establishments

The Proposed Development does not exceed the chemical storage thresholds, set out in the COMAH Regulations (2015), for either Lower or Upper tier. Therefore, the Proposed Development during either construction or operation is not subject to the provisions of the COMAH Regulations (2015). Therefore, a Land Use Planning assessment under the COMAH Regulations (2015) is not required for the Proposed Development.

The location of the Proposed Development is not within the consultation distance of any notified Seveso establishment, there are no implications for major accidents or hazards from Seveso establishments at the Proposed Development site.

The likelihood of a Seveso establishment initiating a major accident at the Proposed Development is negligible, and the likelihood of the project initiating major accident at a nearby a Seveso establishment during construction is considered negligible; therefore, as likelihood of the occurrence is low/negligible there are no likely significant effects.

2.4.13.2 Landslides, Seismic Activity and Volcanic Activity

Any construction or built environment, whether it's a building, infrastructure, or other development, can be at risk of being affected by natural events like landslides, seismic (earthquake-related) activity, or volcanic eruptions. These events have the potential to cause damage or disruption to the development due to their unpredictable and often powerful nature.

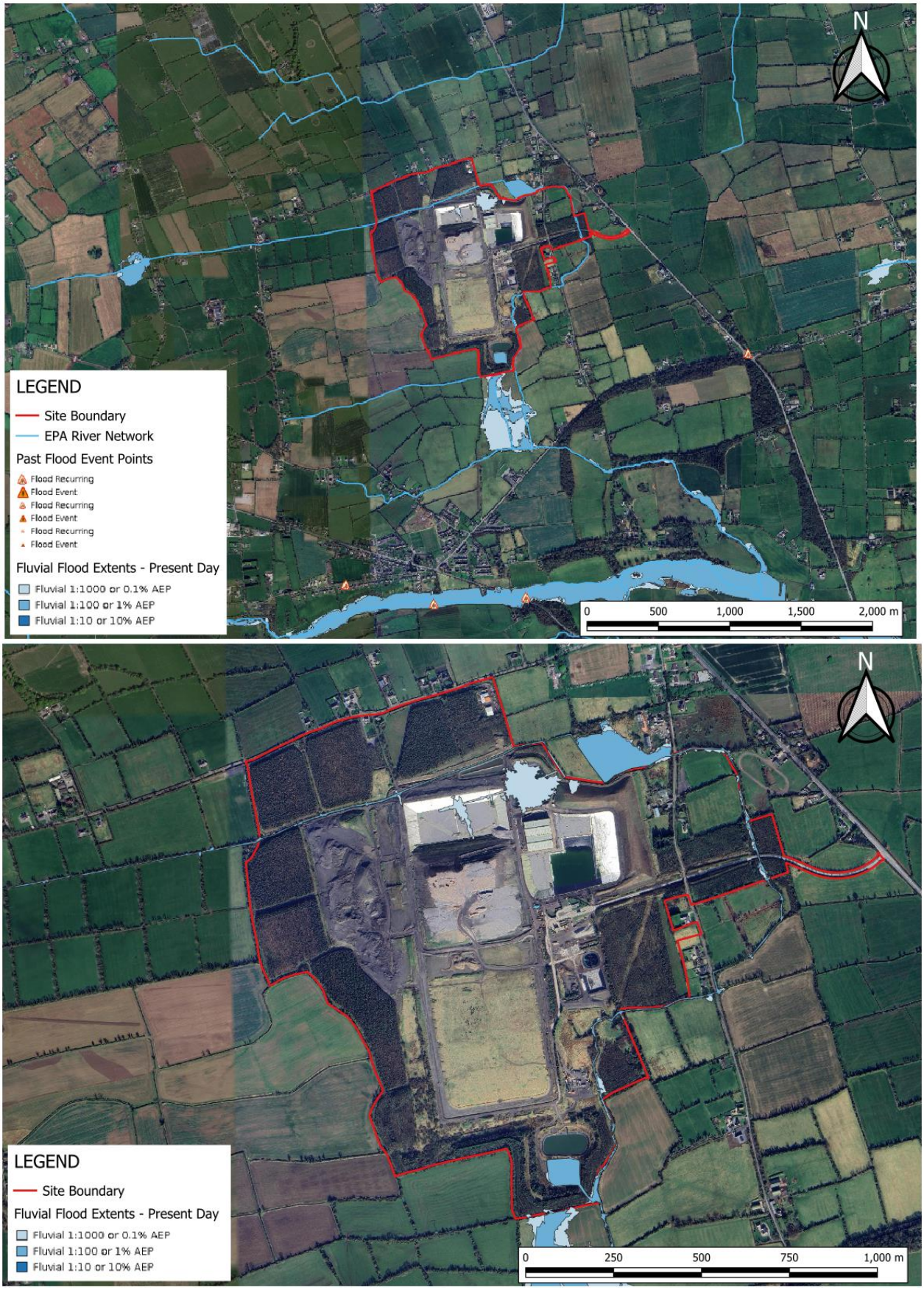
The location Proposed Development site is not located in an area at risk of landslides, seismic activity or volcanic activity. Therefore, the likelihood of a landslide initiating a major accident at the Proposed Development is negligible and the likelihood of the project initiating a landslide during construction is considered negligible; therefore, as likelihood of the occurrence is low/negligible there are no likely significant effects.

2.4.13.3 Flooding / Sea Level Rise

A Flood Risk Assessment has been prepared by the AWN (2025) and included as Appendix 6.3 of the EIAR.

An extract from the OPW mapping (www.floodinfo.ie) is shown in Figure 2-9 below in the context of the Proposed Development site. The risk of pluvial flooding is considered low. The risk of coastal and groundwater flooding at the site is considered low.

Figure 2-9 Extract from CFRAM Fluvial Flooding Map (Source: OPW, 2025)



Management of surface water run of as undertaken presently for the existing landfill together with the planned increase in the capacity and flow management for the southern attenuation pond when the landfill is fully capped will ensure that there is no change to existing flooding off site as a result of the development.

Extreme, storm events, lightening, heat or cold weather can result in structural damage and/or pollution to soils, groundwater or surface waters. In order to prioritise safety and mitigate potential risks, as with any construction project a proactive approach will be taken towards anticipating and managing extreme weather events during the construction process. Weather forecasting will be reviewed to monitor meteorological conditions closely and identify the occurrence of storm events, lightening, heat or cold weather etc.

When an impending extreme weather event is detected through these forecasting systems, as part of safety protocols the work zones, construction equipment, materials, and machinery that may be vulnerable to damage or displacement by severe weather will be 'made safe' by being secured or moving to safe locations. The site will be monitored and adjustments to safety measures as needed to address changing conditions. The CEMP will include further detail of emergency preparedness and environmental incident planning.

On the basis of the foregoing, the likelihood of an extreme weather initiating a major accident at the Proposed Development is negligible; therefore, as likelihood of the occurrence is low/negligible there are no likely significant effects.

2.4.13.4 Pollution to soils / groundwater / surface waters

Multiple rounds of site investigations, including ongoing groundwater and surface water monitoring in line with IED licence (W0146-04) , have taken place since the original permission for the landfill was submitted.

Details of site investigation and existing soil and water quality is outlined in Chapter 5 and 6. No evidence of historical soil contamination has been identified Geotechnical Site Investigations were undertaken by Priority Geotechnical (PGL) in August and September 2016. The site investigation comprised the advancement of 1No. rotatory cored borehole (RC01) to 27.0 m bgl and 10 No. shallow shell and auger boreholes (BH01 – BH10) to a maximum depth of 15.0 m bgl. Further environmental soil testing will be undertaken prior to any excavated material removed off site.

In order to mitigate potential impacts during the construction phase, best practice construction methods will be implemented in order to prevent water (surface water and groundwater) pollution. These mitigation measures as outlined in Chapter 5, and Chapter 6 of the EIAR; and will be duplicated in a Construction Environmental Management Plan which will be implemented during the construction phase.

On the basis of the foregoing, and implementation of the mitigation measures set out in this EIAR, the likelihood of a major spill or pollution event initiating a major accident at the Proposed Development is negligible and the likelihood of the project initiating a major spill or pollution event during construction is considered negligible; therefore, as likelihood of the occurrence is low/negligible there are no likely significant effects.

2.4.14 Potential Impacts and Mitigation During Construction

There are potential nuisances such as traffic impacts, dust, noise, as well as the potential for pollution of groundwater and surface water associated with excavations and construction.

In order to manage these impacts, the mitigation measures set out in this EIAR (Chapters 4 through 14) will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager, Resource Manager and Environmental Clerk of Works where relevant. The specific mitigation measures to address potential

environmental impacts, are presented in each individual EIAR chapter. The main potential impacts during excavation, construction, and commissioning which require mitigation are:

- Management of run-off water in terms of silt runoff and dewatering (if required) (see Chapter 5 (Land, Soils and Geology) and Chapter 6 (Hydrology and Hydrogeology) for further information);
- Impacts on human beings in terms of nuisances relating to the air quality of the environs due to dust and other particulate matter generated (see Chapter 8 (Air Quality) for further information); and
- Impacts on human beings in terms of nuisances due to plant noise from equipment and operational works associated with the landfill facility (see Chapter 10 (Noise and Vibration) for further information).

The potential for impacts depends on the type of construction activity being carried out in conjunction with environmental factors including prevailing weather conditions i.e. levels of rainfall, wind speeds and wind direction; as well as the distance to potentially sensitive receptors.

2.5 Operation of the Proposed Development

The proposed activities to be undertaken as a result of the expanded landfill void can broadly be described as:

- placement of waste within lined cells
- management of leachate
- storage of surface water for attenuation prior to discharge
- storage of unsuitable waste in quarantine area prior to removal off-site

Operation of the landfill will be undertaken in compliance with an amendment to the current EPA IED Licence. Relevant sections of the existing licence (W0146-04) are provided below for reference as to how these aspect are managed and monitored within the existing licence.

2.5.1 Waste Intake

Broadly, the waste types to be accepted as part of the proposed development are the same as those currently accepted at the facility.

The waste types to be accepted are:

- Non-hazardous residual municipal solid wastes of household, commercial and industrial origin, which will have undergone various degree of pre-treatment from separate 'black bin' collection to biological treatment in the form of stabilised residual fines, as well as residual MSW from other sources such as unauthorised landfill remediation and/or repatriated wastes;
- Non-hazardous incinerator bottom ash (which is currently accepted at the facility).
- Non-recyclable bulky wastes, where bulky wastes are broadly considered as larger wastes which do not fit in household/commercial bins e.g. mattresses, furniture etc.
- Non–hazardous soils and stones and other C&D wastes.
- Street sweepings and similar cleansing wastes.
- 'Individual' volumes of non-hazardous industrial wastes from various industries such as food preparation, chemical processes, thermal processes, metal treatments, health care (non-hazardous) and water/wastewater treatment industries, all of which are currently accepted at the facility.
- Stable non-reactive hazardous waste
- Baled recyclable waste (contingency storage)
- Baled MSW (contingency storage)

The quantity of waste received at the facility will not change and will be as per the existing IED Licence (W0146-04), i.e. acceptance of up to 435,000 tonnes per annum of non-hazardous wastes and up to 5,000 tonnes per annum of stable non-reactive hazardous waste. The non-hazardous waste accepted at the site

comprises up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables.

As per Section 3.30 of the IED Licence:

- *Landfill Cell Filling*

  Wastes shall not be deposited in any cell or part of the landfill without the prior approval of the Agency.

  Unless otherwise approved by the Agency, the landfill cells shall be filled with non-stabilised waste, stabilised and inert waste, and IBA waste as per Drawing No. LW14-821-01-P-0050-010 of the EIAR [2018 - ABP-303211-18]*Volume 4. The filling sequence shall be as per the directional arrows of the Drawing and as described in Section 2.4.3 of the main EIAR* [2018 - ABP-303211-18]*. SNRHW shall be landfilled within dedicated sub cell areas within Cells 27 and or Cell 28, unless the risk assessment as per Condition 3.41.7* [of the IED Licence W146-04] *determines otherwise.*

2.5.2 Proposed Landfill Cells

Once a landfill cell is constructed, waste cell filling (operation) will be carried out in line with the IED Licence (W0146-04) and permitted planning applications, including any conditions stipulated by the planning authority.

In total, the Proposed Development consists 4.12 million m^3 active void space for landfilling (3.32 million m^3 of additional constructed void space with further void space of 807,000 m^3 for the 'Piggyback Cell').

Once a cell is at capacity, a permanent capping will be constructed over the cell. See Section 2.6 below for further information on capping and decommissioning.

2.5.3 Operation of Leachate Management

Pipework will be placed in the drainage stone layer above the HDPE barrier which has been designed to collect any leachate runoff from the landfill cells. Leachate will be pumped from the base of cells via a rising main and stored in leachate lagoons/tanks, prior to removal off-site for disposal at an authorised wastewater treatment plant. In the event leachate will be pretreated on-site, treatment and subsequent storage will be carried out in bunded units and tanks.

Leachate management during the operational phase of the proposed development will be carried out in accordance with the current IED Licence (W146-04). As per Section 3.36 of the IED Licence:

- *Effective leachate management infrastructure shall be provided, operated and maintained at the installation, as per Section 2.7 of the main Environmental Impact Assessment Report* [2018 - ABP-303211-18] *unless otherwise required by Conditions of this licence.*

- *Unless otherwise approved by the Agency, leachate from the following waste types shall be extracted, collected, stored, pretreated (if pre-treatment approved to be implemented on site) and removed from site separately to facilitate leachate treatment and prevent dilution or cross contamination of streams:*
  - *i. (i) SNRHW;*
  - *ii. (ii) IBA;*
  - *iii. (iii) Stabilised and inert waste; and*
  - *iv. (iv) Non-stabilised waste.*

- *The licensee shall provide and maintain separate leachate storage lagoons for the waste types as per Condition 3.36.2* [of the IED Licence W146-04] *at the installation to facilitate the storage of leachate*

abstracted and collected from the waste, unless otherwise agreed by the Agency. The location of the leachate storage lagoons shall be in accordance with Drawing No. LW14-821-01-P-0000-003 of the EIAR [2018 - ABP-303211-18] *Volume 4, unless otherwise approved by the Agency.*

- *The licensee shall submit details for approval by the Agency of the proposals for the treatment of leachate on-site prior to carrying out such an activity. The details shall include information on the proposed leachate treatment system including its operational criteria, the proposed standards for treated leachate and a timescale for the construction and commissioning of the system. Leachate treatment proposals shall incorporate the requirements of BAT 34 of CID 2019/2010.*
- *Leachate treatment plant, if implemented, shall be in accordance with Drawing No. LW14-821-01-P-0600-001 /002/ 003 of the EIAR* [2018 - ABP-303211-18] *Volume 4, unless otherwise approved by the Agency.*
- *All structures for the storage and / or treatment of leachate shall be fully enclosed except for inlet and outlet piping.*
- *All leachate management structures on-site shall be inspected and certified fit for purpose on an annual basis by an independent and appropriately qualified chartered engineer. Any remedial works recommended in this report must be implemented immediately.*
- *Treatment of leachate from SNRHW in the leachate treatment plant (if implemented) shall only be carried out after the completion of the risk assessment, as per Condition 3.41.7* [of the IED Licence W146-04].
- *The management of IBA leachate and waste washings shall take into account the risk assessment required in accordance with Condition 3.40.2* [of the IED Licence W146-04].
- *Leachate from SNRHW, IBA, stabilised and inert waste and non-stabilised waste must be appropriately characterised and analysed and assigned a LOW code in accordance with the EPA Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous. These requirements should be repeated in the event the nature of the leachate changes over time or as required by the Agency.*
- *Leachate from IBA cells and treatment area treated in the leachate treatment plant shall be subject to the limit set out Schedule 3.5 Treated Leachate Limits, of this licence and the control and monitoring requirements as set out in Schedule C.7.I Control of Treated Leachate, of this licence* [IED Licence W146-04] *and Schedule C.7.2 Monitoring of Treated Leachate, of this licence* [IED Licence W146-04].
- *Unless otherwise agreed by the Agency leachate stored in the leachate storage lagoons and leachate treatment plant tanks shall be disposed of by tankering off-site in fully enclosed road tankers and discharging to an agreed authorised Waste Water Treatment Plant as per Condition 5.8. The frequency of leachate removal from the leachate lagoons shall be such that a minimum freeboard of 0.75m shall be maintained in the leachate lagoons at all times.*
- *Discharges of treated or untreated leachate to ground or to surface waters are not permitted by this licence.*
- *Storage and treatment of leachate from waste cells, as per licence* [IED Licence W146-04] *Conditions, is permitted after waste acceptance to the installation has ceased, unless otherwise approved by the Agency.*
- *The licensee shall maintain and implement operational and control procedures for leachate management, which shall at a minimum include the following:*

i. *monitoring infrastructure details and procedures for monitoring the level of leachate in the pump sumps, the landfill cells, the leachate lagoons/tanks and the leachate treatment plant units/tanks if implemented;*
ii. *leachate extraction from landfill cells, collection and storage of leachate in the leachate lagoons/tanks, and removal of leachate from storage and subsequent transport / discharge to the relevant waste water treatment plant; and*
iii. *procedures for the operation of the leachate treatment if implemented.*

- *Leachate Monitoring Infrastructure*

  The licensee shall install and maintain leachate monitoring points in each active cell and in each leachate storage lagoon / tank to allow for the sampling and analyses of leachate.

  The licensee shall install monitoring points for each treated stream in the leachate treatment plant (if implemented) and a composite sampler on the discharge point for each stream if required, unless otherwise approved by the Agency.

- *Leachate levels in the waste cells shall not exceed a level of 1.0m over the top of the liner at the base of the landfill*

- *The level of leachate in the waste cell pump sumps shall be continuously monitored.*

- *Re-circulation of leachate or other contaminated water shall not be undertaken without the prior approval of the Agency and shall only be undertaken within cells, which have been lined and capped to the satisfaction of the Agency.*

2.5.4 Surface Water Management

The proposed surface water management infrastructure will connect to the existing infrastructure on site and continue to operate as is. The southern attenuation pond will be expanded as part of the proposed development works, however this will not affect the operation of the on site surface water system.

As per Section 3.34 of the IED Licence (W146-04):

- *Surface water management infrastructure shall be provided and maintained at the installation during construction works, operation, closure, restoration and aftercare at the installation. As a minimum, the infrastructure shall be capable of the following:*
  i. *Collection/diversion of any contaminated run-off arising within the installation;*
  ii. *the prevention of contaminated water and leachate discharges into surface water drains and courses; and*
  iii. *the collection/diversion of run off arising from capped and restored areas, incorporating adequately sized swales.*

- *The northern surface water holding pond, attenuation pond, constructed wetland, associated surface water management infrastructure, culvert and river diversion shall be constructed and operational prior to the commencement of other construction works and prior to the acceptance of IBA waste for storage and recovery on-site.*

- *The licensee shall, one month prior to the commencement of works associated with the installation of the culvert at the northern surface water management system and the onsite realignment of the Knockharley Stream (Flemingstown River, IE-EA_08F050930), submit to the Agency a surface water works project plan which includes:*
  iv. *A copy of the relevant approvals from the Office of Public Works;*
  v. *Recommendations following consultation with Inland Fisheries Ireland; and*

vi. *An implementation plan to address (i) and (ii) above including timelines far works. No instream works are to be carried out between 01 October and 30 June in any given year.*

- *The surface water from all roads, hardstanding areas and all areas of the installation where surface water has the potential to become contaminated shall be directed to the northern holding pond and southern attenuation pond.*
- *The design and capacity of the northern and southern surface water ponds shall ensure that they are capable of fulfilling the requirements of this licence and dealing with all surface water run-off from potentially contaminated areas of the installation. The surface water ponds shall be constructed and maintained at the locations as shown in EIAR* [2018 - ABP-303211-18] *Volume 4 Drawing No, No, LW14-821-01-P-0050-004 and Drawing No. LW14-821-01-P-0050-005, unless otherwise approved by the Agency.*
- *The inlet to the northern surface water holding pond and southern attenuation pond shall be fitted with a Class I Full Oil Interceptor.*
- *The discharge from the northern holding pond, attenuation pond and constructed wetland shall be controlled by an actuated penstock that will prevent surface water discharging into the next pond, constructed wetland or receiving water in the event that monitoring should indicate contamination of the surface water.*
- *The discharge from the southern surface water pond shall be controlled by an actuated penstock that will prevent surface water discharging into the constructed wetland in the event that monitoring should indicate contamination of the surface water.*
- *The licensee shall install continuous monitoring equipment on each pond inlet and on the discharge point of the northern surface water management infrastructure which shall be capable of monitoring parameters on a continuous frequency as required by Schedule C.2.2 Monitoring of Emissions to Water, of this licence.*
- *The licensee shall install a composite sampler at emission point reference SW10 prior to discharge occurring. A composite sampler shall also be installed at emission point reference SW9, unless otherwise approved by the Agency.*
- *Constructed Wetlands*

  The licensee shall establish, maintain and implement a programme for inspection and maintenance of the constructed wetlands to include at least the following:
  - i. *regular flow patterns;*
  - ii. *water depth and turbidity; and*
  - iii. *sediment depth, vegetation composition and invertebrate monitoring.*

2.5.5 Operation of Landfill Gas Extraction

During waste placement, horizontal and vertical gas collection pipework will be installed to facilitate extraction, under negative pressure, of landfill gas, as may be required in cells designated for the placement of non-stabilised residual waste. During cell construction, the perimeter gas collection pipework will be extended from the in-situ above ground system on-site.

Landfill gas extraction during the operational phase of the proposed development will be carried out in accordance with the current IED Licence (W146-04).

As per Section 3.33 of the IED Licence (W146-04):

- Landfill gas management at the installation shall be carried out as described in Chapter 7 of the main *Environmental Impact Assessment Report* [2018 - ABP-303211-18]*, and Application Attachment L.4, submitted with the application, unless the licence Conditions or Agency require otherwise.*

- *The licensee shall maintain all passive vents, gas wells, pipework, valves, pumps, biogas desulphurization unit, engines, flares and other infrastructure that form part of the landfill gas management system in a safe and fully operational manner.*

- *Landfill gas management and associated infrastructure shall meet the recommendations and requirements as outlined in the EPA Landfill Manuals, unless otherwise approved by the Agency.*

- *The licensee shall install and maintain landfill gas monitoring infrastructure at the following locations:*
  - *i. (Perimeter monitoring boreholes at 50m intervals around the periphery of the landfill footprint, which shall be monitored prior to waste acceptance in the adjacent cell to determine baseline levels;*
  - *ii. Site office and all other site buildings; and*
  - *iii. A minimum of two monitoring boreholes per cell within the landfill. The installation of monitoring boreholes within cells containing SNRHW shall be dependent on the risk assessment carried out, as per Condition 3.41.7* [of the IED Licence W146-04].

- *The construction of the landfill gas monitoring boreholes shall be phased so as to match the phased development of cells.*

- *The licensee shall install and maintain a permanent continuous gas monitoring system with an alarm in the site office and in any other enclosed structures at the installation.*

- *Landfill gas utilisation engines and associated infrastructure, as per emission point references in Schedule B.1.1 Emission limit Values for Landfill Gas Utilisation Engines, of this licence* [IED Licence W146-04]*, shall be operated and maintained at the installation as required, unless otherwise approved by the Agency.*
  - *i. The gas utilisation engines shall comply with the emission limits in Schedule B.1.1 Emission limit Values for landfill Gas Utilisation Engines, of this licence* [IED Licence W146-04]*;*
  - *ii. The flaring or utilisation of landfill gas for any purpose, other than electricity generation, shall require the approval of the Agency.*

- *Landfill gas flares and associated infrastructure, as per emission point references in Schedule B.1.2 Emission limit Values for Landfill Gas Flares, of this licence* [IED Licence W146-04]*, shall be operated and maintained at the installation as required, unless otherwise approved by the Agency.*
  - *i. The flares shall be of an enclosed design type and shall comply with the emission limits in Schedule B.1.2: Emission limit Values for Landfill Gas Flares of this licence* [IED Licence W146-04]*; and*
  - *ii. Flare unit efficiency shall be tested once every three years. New / replacement flares shall also be tested upon installation and upon commencement of landfill gas flaring.*

- *As per Application Attachment L.4, and unless otherwise approved by the Agency, the licensee shall install and operate a passive landfill gas management system, in cells containing stabilised waste, inert waste, SNRHW (pending the risk assessment carried out, as per Condition 3.41.7* [of the IED Licence W146-04]*) and IBA waste (storage and treatment areas of IBA cells), incorporating the following requirements:*
  - *i. The design of the gas management system shall be in accordance with the EPA Landfill Manuals - Landfill Site Design and shall be approved by the Agency prior to installation in accordance with Schedule E: Specified Engineering Works, of this licence* [IED Licence W146-04]*;*
  - *ii. As a minimum, a gas extraction well shall be installed in cell 23,24,27,28,29 and 32 to facilitate active gas extraction where required;*

iii. *The gas ring main shall be extended around the landfill footprint to facilitate active gas extraction where required;*
iv. *Gas vent pipes shall not be perforated above ground level and the spacing between the gas vent pipes shall be sufficient to achieve adequate gas venting; and*
v. *Gas vent pipes shall incorporate a carbon or other filter type as appropriate and a cowl, unless active gas extraction is required.*

Passive gas venting from cells containing SNRHW shall only be carried out as required following the risk assessment as per Condition 3.41.7 [of the IED Licence W146-04].

- *Establish appropriate trigger levels for landfill gas emissions passively vented from cells, as per Condition 3.33.8* [of the IED Licence W146-04]*, above which active gas extraction shall be required. Trigger levels, addressing gas composition and flow rates, should be submitted to the Agency for approval within 1 month of the date of grant of this licence. Gas requiring active extraction from these cells, shall be utilised / flared in the landfill gas compound, unless otherwise approved by the Agency.*

2.5.6 Operational Traffic

As there will be no change in the quantity of waste material or inclusion of additional waste streams at the site as part of the operational phase of the Proposed Development, the operational traffic will remain consistent with the current e traffic which takes into account traffic for the existing Knockharley Landfill facility.

2.5.7 Waste Acceptance Hours and Hours of Operation

Hours of operation and hours of waste acceptance will be as detailed in the existing IED Licence (W146-04), that is:

With the exception of emergencies, or as may be approved by the Agency, waste shall only be accepted at or dispatched from the installation between the hours of 08:00 and 18:00 Monday to Saturday inclusive.

The installation shall be operated only during the hours of 07:30 and 18:30 Monday to Saturday inclusive.

The installation shall not operate or accept/dispatch waste on Sundays or Public Holidays without the approval of the Agency.

2.5.8 Operational Phase Duration

Current projections for the duration of the operational phase of the Proposed Development indicate that waste will be accepted (site will be operational) at the newly proposed extension for 17 years (from the 3rd year following the beginning of construction to the 19th year following the beginning of construction).

2.5.9 Potential Impacts and Mitigation During Operations

There are potential nuisances such as traffic impacts, dust, noise, as well as the potential for pollution of groundwater and surface water associated with operational works. To minimise any operational effect on the receiving environment, the landfill will be required to operate in compliance with an IED licence.

2.6 Decommissioning and Remediation of the Project

Decommissioning and remediation will be carried out in accordance with the existing IED Licence (W0146-04), the CRAMP for the facility and the planning application's permitted by the planning authority, including planning conditions.

2.6.1 Final Capping

On completion of the deposit of waste at the facility, final capping shall be restored over the waste mass. As per Condition 10.7 of the IED Licence (W0146-04), unless otherwise agreed by the Agency, the final capping shall consist of the following:

1. *top soil (150 -300mm);*
2. *subsoils, such that total thickness of top soil and subsoils is at least 1m;*
3. *drainage layer of 0.5m thickness having a minimum hydraulic conductivity of 1 x 10^{-4} m/s or an equivalent geosynthetic layer;*
4. *compacted mineral layer of a minimum 0.6m thickness with a permeability of less than 1 x 10^{-9} m/s or a geosynthetic material (e.g. GCL) or similar that provides equivalent protection; and*
5. *gas collection layer of natural material (minimum 0.3mm) or a geosynthetic layer.*

2.6.2 Site Decommissioning

Following completion of the final capping and establishment of interim restoration of the site, all structures, plant and equipment that are not required for restoration purposes will be decommissioned by appropriately licensed contractors in accordance with recognised standard procedures and regulatory requirements and removed from the site.

There are numerous options for site restoration. As outlined in the CRAMP for the site, these are as follows:

- Reversion to grazing and tillage;
- Establish intensive horticulture under cover; or
- Establishment of nature conservation area.

Compliance with other conditions of the licence and planning permission, influences the restoration options.

The landscape plans prepared by Macroworks and submitted along with the planning application for the Proposed Development details landscaping on the site during the operation of the landfill and following final capping and initial removal of ancillary infrastructure not required for aftercare management of the site.

The landscaping of the site serves multiple purposes, including ecological enhancement, visual mitigation, and long-term site integration.

Landscaping will be implemented in a phased manner. In the early stages, planting over constructed screening berms will provide immediate visual screening and contribute to local biodiversity. As landfills cells are filled and capping takes place, they will be landscaped to stabilise soils and enhance site aesthetics. Final landscaping will occur following capping of all landfill cells, with amenity grassland established to protect the cap, prevent erosion, and support future land uses.

Overall, the landscaping approach is integral to the environmental rehabilitation and long-term sustainability of the site.

Table 2.14. Summary of key landscaping and capping works

Activity	Description of Activity
Capping of Landfill Cells	Once each landfill cell reaches final waste capacity, capping will be completed using a multi-layer engineered system to prevent infiltration, minimise emissions, and enable surface water management. The final capped profile will conform to a post-settlement height of 85 mOD, consistent with the existing permitted contours.
Landscaping and Replanting	It is planned for c. 1.6 ha to be planted during the reinstatement phase at the lower half of the proposed earthen berms. 32.3 ha of native grassland meadows will be established during the reinstatement phase.

2.6.3 Aftercare Management

Final capping of the landfill (in accordance with Condition 10.7 of the licence), and closure plan validation (in accordance with Section 3.10 of this report) will trigger the commencement of aftercare. A waste licence review application will be made in or around the time that the aftercare is identified and commenced. The review application will have regard to:

- The management structure at the facility
- The removal of redundant facility infrastructure
- Changes to the monitoring regime
- Modification to the annual charge paid under Condition 12 of the licence.
- Aftercare will include the management of:
- Landfill gas
- Leachate
- Environmental monitoring
- Ongoing inspection and maintenance

Aftercare Management will continue in line with the facilities IED Licence until such time that it can shown that there is no continuing risk to the environment. The facilities IED Licence cannot be surrender until such time as this is shown and agreed with the EPA.

2.6.3.1 Landfill Gas Management

Landfill gas will continue to be produced in the landfill many years after closure. Landfill Gas utilisation is active at the site, there are currently 4 Landfill Gas engines, generating approximately 13,000 MWh (annual) of electricity for export to the national grid. Back-up flaring is carried out as necessary in response to outages of the engines, or in support of the engines should gas exceed the capacity of the engines, to reduce the potential for the nuisance effect of the landfill gas.

It is likely that the gas utilisation operation will continue for some years after landfilling ceases. The management and maintenance of the landfill gas utilisation plant will be on the basis of a specialist contract with an approved service provider, with additional engines or flaring capacity being provided as necessary in response to any increased gas generation.

Gas utilisation would continue until the quantity of combustible gas decreases, with engines and flares being decommissioned and removed from site as they are no longer required. When gas levels have declined to the extent that landfill gas utilisation is no longer appropriate, gas would be flared until such time that the gas no longer poses a risk to the environment.

As landfill gas infrastructure is decommissioned, all buried pipework and cables will be grubbed up and removed from site.

2.6.3.2 Leachate Management

Leachate extraction and management will continue in the aftercare phase, notwithstanding the fact that the landfill will be capped. Despite the low permeability cap over the waste, a small portion of the rainfall incident on the landfill will percolate into the waste mass, for example through penetrations (gas wells, etc.) through the cap.

In addition, it is considered desirable to recirculate leachate back into the waste mass so as to accelerate the biodegradation of waste matter. Two benefits accrue:

- the aftercare phase is shortened because the waste stabilises, (i.e. approaches an inert state) more speedily
- the quantity and quality of landfill gas being produced can be managed and manipulated, thus making recovery options more attractive.

The initiation of leachate recirculation would be by agreement with the EPA and subject to a specified engineering works report.

Throughout the aftercare period, leachate within the landfill would be maintained at or below the levels required by the IED licence. To achieve this, leachate would continue to be pumped to the leachate lagoon before being disposed off-site by tankering which is the basis of the modelling for the CRAMP for the facility.

It is planned that leachate would be treated on site to allow for use in the IBA Facility. This is expected to consume approximately 90% of the treated leachate. The remaining leachate will be tankered off site for disposal or recirculated.

As leachate management infrastructure is decommissioned, all buried pipework and cables will be grubbed up and removed from site.

2.6.3.3 Environmental Monitoring

The current IED Licence prescribes a monitoring regime that will continue during waste placement. Following validation of closure of the facility, the licensee will apply to the EPA for a modified schedule and frequency of monitoring under the headings:

- Landfill gas
- Leachate
- Dust
- Odours
- Surface water
- Groundwater
- Landfill settlement
- Landfill stability
- Flora and fauna

The results of the environmental monitoring will be used to assess the progress of the waste mass towards stabilisation.

2.6.3.4 Ongoing Inspection and Maintenance

Regular maintenance of all relevant infrastructure will continue in the aftercare phase including the maintenance of drainage ditches, internal roads, fencing, CCTV including intruder alarm, gates, etc.

2.6.4 Potential Impacts and Mitigation During Decommissioning

In order to manage potential impacts during the decommissioning phase, the mitigation measures set out in this EIAR (Chapters 4 through 14) will be implemented and adhered to by the operator of the facility. The specific mitigation measures to address potential environmental impacts, are presented in each individual EIAR chapter. As outlined above, as decommissioning is undertaken as part of the IED licence, management and monitoring will be undertaken in compliance with licence conditions to ensure protection of the receiving environment.

2.7 Changes to the Project

At this time, the landfill facility, including the Proposed Development, is expected to cease acceptance of all waste stream in 2043, with the exception of IBA. Following this the IBA Landfill will continue to operate through the aftercare period of the non-hazardous landfill (2030 to 2060) before being closed at the end of the non-hazardous landfill aftercare period. The IBA facility would be subject to a clean closure at this time.

As stated in Section 2.6, decommissioning and remediation will be carried out in accordance with the existing IED Licence (W0146-04), the CRAMP for the facility and the planning application's permitted by the planning authority, including planning conditions.

The costs associated with the decommissioning, removal and disposal of the asset will be met by Knockharley Landfill Limited.

2.8 Description of Related Development

Related development and permissions have been outlined in Section 2.2.1.1.

2.9 Description of Potential Cumulative Developments

As part of the assessment of the impact of the Proposed Development, account has been taken of relevant developments that are currently planned, permitted, or under construction and substantial projects for which planning has been submitted within the surrounding areas.

The planning search tool was used to generate a list of relevant planning permissions from the surrounding areas of the Proposed Development within the previous five years. The outcome of this search is presented in Appendix 2.1 to this Chapter.

The search also showed a significant number of small extensions, retention and other minor alterations to dwelling houses. These permissions were for established residential properties and businesses within the vicinity of the development. In addition, the search encompassed a number of new one-off dwellings.

Two projects of note in the proximity to the development are the proposed 180 Megawatt gas fired peaking power plant proposed to be located to the immediate southwest of the Proposed Development site, and a planned 165 ha solar farm in the vicinity of the Proposed Development site, however this has not yet within the planning system. The project is at non-statutory pre-planning community consultation stage.

As part of the assessment of the impact of the Proposed Development, Chapter 4 – 14 of this EIAR considers the potential for cumulative impact with existing and/or approved projects. There is the potential for short-term and long-term effects, during the construction and operational phases.

Chapter 3 – Alternatives

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3. ALTERNATIVES

3.1 Introduction

The requirement to consider alternatives within an EIAR is set out in Annex IV (2) of the EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU), and in Schedule 6 of the Planning and Development Regulations, 2001, as amended ("the Regulations"), which states:

> *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.*

Schedule 6(2)(b) of the Regulations elaborates on this requirement by requiring the following information:

> *(b) a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) 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 selecting the chosen option, including a comparison of the environmental effects;*
>
> *Reasonable alternatives may include project design proposals, location, size and scale, which are relevant to the proposed development and its specific characteristics. The regulations require that an indication of the main reasons for selecting the preferred option, including a comparison of the environmental effects to be presented in the EIAR.*

The EPA's *Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022)* – states:

> *The presentation and consideration of the various reasonable alternatives investigated by the developer is an important requirement of the EIA process.*
>
> *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.*

As such, the consideration and presentation of the reasonable alternatives studied by the project design team is an important requirement of the EIA process.

This chapter provides an outline of the reasonable alternatives examined during the design phase. It sets out the main reasons for choosing the development as proposed, taking into account and providing a comparison on the environmental effects.

This chapter assesses the evolution of the Proposed Development and the alternatives examined by the Applicant relating to the location, size and scale, and project design and processes of the Proposed Development. This chapter provides a full justification for the Proposed Development and provides a comparison of the environmental effects of each alternative option.

The reasonable alternatives examined throughout the design process are set out as follows:

- Do nothing alternative;
- Alternative project locations;
- Alternative layout, size and scale;

- Alternative processes; and
- Alternative mitigation measures.

This chapter describes the alternatives that were considered for the Proposed Development, where applicable, under each of these headings and the reasons for the selection of the chosen options, including a comparison of environmental effects.

3.2 Do Nothing Alternative

In a do nothing scenario there would be no expansion of the landfill and therefore the void space for landfilling that the Proposed Development would create would not be available in Ireland.

The use of landfills for the disposal of waste is the least preferred option in the waste hierarchy (as defined by EU Waste Framework Directive 2008/98/EC) and Ireland is under the obligation to minimise landfill use. However, due to limitations in processing capacity, contamination in recycling streams, and certain types of non-recoverable waste, landfilling remains a necessary part of Ireland's integrated waste management system and it is necessary to maintain sufficient landfilling capacity for unavoidable waste and unforeseen events (e.g. natural disasters or temporary disruptions to waste-to-energy facilities).

In the absence of the Proposed Development, in the future, Ireland may not have the capacity to undertake landfilling where it is necessary.

EU legislation and National and regional policy documents relevant to waste management are described herein along with details of how the Proposed Development supports their policies and objectives.

European Union (Landfill) Directive 2018/850

Directive 2018/850 amending Directive 1999/31/EC on the landfill of waste has set a target to limit the amount of waste that may be landfilled in any year by 2035. The European Commission states that this reduction of landfilling is necessary to prevent detrimental impacts on human health and the environment and to ensure that economically valuable waste materials are gradually and effectively recovered through proper waste management and in line with the waste hierarchy.

According to the EPA, Ireland has been reducing the number of landfills accepting municipal solid waste (MSW) over the last number of years, from 31 no. facilities in 2008 to 3 no. facilities as of 2025 (Ballynagaran, Co. Wicklow; Drehid, Co. Kildare; and Knockharley, Co. Meath). The Landfill Directive 2018/850 includes a target to ensure that by 2035 the amount of MSW landfilled is reduced to 10 % or less of the total amount of MSW generated (by weight). In a do-nothing scenario, once the existing Knockharley Landfill reaches capacity (expected in 2029 in the absence of the Proposed Development), the facility would need to cease acceptance of waste. Although this would help to achieve the target of 10% or less MSW to landfill it would expose the country to several significant waste management risks, such as:

- Lack of Contingency Capacity during:
  - Emergency events (e.g. natural disasters, pandemics, industrial incidents)
  - Temporary disruptions to waste-to-energy facilities or export routes
  - Surges in waste arisings due to economic or population growth
- Over-reliance on exportation of MSW
  - Ireland is left vulnerable if international markets or facilities were interrupted or became unavailable.
  - Many overseas facilities treating Irish waste operate to comparable standards under the same legislative framework, specifically destinations in other EU Member States. However, the standard of treatment in destinations outside of the EU is not as certain and therefore we cannot guarantee that waste will not be disposed of in a fashion which could have detrimental impacts to human health and the environment.

- Legal and Compliance Risks
  - If residual waste cannot be legally managed, Ireland risks non-compliance with broader environmental obligations (e.g. under the Waste Framework Directive) as well as, having to manage waste in a way that may be detrimental to human health and the environment.

The premature closure of landfills could also undermine the circular economy transition. If landfill capacity becomes unexpectedly reduced, Ireland may need to divert financial resources that would ideally be invested in ensuring that economically valuable waste materials are gradually and effectively recovered instead toward managing MSW in expensive ways (e.g. exportation). This would reduce the system's ability to manage these economically valuable waste materials while proper circular waste management systems are being scaled up.

In conclusion, the Proposed Development is of strategic importance to the State, in order to ensure that an operational capacity of a permitted landfill facility is sufficient to meet the required disposal capacity.

National Waste Management Plan for a Circular Economy 2024-2030

The National Waste Plan for a Circular Economy (NWPCE) 2024-2030 seeks to influence sustainable consumption and prevent the generation of waste, improve the capture of materials to optimise circularity and enable compliance with policy and legislation. This section describes how a do-nothing scenario with respect to the Proposed Development will relate to the plan.

Section 5.4.3 of Volume I (Current Situation and Challenges) of the NWPCE, notes *"the continued demand for landfill for the disposal of residual municipal waste currently exceeds the available capacity on an annual basis"*. Ireland is heavily reliant on the export of municipal waste to meet its waste management targets. In 2021, Ireland exported 38% of its total MSW. This current situation carries inherent risk which could escalate if international markets or facilities were interrupted or became unavailable.

In a do-nothing scenario, the existing Knockharley Landfill would need to cease operations in c. 2029 due to lack of landfilling space, further increasing Ireland's reliance on exportation.

The NWPCE notes 16 Focus Areas in Volume II (Policy Responses and Actions) and one of these, Focus Area 15, relates to Disposal Infrastructure. Ireland's disposal infrastructure is declared a focus area in the NWPCE to ensure that adequate disposal capacity at landfills is maintained and to ensure they provide for contingency capacity for unforeseen events. Of the 6 no. targeted policies related to Focus Area 15, TP15.1 and TP15.2 are relevant to the Proposed Development:

> *TP 15.1: Additional disposal capacity for nonhazardous waste is only supported in the context of compliance with the EU target of disposal to landfill of not more than 10% of MSW* [municipal solid waste] *by 2035.*

According to the EPA, Ireland has reduced the percentage of MSW to landfill from 42% in 2012 to 14.7% in 2022.

Under the Proposed Development, there is no proposed increase in the permitted annual acceptance at the existing landfill of up to 435,000 tonnes per annum of non-hazardous wastes. These non-hazardous wastes comprise up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables.

The proposed expansion of the landfill under the existing acceptance limits will allow for the continued use of the landfill as necessary for an extended period.

The landfill currently accepts both MSW and non MSW, therefore as Ireland reduces the landfilling of MSW, the landfill can be still utilised as contingency and for other waste streams.

TP 15.2: Ensure the provision of appropriate waste contingency capacity in response to market disruption/interruption and/or events which pose a risk to the environment and/or health of humans and livestock.

As already stated above, the Proposed Development can play an important role in providing waste contingency in the event of unforeseen events, which could pose a risk to the environmental and/or health of humans and livestock.

The NWPCE also sets out core policies in Volume II (Policy Responses and Actions). Core Policy 12 relates to Nationally and Regionally Important Infrastructure. This policy states:

The Plan recognises and supports the need for nationally and regionally important waste infrastructure, including infrastructure of the type, scale and proximity essential to maintain waste services and infrastructure that contributes to the ambition and policies of the Plan.

In support of Core Policy 12 it is noted that a non-hazardous landfill with a capacity greater than 100,000 tonnes per annum is nationally and regionally important infrastructure. The Proposed Development will ensure that the facility can fulfil this capacity.

Key Deliverable 14 of the NWPCE as laid out in Volume III (Delivery Roadmap), states:

The Local Government Sector supports the retention of existing disposal capacity at landfill and will seek to secure contingency capacity subject to authorisation.

This Key Deliverable is what the Proposed Development is aiming to achieve.

In conclusion, the NWPCE acknowledges the need for the reduced use of landfilling as a method of waste management; however it is noted that landfilling is still a necessary contingency within a broader self-sufficiency and circular economy framework.

Meath County Development Plan 2021-2027

The Meath County Development Plan reiterates the goals and objectives of EU and national policy and generally acknowledges that waste management policy is predicated on the EU Waste Hierarchy of prevention, preparing for reuse, recycling, energy recovery and sustainable disposal.

However, the Development Plan recognises that a contingency capacity for landfill is required within the country to facilitate emergency situations for example, the management of waste from a foot and mouth disease outbreak.

Therefore we refer to all the points discussed above in relation to the EU legislation and national guidance in stating that a do-nothing scenario would deprive Ireland of a secure contingency of providing landfill capacity for up to 10% of MSW in the future. See section below for further details.

Conclusion

As discussed above, it is clear that at a European and National Level, landfill is recognised as an absolute necessary element of the waste hierarchy within the circular economy model. Moreover, given the uncertainty surrounding Ireland's residual waste disposal demands and annual acceptable allowance capacity, Knockharley landfill, with its acceptance allowance of 188,000 tonnes of MSW per year (of an overall 396,000 tonnes with contingency of 44,000 tonnes for all waste streams), is, now more than ever, a critical piece of the country's waste infrastructure.

However, the landfill's void capacity' (i.e. how much total waste it can facilitate in the life of its operation) is quickly filling up. It is currently projected that the void capacity for Knockharley will be full by the year 2029, rather than 2032 as previously predicted within the 2018 application.

The table below was prepared by Tom Phillips and Associates and outlines the country's current and future landfill capacity in a do-nothing scenario along with the projected demand.

Table 3-1 Projected MSW annual landfill acceptance capacity and projected MSW annual landfill demand until 2036. Projected demand calculated by applying total projected MSW for each year times 0.115 (11.5% is the median of Ireland's current landfill rate (13%) and Irelands targeted land fill rate for 2035 (10%)).

	2026	2028	2030	2032	2034	2036
Ballynagran MSW Capacity (tonnes)	150,000 t	Planning to expire	Planning to expire	Planning to expire	Planning to expire	Planning to expire
Drehid MSW Capacity (tonnes)	120,000 t	120,000 t	120,000 t	120,000 t	120,000 t	120,000 t
Knockharley MSW Capacity (tonnes)	188,000 t	188,000 t	Void capacity to be full	Void capacity to be full	Void capacity to be full	Void capacity to be full
Total Capacity	458,000 t	458,000 t	120,000 t	120,000 t	120,000 t	120,000 t
Projected Demand	407,000 t	422,000 t	436,000 t	451,000 t	466,000 t	481,000 t
Projected Deficit	**+51,000 t**	**-144,000 t**	**-316,000 t**	**-331,000 t**	**-346,000 t**	**-361,000 t**

While showing a clear trajectory of Ireland's declining MSW capacity, the above tables do not factor in C&D waste, IBA, or contingency waste intake. With those waste streams factored in, it is considered that the overall waste capacity deficit could be far more severe. As such, if additional capacity is not secured soon, Ireland could be left with a substantial landfill capacity deficit within the next decade.

3.3 Alternative Project Locations

As noted in Section 4.13 of the 2018 Guidelines *"some projects may be site specific so the consideration of alternative sites may not be relevant."*

We also refer to the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022), which states that in some instances alternative locations may not be applicable or available for a specific project which is identified for a specific location.

The location of a landfill expansion is tied to the existing Knockharley Landfill and therefore for this development, alternative locations beyond the current Knockharley site are not considered.

3.4 Alternative Layout/Design

The project design team undertook a comprehensive design process to determine an effective and efficient layout for the Proposed Development, which has regard for the operation requirements, planning requirements and the environmental sensitivities of the site and the surrounding context. Two pre-planning meeting were undertaken with An Coimisiún Pleanála (ACP) on 26th February and 31st July 2025; and two pre-planning meetings with Meath County Council (MCC) on the 8th July and in August 2025 to discuss the Proposed Development.

The potential for environmental effects which informed this proposed expansion primarily related to visual impact, air quality and land and hydrology.

Alternative layouts for the Proposed Development were curtailed principally by the need to reduce the visual impact and air quality impact (odour) on the nearest sensitive receptors, to limit the impact on the Knockharley Stream and to allow for a piggyback cell between the proposed and permitted landfill bodies.

Concept 1, 2 and 3 illustrated below were considered.

Figure 3.1 Knockharley Landfill Expansion Concept 1

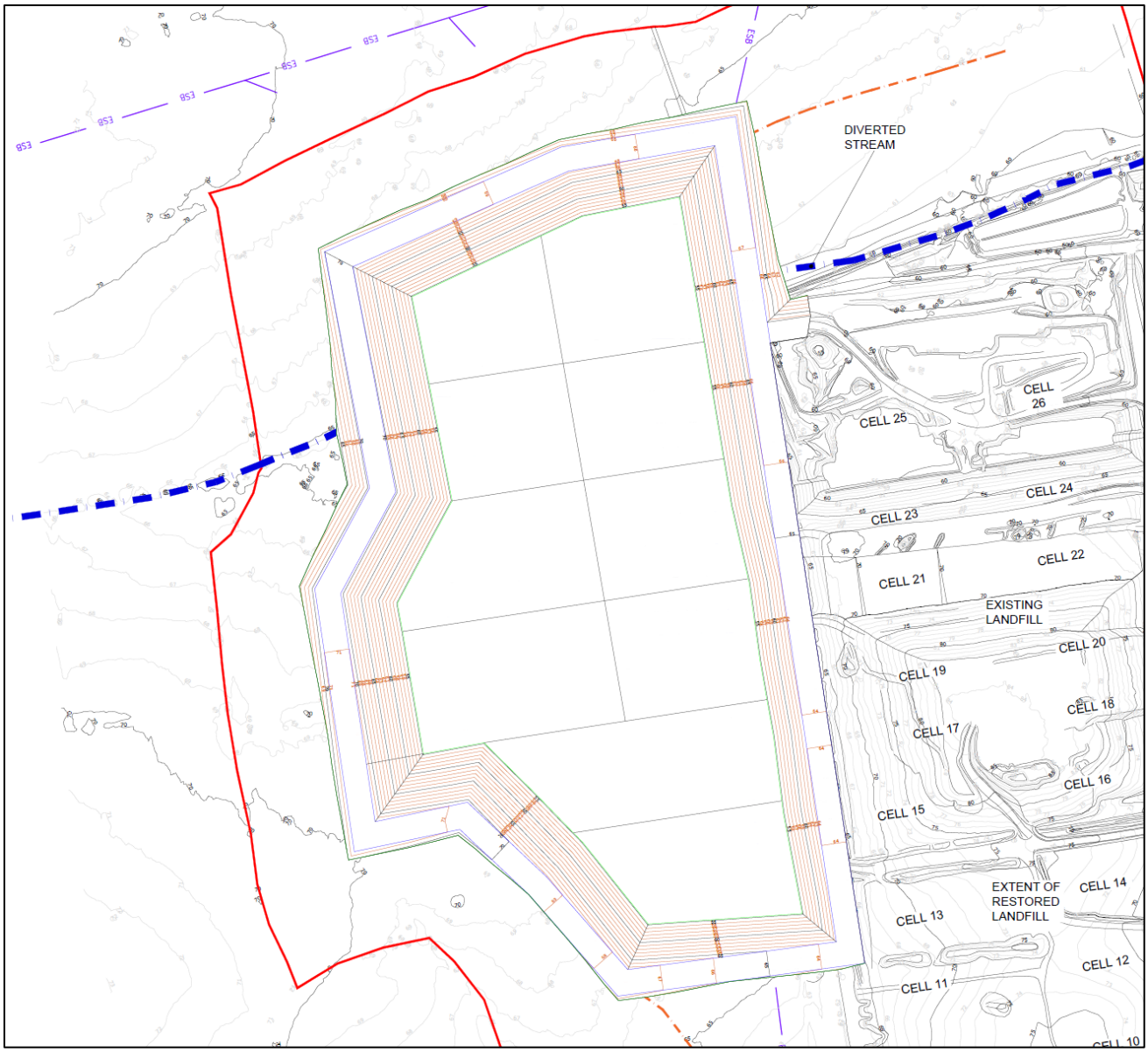


Figure 3.2 Knockharley Landfill Expansion Concept 2

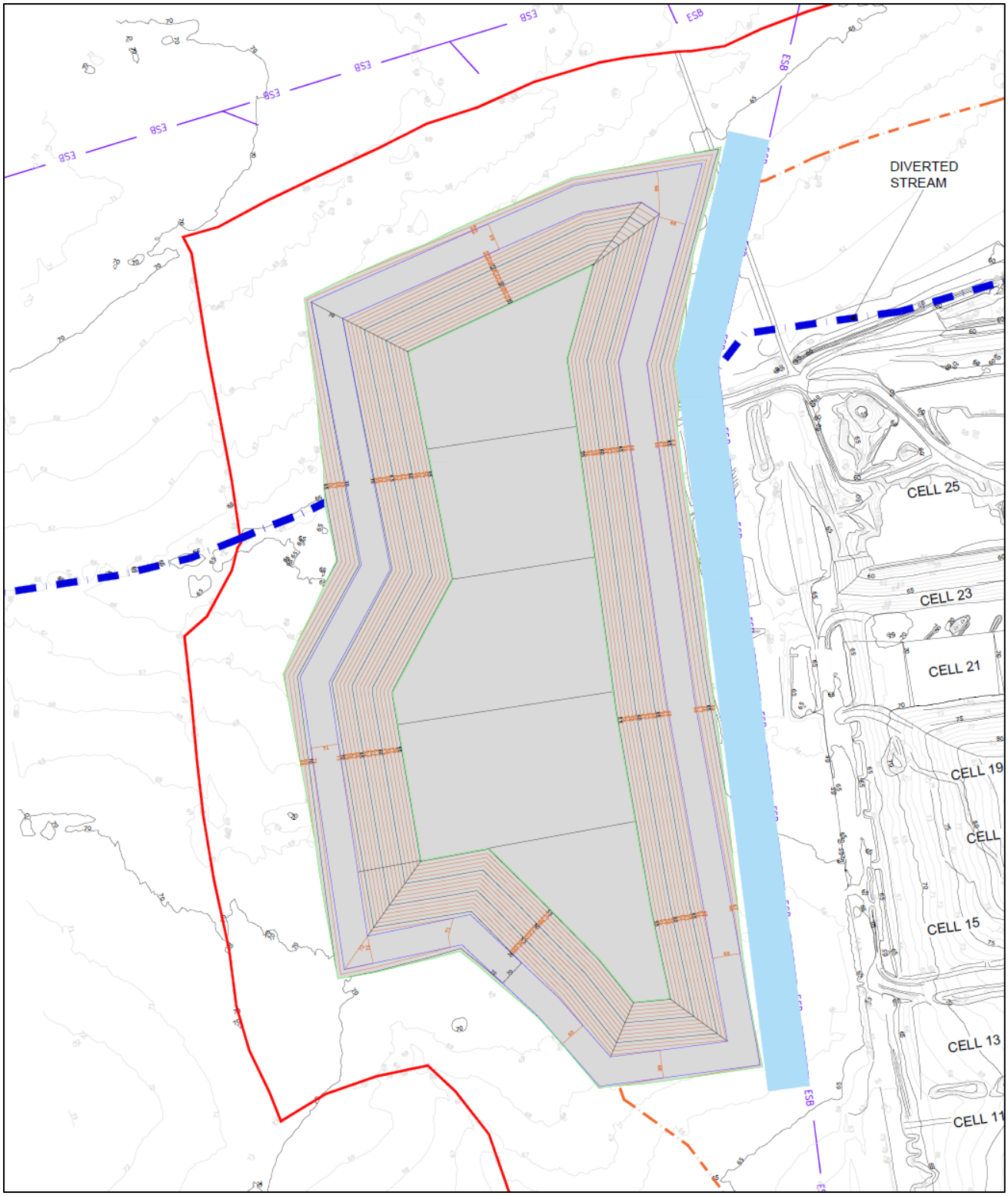
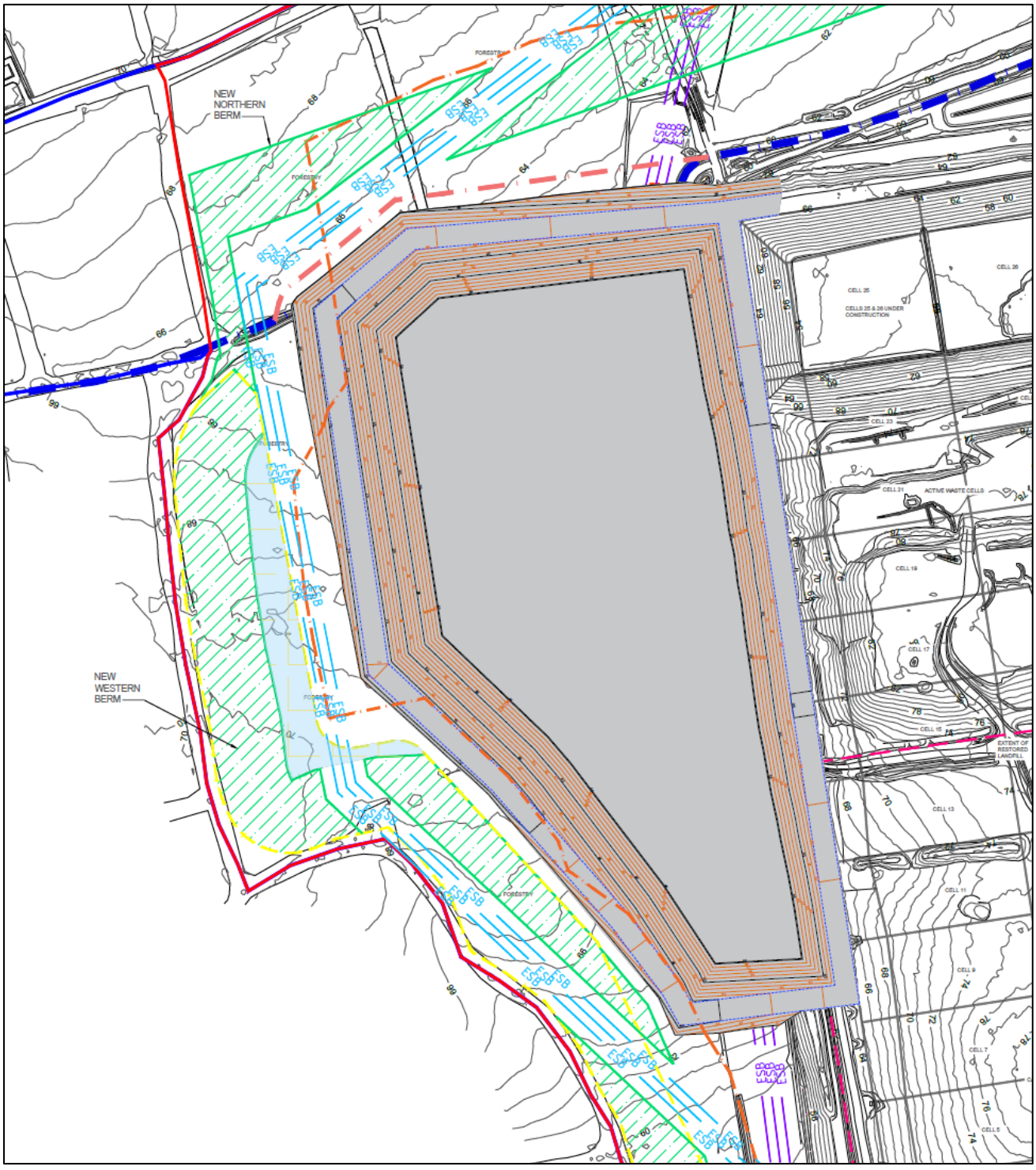


Figure 3.3 Knockharley Landfill Expansion Concept 3



The following defining characteristics can be observed on the considered concepts:

- Concept 1 and 2 consider an extension northwards with respect to the existing northern boundary of the landfill. Concept 3 includes a flush boundary with the existing landfill.
- Concept 2 requires no modification to existing powerlines, while Concept 1 and 3 require powerlines to be rerouted around the proposed boundary.
- Concept 1 and 3, can incorporate a 'piggyback cell' – a final cell which fills the gap between the proposed and permitted landfill bodies. Due to powerlines Concept 2 cannot incorporate this.

- All concepts require the realignment of the Knockharley Stream, however Concept 3 requires a less intrusive realignment.

The design process was an iterative one, which was ultimately driven by the need to provide landfill void space to meet Ireland's landfilling requirements. This was also influenced by the following environmental criteria:

- To minimise the impact of odour from the Proposed Development on the nearest sensitive receptors.
- To minimise the visual impact from the landfill extension.
- To minimise the impact on the Knockharley Stream.
- To protect and enhance the native hedgerows that define the sites boundary.
- To include, as far as is possible, native woodland mix to offset the loss of conifer forest removed to facilitate the Proposed Development .

With respect to odour, Concept 1 and 2 move the northern most face of the landfill closer to residential sensitive receptors on Knockharley Road to the north of the Proposed Development site. Distance is a primary factor with respect to how potent an odour is on a receptor. It is preferred to keep the landfill at a distance from these receptors, hence Concept 3 is preferred.

With respect to visual impact, the Knockharley landfill and the location of the Proposed Development is well screened from the view of the public and hence there is no preferred option with respect to visual impact.

With respect to minimising the impact on the Knockharley Stream, as is already mentioned above, Concept 1 and 2 move the northern face of the landfill northwards which would require the Knockharley Stream to be diverted around the additional northern portion. Concept 3 still requires a realignment but at a less significant scale and complexity, i.e. the stream channel will not need to incorporate multiple 90 degree bends which may lead to undesirable hydrological impacts (e.g. erosion of the constructed channel). Hence, Concept 3 is preferred.

With respect to protection and enhancement of hedgerows and including native woodland mix in the project design, this is possible within all 3 concepts and there is no particular preferred concept.

With respect to the above, from an environmental perspective Concept 3 is the preferred design and this was the chosen design by the design team.

3.5 Alternative Technologies

The EPA's Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2022) state that within each design solution there can be a number of different options as to how the processes or activities of the development can be carried out. This section typically examines the project processes in relation to likely emissions to air, noise and water, likely generation of waste and likely effect on traffic to determine the process that is least likely to impact on these parameters.

In terms of the Proposed Development processes, the various layout options considered (Section 3.4) will generally necessitate the same power requirements, and result in the same waste, and traffic.

The Proposed Development is guided by the Applicant's sustainability objectives, in addition to their proven knowledge and expertise as to what landfill technologies are suitable for the existing site and environs. The Applicant are using the best available technology in the selection of excavation strategy, liner materials and installation, construction and operational machinery, gas and leachate management. There are no practical alternatives to these specialised elements of the proposed landfill extension, many of which are pre-determined by the existing design and operations of the existing landfill. Therefore, development of alternative processes is extremely limited.

3.6 Alternative Mitigation

The EIA process for the Proposed Development involved a team of specialists, each with expertise in a specific aspect of the environment. For each aspect of the environment, each specialist has considered the existing environment, likely impacts of the Proposed Development and reviewed feasible mitigation measures to identify the most suitable measures appropriate to the environmental setting of the Proposed Development. In making a decision on the most suitable mitigation measure the specialist has considered relevant guidance and legislation.

Where relevant, a comparison of environmental effects was made, and the specialist has reviewed the possible mitigation measures available and considered the use of the mitigation in terms of the likely residual impact on the environment. The four established strategies for mitigation of effects have been considered: avoidance, prevention, reduction and offsetting (not required in this development). Mitigation measures have also been considered based on the effect on quality, duration of impact, probability and significance of effects.

The selected mitigation measures for the Proposed Development are outlined in each of the EIAR Chapters 4 - 14. These measures have been specifically chosen to address the potential environmental impacts of the Proposed Development and to minimise any adverse effects on the environment. By considering a range of mitigation measures and strategies, the specialist team has sought to ensure that the Proposed Development is as environmentally sustainable and responsible as possible.

3.7 Conclusions

Based on the assessment of reasonable alternatives (in relation to location, scale, design, technology, mitigation) relevant to the Proposed Development and its specific characteristics as set out in this chapter, the selected site, layout, design and mitigation is considered to be the most suitable for the Proposed Development from an environmental, strategic and planning perspective.

The layout of the Proposed Development has been carefully selected based on a suitably comprehensive assessment of reasonable alternative layouts and technologies. The Proposed Development presents minimised environmental impacts, while maximising the strategic potential of the site with respect to its use as a landfill.

In conclusion it is considered that the proposed site and chosen layout and design is highly suitable for the Proposed Development.

Chapter 04 – Human Health And Population

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4. HUMAN HEALTH AND POPULATION

4.1 Introduction

This Human Health and Population Impact Assessment has been prepared to assess the likely significant effects on human health population in respect of the Proposed Development.

The EU (2017) *Guidance on the preparation of the Environmental Impact Assessment Report* outlines that human health is a very broad factor that is be highly project dependent. This guidance states:

The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the project, effects caused by changes in disease vectors caused by the project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study.

Human health should be considered in the context of environmental pathways which may affect health such as air quality, noise, water and soil quality. All can contribute to negative effects on human health by facilitating the transport of contaminants or pollutants. An evaluation of the effects of these pathways on health, by considering the accepted standards of safety in dose, exposure or risk of air quality and noise levels for example, is considered appropriate, as these standards have been arrived at via scientific and medical research.

The EPA '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' (EPA, 2022) notes that the transposing legislation does not require assessment of land-use planning, demographic issues, or detailed socioeconomic analysis (EPA, 2022).

Furthermore, in accordance with the EPA (EPA, 2022), the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the Environmental Impact Assessment Report (EIAR). The likely significant impacts on Human Health and Population regarding issues such as soils, geology and hydrogeology, water, air quality, noise and vibration, traffic and landscape are addressed in detail within the following EIAR chapters:

- Chapter 5 – Land, Soils, and Geology;
- Chapter 6 – Hydrology and Hydrogeology;
- Chapter 8 – Air Quality;
- Chapter 10 – Noise and Vibration;
- Chapter 12 – Landscape and Visual; and
- Chapter 13 – Material Assets - Traffic and Transportation.

Where these topics are dealt with in further detail elsewhere in this EIA Report, the relevant chapters have been cross referenced in this Chapter to provide the Planning Authority with a context for their determination.

The assessment of other health and safety issues that are carried out under other EU Directives are also relevant. These may include reports prepared under the Industrial Emissions, Waste Framework, Landfill, Strategic Environmental Assessment, Seveso III, Water Framework Directive, Floods or Nuclear Safety Directives. In keeping with the requirement of the amended EIA Directive, an EIAR considers the results of such assessments without duplicating them.

4.2 Methodology

4.2.1 Relevant Legislation and Guidance

This chapter has been prepared in accordance with:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Environment Protection Agency (EPA, 2022).
- Health Impact Assessment Guidance. Institute of Public Health (IPH), (IPH, 2021).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report European Commission (EU, 2017).

This chapter follows these guidelines and will examine the health effects relevant to the proposed development as they relate to the relevant study area.

The description of the sensitivity, magnitude and significance, outlined within this assessment are based on the Health Impact Assessment Guidance (IPH, 2021) criteria, while the probability and duration of effects are based on the definitions set out within Section 3.7 of the 'Guidelines on information to be contained in Environmental Impact Assessment Reports' (EPA, 2022).

4.2.2 Data Sources of information

The following sources of information have been used in this assessment:

- 2022 Census results carried out by the Central Statistics Office (CSO) 03 April 2022. Made available from https://www.cso.ie/en/
- 2016 Census carried out by the Central Statistics Office (CSO) 24 April 2016. Made available from https://www.cso.ie/en/
- Pobal HP Deprivation Index based on 2022 Census Data (CSO) Made available from https://www.pobal.ie/
- Pobal HP Deprivation Index based on 2016 Census Data (CSO) Made available from https://www.pobal.ie/
- Google maps available from https://www.google.com/maps
- OpenStreetMap and contributors available from https://www.openstreetmap.org
- Health and Safety Authority (HSA) online register of Notified Seveso Establishments available from https://www.hsa.ie/eng/your_industry/chemicals/legislation_enforcement/comah/list_of_establishments/.

4.2.3 Study Area

There is no specific guidance available on an appropriate study area to focus the assessment of existing land use and/or permitted projects. The research area has been established using expert judgement and based on the accessibility of data and taking into consideration the potential for impact from the proposed development.

It is acknowledged that projects like the one proposed can have an impact on activity in a larger area than only the site itself. Generally, the closer to the works, the greater the potential for impacts. Based on our professional experience with similar developments, and the sensitivity of the surrounding source-pathway-receptor human baseline, the majority of the potential environmental impacts are likely to be confined within 50-150 m of the Proposed Development. Some effects from the Proposed Development, including air quality and traffic, might have a larger area of effect, and these are addressed in further detail in the corresponding expert assessments that are set out in the other chapters within this EIAR.

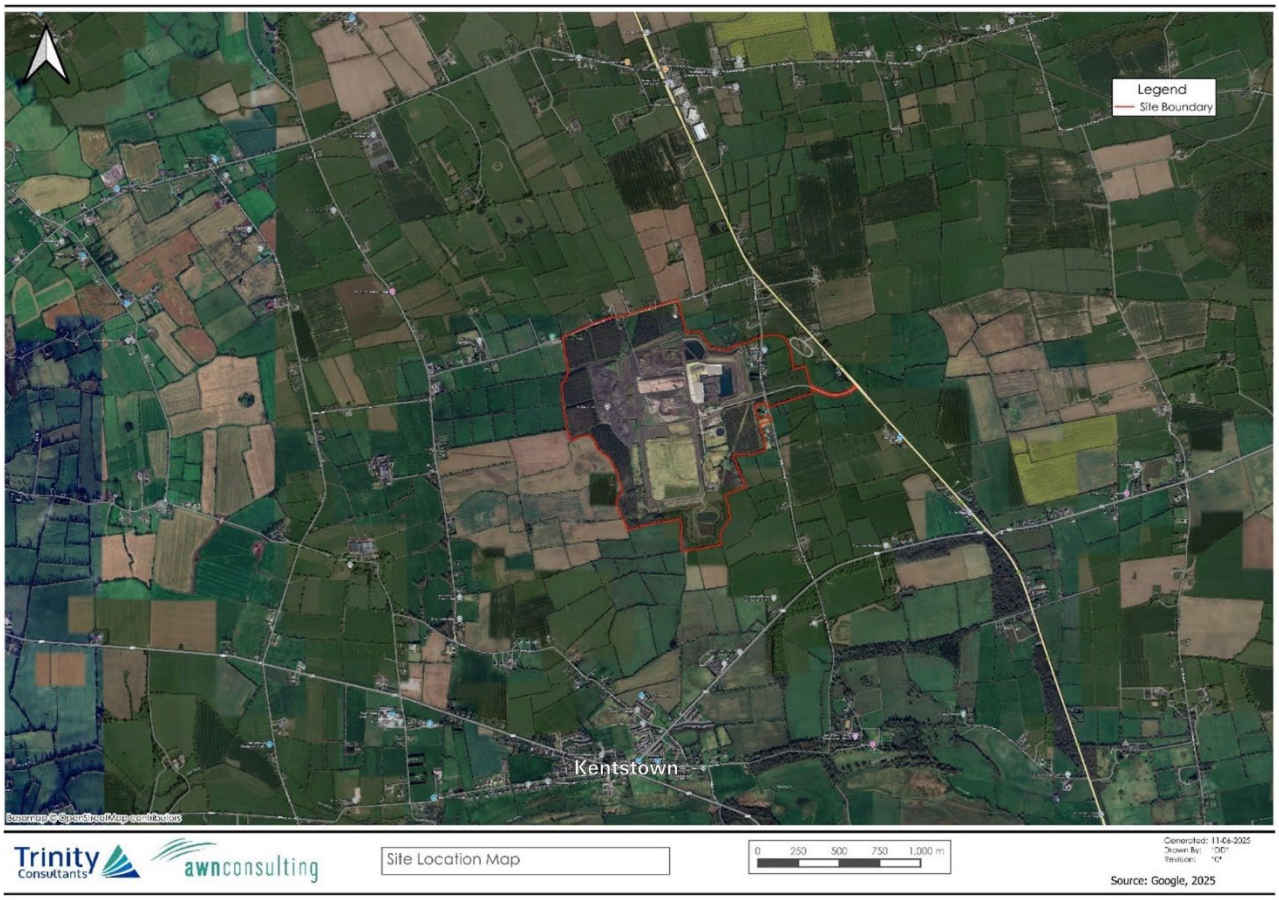
The project being considered, is not expected to have Regional, National or International, or Transboundary impacts on Human Health. Therefore, the Study area has been restricted to the

neighbouring community (site-specific population), and wider community (local population). A general study area of 1 km from the site location is included for population statistics, while the wider area of 2.5 km from the site location has been used to inform the baseline description of the area.

In the desk-based assessment of Population Health Sensitivity the use of Electoral Divisions (ED) statistics from CSO have been utilised. Electoral Divisions are the smallest legally defined administrative areas in the state; developed with the intention of producing areas roughly equivalent in both population and "rateable value" (CSO).

The Proposed Development site is located in the Local Authority area of Meath County Council (MCC), and in the ED of Kentstown (167041). The selection of additional ED within the study area has included ED that are either entirely contained within or partially within 1 km of the Proposed Development site. In the case of the Proposed Development, the ED included alongside Kentstown are the EDs of Painestown (167071) and Ardmulchan (167004).

Figure 4-1 Location of the Proposed Development within the Study Area



4.2.4 Population Impact Assessment Categories

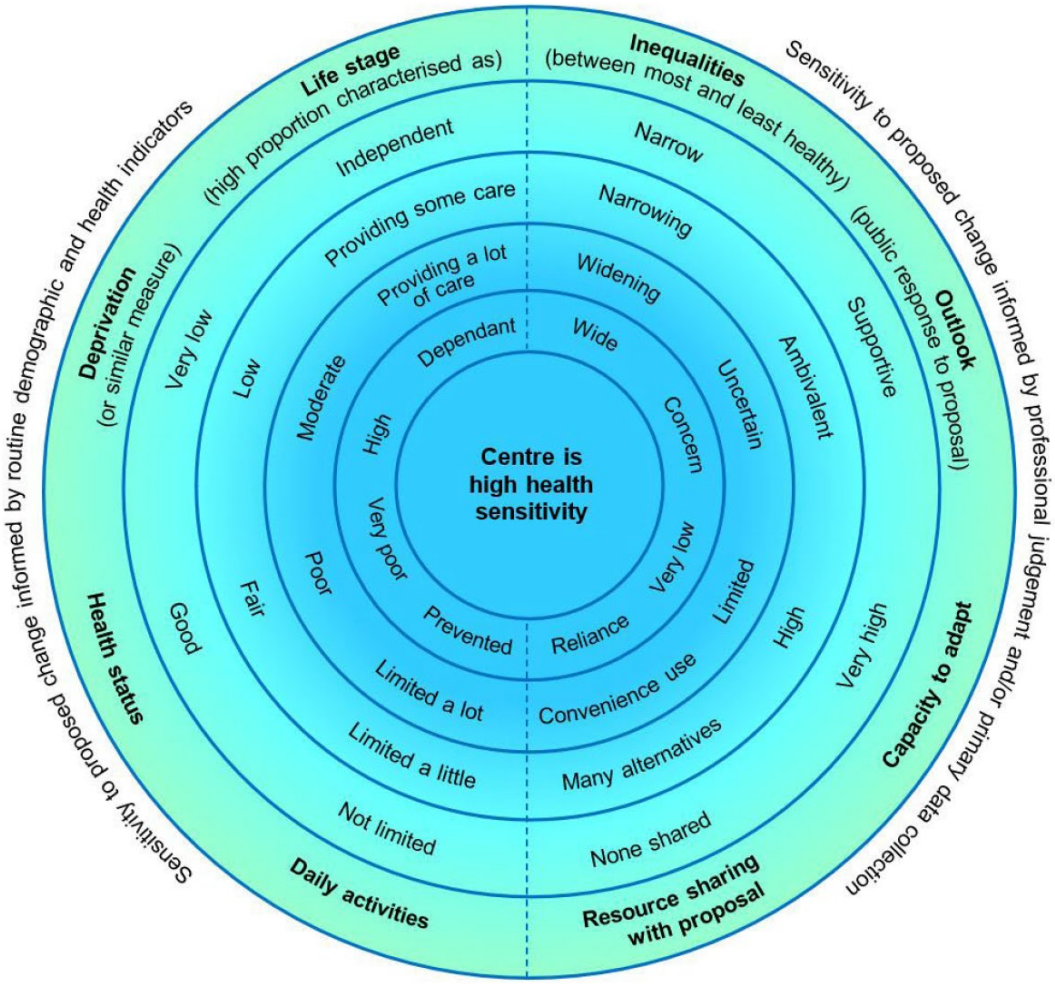
4.2.4.1 Assessment Sensitivity of Population

The assessment of significance of an impact is a professional appraisal based on the sensitivity of the receptor and the magnitude of effect. Within any area, the sensitivity of individuals in a population will vary. The Health Impact Assessment Guidance (IPH, 2021) sets out conceptual model of the different components of sensitivity (Figure 4-2). It uses criteria (segments) and indicative classifications (levels) to

explore, and explain, a finding of sensitivity. The conclusion may be summarised as a high, medium, low or negligible sensitivity to change.

The existing sensitivity of the receiving environment (in terms of population and human health) has been appraised for the study area with a desk-based assessment of routine demographic and health indicators, rather than the use of surveys or collection of primary data. This includes analysis of existing data (based on the availably of information) from the Central Statistics Office (CSO) and Pobal to build up a profile of the baseline population information within the study area. Topographical maps and Google maps have also been used to inform the baseline description of the area to inform the proximity of the site to areas of economic activity, employment, community infrastructure, emergency services, tourism and recreation amenities.

Figure 4-2 Health sensitivity: conceptual model (Source: Health Impact Assessment Guidance (IPH, 2021))

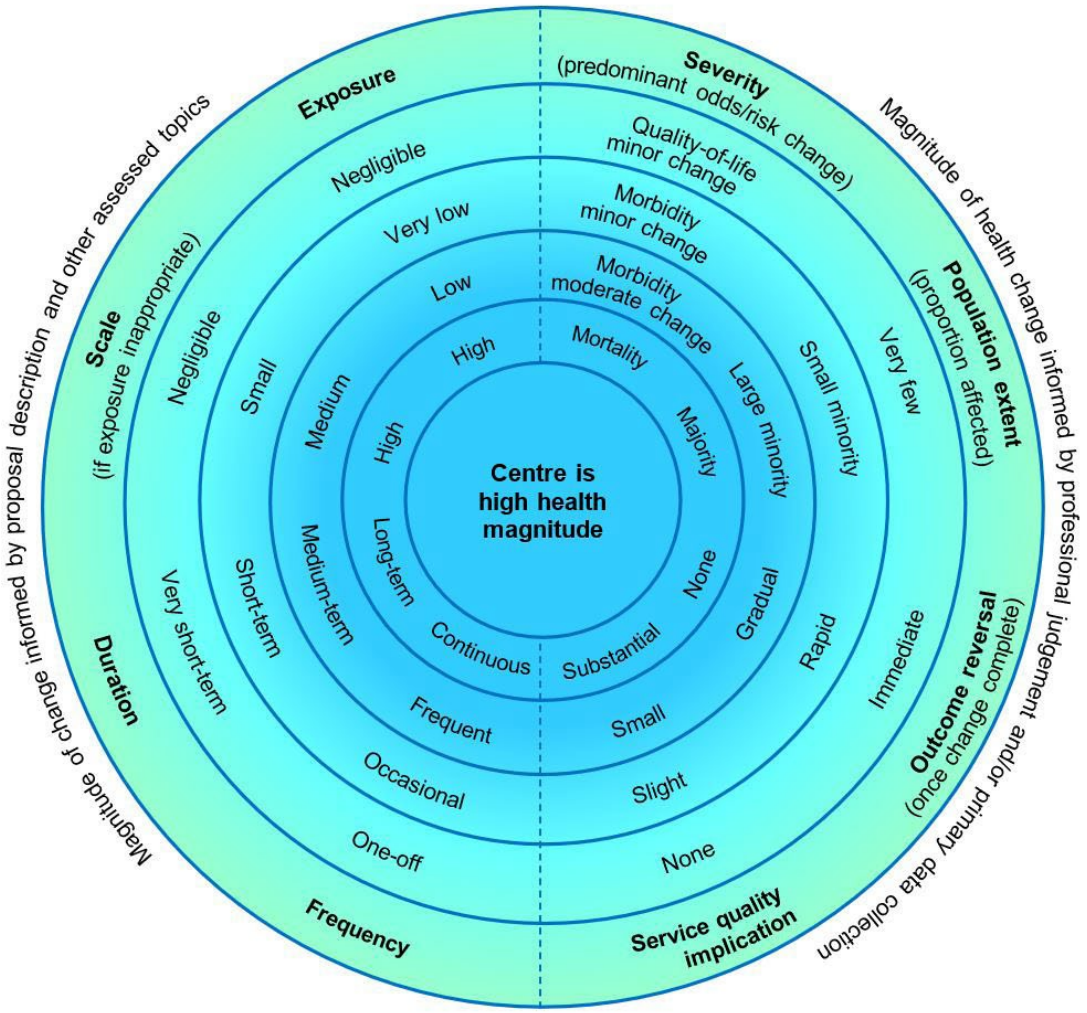


4.2.4.2 Magnitude of Impact

Magnitude considers the characteristics of the change which would affect the receptor as a result of the proposal. The Health Impact Assessment Guidance (IPH, 2021) sets out a conceptual model of the different components of sensitivity (Figure 4-3). Again, this model provides different components of *magnitude*. It uses criteria (segments) and indicative classifications (levels) to explore, and explain, a

finding of *magnitude*. The conclusion may be summarised as a high, medium, low or negligible magnitude of change.

Figure 4-3 Health magnitude: conceptual model (Source: Health Impact Assessment Guidance (IPH, 2021))



4.2.4.3 Significance of Effects

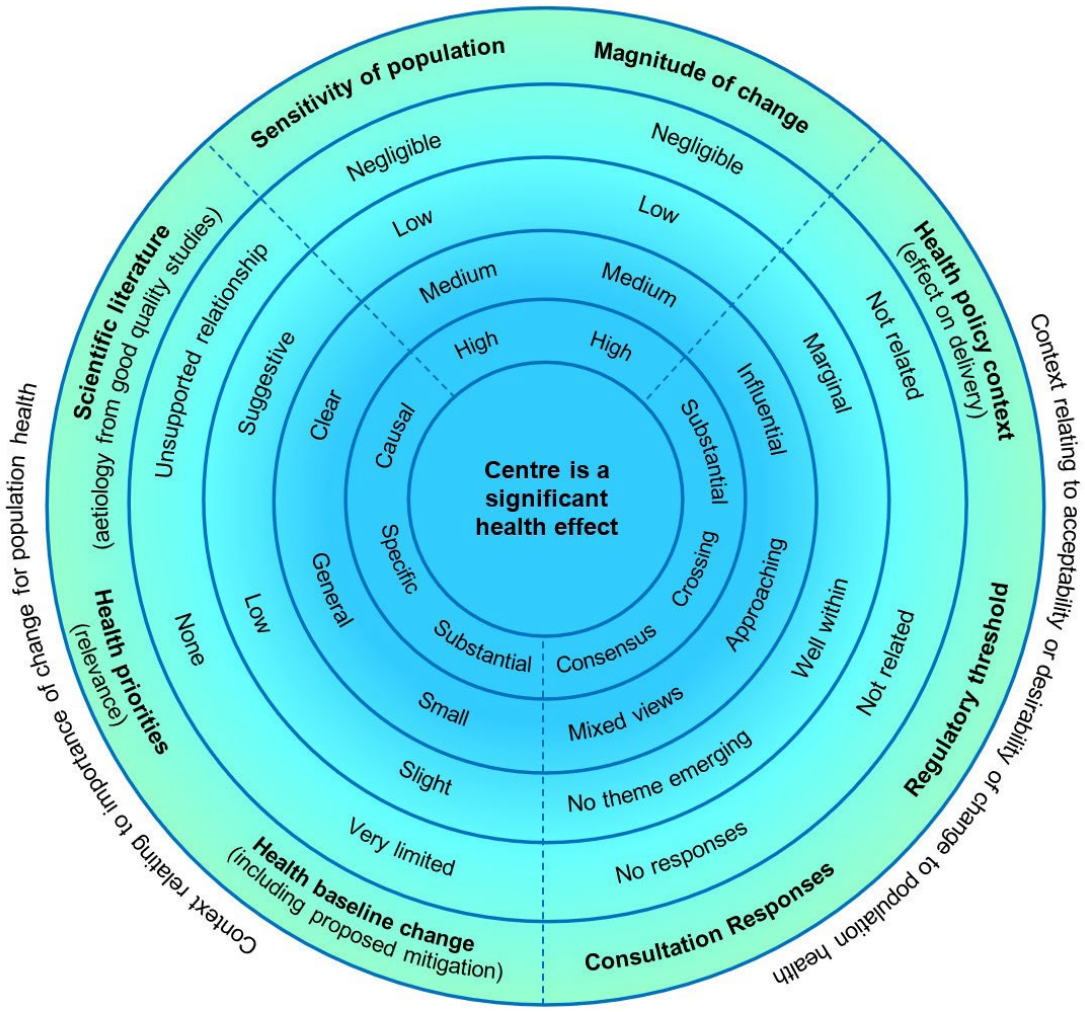
Significance relies on informed, expert judgement about what is important, desirable or acceptable with regards to changes triggered by the proposal in question. The assessment of the significance of effects in this assessment is a professional appraisal and has been based on the relationship between the magnitude of the effects and the sensitivity of the receptor.

The Health Impact Assessment Guidance (IPH, 2021) sets out a conceptual model of the different components of significance. It uses criteria (segments) and indicative classifications (levels) to explore, and explain, a finding that a health effect is significant or not significant.

The Health Impact Assessment Guidance (IPH, 2021) model brings together different types of evidence, e.g. scientific literature, public health priorities, regulatory standards and health policy. The model thus not only take into account a range of evidence sources, but also a diversity of professional perspectives, e.g. academics, public health practitioners, regulators and policy makers.

The model below, includes the factors of magnitude of impact and the sensitivity of receptors as determined in Section 4.2.1 and Section 4.2.2 above. This EIA assessment typically relies on regulatory thresholds, where there would be formal monitoring by regulators, to set out the acceptability or desirability of change to population health.

Figure 4-4 Health significance: conceptual model



4.2.5 Forecasting Methods and Difficulties Encountered

No particular difficulties were encountered in preparing the population assessment.

There are uncertainties in relation to assessing impacts on individuals or communities due to the lack of individual health data and the difficulty in predicting effects, which can only be based on general guidance and assumptions.

Forecasting methods and methodology, if any, are set out within the specialist chapters that this assessment relies upon.

4.3 Receiving Environment

4.3.1 Population Health Sensitivity within the Study Area

The purpose of the population health sensitivity assessment is to identify the likely sensitivity of the local population and its capacity to absorb change. For this assessment, it is considered that available data on population, deprivation, life stage and health status within the Study Area provides sufficient information to establish population sensitivity and to provide the Planning Authority with context. These datasets reflect the main factors that influence how a population may be affected by change, and are consistent with commonly used indicators in health and environmental assessments. Based on professional judgement, they are appropriate and proportionate to the scale and nature of the proposed development.

4.3.1.1 Population

The most recent census of population was carried out by the CSO on the 3rd of April 2022. The census compiles data for the whole state as well as smaller individual areas including counties, cities, towns, and electoral divisions. Taking into consideration the location of the Proposed Development, the census information on population, age profile, employment, and social class, has been analysed in relation to the development site.

Table 4-1 denotes the population change of the State and the electoral divisions which make up the Study Area for the census years 2016 and 2022. The latest census data (2022) indicates that all three no. Electoral Divisions (EDs) experienced population growth from 2016 to 2022. However, the growth rates in Kentstown and Painestown was lower than that of the Republic of Ireland during the same period, while the ED of Ardmulchan had a higher growth rate than that of the Republic of Ireland.

Table 4-1 Population Change at National, County and Electoral Division Level from 2016 – 2022 (Source: www.cso.ie)

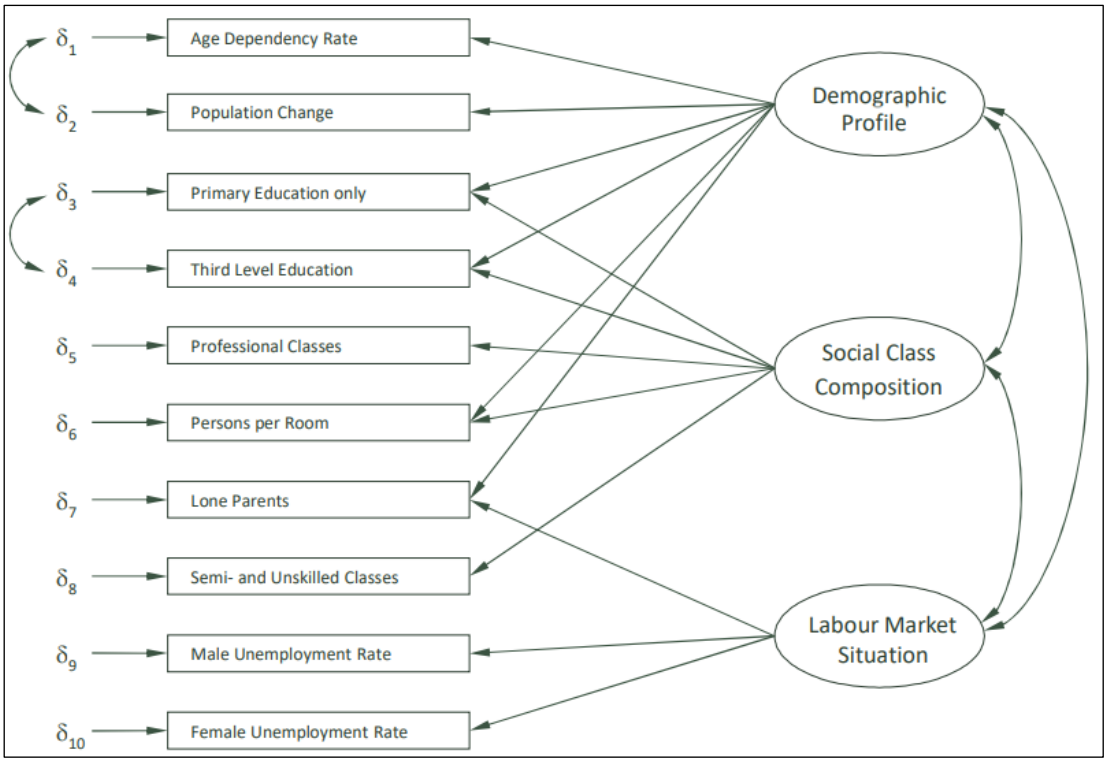
Area	Population for Census Year		% Change 2016-2022
	2016	2022	
State - Republic of Ireland	4,761,865	5,149,139	+8.1%
Kentstown	2,152	2,263	+5.2%
Painestown	1,185	1,260	+6.3%
Ardmulchan	979	1,137	+16.1%

4.3.1.2 Deprivation

The Health Impact Assessment Guidance (IPH, 2021) outlines that impact assessments should consider if the population is already stressed by limited resources or high burdens as well as if groups are affected that have reduced access to financial, social and political resources. Deprivation differences between areas are indicative of social gradients, which are central to the consideration of health inequalities.

Deprivation statistics for Ireland are available from the Pobal HP Deprivation Index that shows the overall affluence and deprivation. This Index draws on data from the national Census and combines three dimensions of relative affluence and deprivation: Demographic Profile, Social Class Composition and Labour Market Situation that are measured by ten key socio-economic indicators from the Census of Population.

Figure 4-5 Basic Model of the Pobal HP Deprivation Index



The Pobal HP Deprivation Index Relative Index Score allows for the provision of descriptive labels with the scores, which are grouped by standard deviation as seen in Table 4-2 below.

In order to make a uniform assessment using the conceptual model as set out in Figure 4-5 above a relative Population Sensitivity is used - the Deprivation Score of 'Very disadvantaged', or 'Extremely disadvantaged' would represent a high sensitivity. Conversely, a 'Extremely affluent' or 'Very affluent' would represent a very low sensitivity.

Table 4-2 Pobal HP Index Relevant Index Score labels (Source: Pobal HP Deprivation Index)

Deprivation Score	Pobal HP Description	Sensitivity of Population
> 30	Extremely affluent	Very Low
20 to 30	Very affluent	Very Low
10 to 20	Affluent	Low
0 to 10	Marginally above average	Low
0 to -10	Marginally below average	Moderate
-10 to -20	Disadvantaged	Moderate
-20 to -30	Very disadvantaged	High
< -30	Extremely disadvantaged	High

The data in Table 4.3 shows the Pobal HP Deprivation Index scores for the Study Area, based on the 2022 Census. As Pobal has not yet released national-level deprivation scores for 2022, the Meath County score has been used for comparison. The Deprivation Index indicates that, in 2022, two of the EDs in the Study Area were classified as 'Marginally Above Average', consistent with the Meath County score. One ED

(Kentstown) was classified as 'Marginally Below Average'. Overall, this suggests a low to moderate population sensitivity (deprivation) within the Study Area.

Table 4-3 Deprivation Score within the Study Area (Pobal HP Deprivation Index, 2022 Census)

Area	Deprivation Score	Pobal HP Description
Meath County	1.56	Marginally Above Average
Kentstown	-2.00	Marginally Below Average
Painestown	2.92	Marginally Above Average
Ardmulchan	5.45	Marginally Above Average

4.3.1.3 Life Stage (Age Dependency)

The Health Impact Assessment Guidance (IPH, 2021) outlines that life-course analysis is often used in public health and reflects differing health sensitivities and needs at different ages. Typically, children and older people are particularly sensitive to change, including due to being dependants. Dependents are defined for statistical purposes as people outside the normal working age of 15-64. Dependency ratios are used to give a useful indication of the age structure of a population with young (0-14) and old (65+) shown as a percentage of the population of working age (15-64).

A low dependency ratio indicates that there is a larger proportion of working population age (15–64) years as compared to young (0-14) and old (65+). Conversely, a high dependency ratio indicates that there is a larger proportion of young (0-14) and old (65+) as compared to working population age. High dependency ratio can also indicate if some groups are more likely to be at home during the day (for example, due to childcare, or retired persons) and would therefore be more likely to be impacted by a development within the area.

Age dependency ratio is available through the Pobal Online Geo-Profiling tools (https://maps.pobal.ie/) which are based on the national Census.

The age dependency ratio for the study area is shown in Table 4-4 below. From these dependency ratios we can tell that the Study Area is less dependent when compared with the national average. This indicates a largely 'independent' Study Area as compared with ROI, which can be defined as per the conceptual model shown in Figure 4-2 as 'providing some care' to 'providing a lot of care'. This indicates that there is a larger proportion of working population within the Study Area, likely to be more mobile, and out of the home during the day, and would therefore be less likely to be impacted by a development within the area as compared to a more dependant population.

Table 4-4 Age Dependency Ratio within the Study Area (Pobal Geo-Profiling, 2022 Census)

Area	Age Dependency Ratio for Census Year (%)	
	2016	2022
State - Republic of Ireland	52.70	53.22
Kentstown	37.12	35.13
Painestown	34.43	36.83
Ardmulchan	33.31	36.24

4.3.1.4 Health Status (General Health)

The CSO as part of the census records an overall self-reported measure of population health within Ireland. Areas with a poor health status are typically considered to be of a higher sensitivity and more susceptible to change in environmental conditions.

Table 4-5 below shows the self-reported measure of population health within the Study Area compared to ROI. This shows the area predominately self-reports their health as 'Very Good', which is in-line with national trends.

Table 4-5 Self-reported Measure of Population Health (CSO, 2022 Census)

Area	% population describing their general health					
	Not Stated	Very Bad	Bad	Fair	Good	Very Good
State - Republic of Ireland	6.74%	0.32%	1.41%	8.64%	29.66%	53.23%
Kentstown	5.61%	0.13%	1.28%	7.60%	29.31%	56.06%
Painestown	1.90%	0.08%	0.79%	7.30%	28.97%	60.95%
Ardmulchan	4.8%	0.4%	0.6%	6.9%	25.8%	61.5%

4.3.1.5 Ability to Perform Daily Activities

People's ability to perform day-to-day activities is relevant to population sensitivity, particularly where there are changes in access to services or community amenities. Persons with disabilities can also be more susceptible to the changes in environmental conditions. The CSO as part of the census records an overall self-reported measure of persons with disabilities within Ireland.

Table 4-6 details the number of persons with a disability compared to the population as a whole. The data shows that all ED's within the Study Area have a lower percentage of persons with a disability than the national average, indicating relatively limited restrictions on daily activities.

Table 4-6 Persons with a disability (CSO, 2022 Census)

Area	Persons with a disability	Population	% Persons with a disability
State - Republic of Ireland	1,109,557	5,149,139	21.5%
Kentstown	410	2,263	18.1%
Painestown	234	1,260	18.6%
Ardmulchan	195	1,137	17.2%

4.3.1.6 Summary of Population Health Sensitivity

The 2022 Census data indicates that all three Electoral Divisions (EDs) in the Study Area experienced population growth between 2016 and 2022. However, the growth rates in Kentstown and Painestown were lower than the national average, while Ardmulchan recorded a higher growth rate than the Republic of Ireland overall. This reflects moderate population stability within the Study Area.

The Pobal HP Deprivation Index shows that, in 2022, two EDs were classified as 'Marginally Above Average', consistent with the Meath County score. One ED (Kentstown) was classified as 'Marginally Below Average'. Overall, this suggests low to moderate population sensitivity in terms of deprivation.

The age dependency ratio in the Study Area is low, indicating a high proportion of working-age individuals. This implies a greater degree of self-sufficiency and resilience to change.

Health data for the Study Area shows that a high proportion of the population (56%–61%) reported their health status as 'Very Good', with a low proportion reporting 'Bad' or 'Very Bad' health. Additionally, the percentage of persons with a disability in all three EDs is below the national average, suggesting relatively limited restrictions on daily activity.

Taking all of these factors into account, the population in the Study Area demonstrates relatively low sensitivity to change. In accordance with the criteria outlined in Figure 4.2, the Study Area is therefore assessed as having Low to Moderate Population Sensitivity.

4.3.2 Location and Character of the Local Environment

The purpose of describing the location and character of the local environment provides useful information on the current local community and usage within the study area provide the Planning Authority with a context for this assessment. This includes community and social infrastructure that covers a range of services and facilities that meet local and strategic needs and contribute towards a good quality of life. In this context it includes local business, residential areas, education, health facilities, emergency services, and places of worship, and green infrastructure.

Furthermore, the baseline identifies tourism and landscape amenity within the study Area which provides an indication on current intrinsic values placed on the area for local, national and international users that may be impacted by the proposed development.

The local environment also includes areas of natural resources that relate to populations and human health that may be impacted by the proposed development, this includes economic resources, recreational and bathing waters, and drinking water resources.

While a general study area of ED's within 1 km from the site location is included for population statistics, the wider area of 2.5 km from the site location has been used to inform the baseline description of the area. Refer to Figure 4-6 for baseline area map.

Figure 4-6 2.5km Radius Baseline Description Area



4.3.2.1 Community and Social Infrastructure within the Study Area

Residential and Employment areas

The Proposed Development site is situated within a predominantly rural area characterized by a dispersed residential population. The surrounding landscape consists mainly of single-family homes and farms, which reflect the area's strong agricultural character. These residences are scattered throughout the countryside, contributing to a low-density, rural living environment.

The site is located within the jurisdiction of Meath County. Zoning designations have been reviewed in line with the current County Development Plan. The Proposed Development site is zoned RA – Rural Area, with the zoning objective set out in Table 11.7 of the Development Management Standards and Land Use Zoning Objectives section of the *Meath County Development Plan 2020–2027.* This objective is: *"To protect and promote in a balanced way, the development of agriculture, forestry and rural-related enterprise, biodiversity, the rural landscape, and the built and cultural heritage."*

The Proposed Development is directly bordered on all sides by rural greenfield lands, interspersed with existing residential dwellings and agricultural properties. The area is predominantly agricultural, characterised by a dispersed settlement pattern. Most residential units consist of single, standalone dwellings scattered across the landscape. The nearest houses are located along Knockharley Road, immediately north of the site, and along the Rathdrinagh/Flemingstown Road (L5056) to the east.

There are no shopping areas located within the Study Area of the Proposed Development site.
There are no industrial facilities within the Study Area, and only a small number of commercial businesses are located within a 2.5 km radius of the Proposed Development. The existing commercial facilities within the Study Area and their approximate distances from the site boundary are as follows:

- NSP Expert Lab Solutions – c. 470 m west
- The Three Bears Cottage (Hotel) – c. 1.05 km northwest
- Curtis Shop – c. 1.41 km east
- Slane Commercials LTD (mechanics) – c. 1.45 km north
- McKeever's Pub – c. 1.51 km north
- Rambling Rover Campervans Ireland – c. 1.52 km north
- Global Electrical – c. 1.58 km northwest
- Hexafly (Biotechnology company) – c. 1.64 km northeast
- Yellow Furze Nurseries Ltd (Wholesale plant nursery) – c. 1.66 km northwest
- R.H. MOTORS (Car repair and maintenance service) – c. 1.77 km north
- GreenHeart Wood Interiors – c. 1.93 km northeast

Education, Childcare, Schools

There are a few childcare facilities or schools within the Study Area:

- Kentstown National School – c. 865 m South
- Playmates preschool – c. 1.04 km southeast
- Carnuff Little Montessori – c. 1.89 km northwest
- Deanhill Montessori School – c. 1.93 km northwest
- Scoil Naomh Pio – c. 2.35 km northeast

Healthcare Services

There are no healthcare services within the Study Area. The closest healthcare facility is Duleek Health Centre, located c. 6.95 km east of the site.

Emergency Services

There are no emergency services (fire or Garda stations) located within the Study Area. The nearest Garda Station is Slane Garda Station, approximately 6.36 km north of the Proposed Development site. The nearest fire station is Navan Fire Station, located approximately 9.89 km to the west of the site.

Places of Worship

There are 2 no. places of worship in the vicinity of the proposed development:

- Church of the Assumption – c. 1.42 km south
- St. Mary's Church – c. 1.42 km south

Green Infrastructure, Landscape and Amenity within the Study Area

Noteworthy recreational features in the vicinity of the Proposed Development site include a number of sports clubs. The Balrath Park Football Ground is located within the redline boundary on the eastern side of the site, , while Kentstown Rovers FC (Greenstar Park) lies c. 60m from the northwest corner. Knockharley Cricket Club is located approximately 1.10 km to the southwest, and Kentstown Rovers FC (Paul Lenehan Memorial Park) is situated approximately 533 metres to the south of the site.

In terms of landscape amenity, the lands surrounding the site constitute predominantly rural and agricultural greenfields. The primary land use in this area is farming, with scattered residential properties

and farmsteads. There are no listed or scenic views, no landscape or amenity designations pertaining to the site.

There are no Architectural Conservation Areas (ACA) or Special Areas of Conservation (SAC) within the Study Area. Likewise, no archaeological monuments, recorded monuments, protected structures, National Inventory of Architectural Heritage (NIAH) sites, or sites listed on the Record of Monuments and Places (RMP) are recorded within the townland of Knockharley.

However, the site lies within a wider, archaeologically rich landscape. Approximately 5 km to the north is the Boyne Valley, which contains numerous sites of international significance, including the UNESCO World Heritage Site of Brú na Bóinne (the megalithic tombs of Newgrange / Sí an Bhrú, Knowth, and Dowth). To the southwest, c. 8 km away, is the Hill of Tara / Teamhair, the ancient seat of the High Kings of Ireland.

4.3.2.2 Tourism within the Study Area

Tourism in Ireland has experienced a strong resurgence in recent years and remains a key contributor to national economic success. Within County Meath, the importance of tourism is recognised in the Meath County Development Plan 2021–2027 (Chapter 4: Economy and Employment Strategy), which states:

> *"Tourism and recreation are noted as key sectors in both the economic and social development of the County, providing opportunities for employment and wealth generation, and also facilities and infrastructure that enhance the quality of life for residents."*

The proposed development site lies within a predominantly agricultural and residential setting. The site itself does not currently serve a tourism function. Of note, Newgrange Ancient Passage Tomb / Sí an Bhrú is located 5.8 km northeast of the Proposed Development site and the Hill of Tara / Teamhair is located 8.6km southwest of the Proposed Development site.

4.3.2.3 Natural Resources within the Study Area

Geological Heritage, and Economic Resources

Natural resources and land use within the Study Area have also been considered, as they may have implications for the development of the site. A review of Geological Survey Ireland (GSI) online maps indicates that there are no extractive industries, active quarries, or mineral localities in the area. No geological heritage sites are identified within the site boundary or in close proximity (GSI, 2025). The nearest geo-heritage site is Painestown Quarry, located approximately 2.5 km north of the site.

Recreational Waters and Bathing Waterbodies

A review of EPA maps that includes the Register of Protected Areas (RPA) under the Water Framework Directive (WFD) has shown that there are no protected Recreational Waters or Bathing Waterbodies within the Study Area.

Drinking Water Resources

A review of Geological Survey of Ireland online maps and EPA maps that includes the Water Abstraction locations, and Groundwater Public Supply Source Protection Zones (SPZ) has been undertaken. There are no groundwater drinking water protections areas within the Study Area.

The GSI dataset for groundwater wells and springs indicates 14 no. boreholes within the Study Area. They are listed with the following primary uses: 4 no. public supply, 1 no. other, 5 no. unknown, 1 no. domestic use and 3 no. agricultural and domestic use.

4.3.3 Risk of Major Accident Hazards or Disasters

The potential for a project to cause risks to human health, cultural heritage, or the environment due to its vulnerability to external accidents or disasters is considered where such risks are significant, e.g., the potential effects of floods on sites with sensitive facilities. Where such risks are significant then the specific assessment of those risks in the form of a Seveso Assessment (where relevant) or Flood Risk Assessment may be required.

Landslides, Seismic Activity and Volcanic Activity

In general, risk of landslides in Ireland is considered to be low, as the country is not located in a region with high seismic activity or large mountain ranges. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff landslides and falls lead to recession of the cliffs. Landslides have occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The landslide susceptibility map (GSI spatial map viewer) identifies areas which are subject to landslides and is measured from low to high. The landslide susceptibility map considers the location of landslides and what causes them (slope, soil type and the impact of the flow of water). Based on the GSI spatial map viewer, the landslide susceptibility of majority of the site is classified as "Low", with a small area classified as 'Low Inferred'.

There are no active volcanoes in Ireland so there is no risk of volcanic activity.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics, Dublin Institute for Advanced Studies, has been recording seismic events in Ireland since 1978 (www.dias.ie). This network consists of several seismometers that are located throughout Ireland. Seismic activity and earthquake risk in Ireland are generally considered to be low. This is because Ireland is located on the western edge of the Eurasian Plate, which is a tectonic plate that is not known for its seismic activity. However, earthquakes can still occur in Ireland, although they are typically small and have little impact. There is a very low risk of seismic activity to the Proposed Development site. This means that there is less than a 2% chance of potentially damaging earthquake shaking in the next 50 years.

The Proposed Development site is not vulnerable to landslides, seismic activity or volcanic activity within its boundary. Therefore, there is no significant potential for the Proposed Development to cause risks to human health due to its vulnerability to landslides, seismic activity or volcanic activity.

Proximity to Seveso or Industrial Emissions Sites

The Seveso Directive (Directive 82/501/EEC, Directive 96/82/EC, Directive 2012/18/EU) was developed by the EU after a series of catastrophic accidents involving major industrial sites and dangerous substances. Such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implement the latest Seveso III Directive (2012/18/EU).

The purpose of the COMAH Regulations is to transpose the Seveso Directive into Irish law and lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents, with the overall objective of providing a high level of protection in a consistent and effective manner.

Establishments are either lower tier establishments or upper-tier COMAH sites with above threshold quantities of dangerous substances present, and to which the provisions of the COMAH regulations apply.

The Health and Safety Authority (HSA) list of Notified Seveso Establishments has been used to identify if the Proposed Development falls within the consultation distance of any nearby Seveso Establishments. There are no Upper or Lower Tier Notified Seveso Establishments within the Study Area. The site is not a Seveso facility and is not within the consultation distance of any Seveso facility. Therefore, there are no implications for major accidents or hazards at the Proposed Development site.

There is one EPA Licenced facility within the Study Area that could potentially give rise to cumulative effects, detailed in Table 4.7 below. Licensed facilities are required to comply with specific licence conditions, including monitoring and reporting on their emissions (such as emissions into the air, water, and soil), to ensure that they do not pose a risk to human health or the environment.

Table 4.7 EPA Licenced Facilities nearby to the Proposed Development Site

Registration number	Name	Category	Licence type	Distance (km)
W0140-05	Starrus Eco Holdings Limited (Slane)	Industry	IEL	1.95

It is important to note that the proximity of a licensed facility does not necessarily mean that the Proposed Development will be impacted by their emissions. However, it is essential to consider these sites as part of the existing environment and to consider and understand the potential for cumulative impacts or other interactions with the Proposed Development at this location.

In addition, the Proposed Development site itself operates under an Industrial Emissions Directive (IED) Licence (Licence No. W0146-04). The site will continue to be managed in accordance with the conditions of this licence, which includes measures for emissions control, monitoring, reporting, and environmental protection. Ongoing compliance with IE Licence requirements will ensure that the site's activities are controlled and monitored to prevent adverse impacts on human health and the environment.

Risk of Flooding

A site-specific Flood Risk Assessment (FRA) was undertaken by AWN (2025) and will be submitted with the planning application, in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (DoEHLG, 2009). The assessment considered flood risk to the Proposed Development using the OPW CFRAM online mapping and the *Meath County Development Plan 2021–2027* (Volume 4: Strategic FRA).

According to the FRA, the site lies primarily within Flood Zone C, with smaller areas of Flood Zones A (1% AEP) and B (0.1% AEP) also present. These zones were identified through hydraulic modelling undertaken as part of the OPW's CFRAM programme and are consistent with the Strategic FRA of the *Meath County Development Plan*.

The FRA concludes that there is a medium risk of fluvial flooding, and a low risk of pluvial, coastal, and groundwater flooding. A Justification Test was undertaken, as the landfill is classified as highly vulnerable. The test found no residual risk, as the Proposed Development will not alter the site's existing hydrological, morphological, or hydraulic characteristics, nor will it affect Knockharley Stream or its floodplain.

The proposed drainage system has been designed to accommodate the 1% AEP event, with a 20% allowance for climate change during operation and 30% post-closure. In addition, the proposed layout will have sufficient capacity to control and attenuate the 0.1% AEP event without creating additional flood risk.

4.4 Characteristics of the Proposed Development

The Proposed Development primarily consists of an extension to the existing Knockharley landfill which will allow for the continued landfill operations at the site. The proposed extension will increase the landfill area by approximately 17.68 ha and add an additional 4.12 million m^3 of void space for landfilling.

A full description of the development as reflected in the site notice description can be found in Chapter 2.

4.5 Potential Impacts of the Proposed Development

The main potential impacts on population and human health from the proposed development are potential for spills/leaks, air emissions, noise, visual, and traffic impacts. The baseline environment, pollution pathways, relevant mitigation measures and residual impacts have been assessed in greater detail within the corresponding specialist chapters; Chapter 5 (Land, Soils, and Geology); Chapter 6 (Hydrology and Hydrogeology); Chapter 8 (Air Quality), Chapter 10 (Noise and Vibration); Chapter 12 (Landscape and Visual Impact); and Chapter 13 (Traffic and Transportation).

A summary of the main potential impacts as they are relevant to human health criteria during construction and operation of the proposed development is presented herein.

4.5.1 Construction Phase

4.5.1.1 Potential Impacts on Businesses and Residences

The main potential impacts on local businesses and residences associated with the proposed development will be in relation to nuisances; air quality, noise, visual impact and traffic. The potential impacts and mitigation measures to address them are dealt with within the corresponding chapters of this EIA Report as follows:

- Chapter 8 – Air Quality and Odour
- Chapter 10 – Noise and Vibration
- Chapter 12 – Landscape and Visual Impact
- Chapter 13 – Traffic and Transportation

Construction will have an indirect positive effect on support industries such as builder suppliers, construction material manufacture, maintenance contracts, equipment supply, landscaping and other local services.

For nearby residences, no significant adverse impacts are anticipated. Temporary effects such as increased traffic or noise during construction will be managed through standard mitigation measures.

The construction phase, therefore, is considered to have the potential to have a ***not significant, long-term*** and ***positive*** impact on the economy and employment of the local and wider area.

4.5.1.2 Potential Impacts on Landscape, Amenity and Tourism

There will be no impact on the local parks or the larger amenity areas. It is not anticipated the proposed development will have significant impact on local tourism or shopping amenities. The proposed development will not create any significant wastewater discharge which could have a potential impact on local amenities or the local population.

It is considered following landscape guidelines that the overall impact of the proposed development on the local landscape will be ***negative, moderate-slight,*** and ***long-term*** during the construction phase. The visual impact in the immediate vicinity of the site will be no greater than ***negative, moderate*** and ***long-term.***

4.5.1.3 Potential Impact from Land and Water Emissions on Human Health

With reference to Chapter 6 (Hydrology and Hydrogeology) during construction of the proposed development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

As there are no recorded recreational waters, bathing waterbodies, no downgradient surface water abstraction points or Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas, there is no potential for impacts on human health and populations.

There is a hydrological pathway/connection via the adjacent Knockharley Stream with Balrath Woods pNHA (Site Code: 001519) and located c. 550m south (linear distance) and c.800m downstream from the site. The Knockharley Stream transverses with the pNHA before flowing in a south early direction and discharging to River Nanny.

The proposed development also has a hydrological connection with The River Nanny Estuary and Shore SPA and North-west Irish Sea SPA lie approximately 22km and 27.8km downstream from the Proposed Development, respectively. However, the connection is a long hydrological pathway allowing significant time for settlement and dilution and as such there is no potential for change in water quality of this receiving habitat.

Based on the distance and likely hazard loading during construction and operation there is no potential for impact on water quality on the Natura 2000 sites.

In the absence of mitigation measures the potential impacts during the construction phase on Population and Human Health in respect of the environmental factor of Hydrology and Hydrogeology is ***neutral, imperceptible*** and ***long-term***.

In the absence of mitigation measures the potential impacts during the construction phase on surface water quality and groundwater quality are ***negative***, ***slight*** and ***long term***.

4.5.1.4 Potential Impact from Air Quality on Human Health

The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust.

Construction dust tends to be deposited within 250 m of a construction site however, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Dublin Airport meteorological data indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature (Section 8.6.1). In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30-year average data for Dublin Airport meteorological station indicates that on average 200 days per year have rainfall over 0.2 mm (Met Éireann, 2025). Therefore, it can be determined that 55% of the time dust generation will be reduced due to natural meteorological conditions.

There are approximately 1-10 no. high sensitivity residential properties within 20 m of the site boundary, as detailed in Chapter 8 ((Figure 8-2). In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2024)

as referenced in Chapter 8 (Section 8.6.3.1) the overall sensitivity of the area to dust soiling impacts is medium based on the IAQM criteria outlined in Table 8-10, with a low impact in relation to human health.

Combining the magnitude of the construction activities – demolition, earthworks, construction and trackout (movement of vehicles) – with the overall sensitivity of the area indicates there is at most a medium risk of dust-related human health effects associated with the construction of the proposed development (refer to Table 8-11 of Chapter 8). In the absence of mitigation there is the potential for ***direct, long-term, negative*** and ***slight impacts*** to human health as a result of the proposed development.

4.5.1.5 Potential Impact from Noise and Vibration on Human Health

Exposure to excessive noise is becoming recognised as a large environmental health concern. According to the 2015 European Commission report 'Noise Impacts on Health', (European Commission, 2015), the most common effects of noise on the vulnerable include;

- Annoyance
- Sleep Disturbance
- Heart and circulation problems
- Quality of Life
- Cognitive Process
- Hearing

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. Noise and vibration impacts associated with the development have been fully considered within Chapter 10 of the EIA Report.

The calculated construction noise levels presented in Table 10-13 range between 39 and 63 dB $L_{Aeq,T}$ for the assessed construction activities. The calculated construction noise levels are below the adopted CNT of 65 dB $L_{Aeq,12hr}$ during weekend and 65 dB $L_{Aeq,6hr}$ during Saturday morning periods.

Referring to Table 10-2, the calculated noise levels are below the adopted CNT and in line with or below the prevailing noise environment, hence the potential noise impact during this phase is ***negative, not significant to moderate*** and ***temporary to long-term.***

There will be some construction vehicles entering and existing the site during the construction activities. The volume of which, however, is likely to be insignificant in the context of existing site traffic. In terms of noise impacts, traffic volumes need to be increased by at least 25% to result in a 1 dB change in noise levels and an associated not significant impact. For any potential moderate impact (i.e. a change in traffic noise between 3 to 4.9 dB), traffic volumes would need to increase by 100% over the existing flows entering and existing the site.

Given the proposed construction phase under consideration here, this increase in traffic volumes will not occur. The overall impact is ***negative, not significant*** and ***long-term***.

With respect to the potential vibration impact, there are no significant sources of vibration associated with the construction phase. The potential vibration impact during the construction phase is ***neutral, imperceptible*** and ***temporary.***

4.5.1.6 Potential Impact from Traffic and Transportation on Human Health

The World Health Organisation Report 'Health Effects and Risks of Transport Systems: The Hearts Project' (World Health Organisation, 2006) states that road traffic is a major cause of adverse health effects - ranking with smoking and diet as one of the most important determinants of health in Europe. The report states:

"Traffic-related air pollution, noise, crashes and social effects combine to generate a wide range of negative health consequences, including increased mortality, cardiovascular, respiratory and stress-related diseases, cancer and physical injury. These affect not only transport users but also the population at large, with particular impact on vulnerable groups such as children and elderly people, cyclists and pedestrians"

In the Department of Communications, Climate Action & Environment document *Cleaning Our Air – Public Consultation to Inform the Development of a National Clean Air Strategy* vehicle emissions are included as a key source of health impacts in Ireland (DOCCA&E, 2017).

An assessment of the additional traffic movements associated with the proposed development during the construction and operational phases is presented in Chapter 13 (Traffic and Transportation).

It is considered that the predicted increases in traffic during the construction phase will have a ***negative***, ***not significant*** and ***long-term*** impact on human health.

4.5.1.7 Potential Impacts from Major Accident Hazards and/or Natural Disasters on Population and Human Health

The proposed development has the potential for an impact on the health and safety of workers employed during the construction phase. The activities of the applicant's contractors during the construction phase will be carried out in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013) (as amended) to minimise the likelihood of any impacts on workers' health and safety.

As outlined in Section 4.3.3 there is a negligible risk of seismic activity, volcanic activity and sea level rise. Regarding landslides, the landslide susceptibility classification of the site ranges between 'Low' and 'Low Inferred' as detailed in Chapter 5 (Land, Soils and Geology). As such, there is a negligible risk of landslides occurring at the site.

There are no COMAH sites located within proposed development study area. The proposed development is considered appropriate and with a negligible risk of being impacted by a COMAH site.

As stated in the SSFRA (Appendix 6.4) and Section 4.3.3, the majority of the site is located within Flood Zone C with a small portion of the site located within Flood Zones A and B. However, given the nature of the works in these zones and the incorporation of flood risk mitigation measures, including the provision of compensation storage, the overall flood risk to and from the development is considered to be minimal.

The potential effect is therefore ***imperceptible***, and unlikely, with respect to Major Accident Hazards or Natural Disasters on Population and Human Health during the Construction Phase of the proposed development.

4.5.2 Operational Phase

4.5.2.1 Potential Impacts on Businesses and Residences

The main potential impacts on local businesses and residences associated with the proposed development will be in relation to nuisances: air quality, odour, noise, visual impact and traffic. The potential impacts and mitigation measures to address them are outlined in the following sections of this chapter and in detail within the corresponding chapters of this EIA Report as follows:

- Chapter 8 – Air Quality and Odour
- Chapter 10 – Noise and Vibration
- Chapter 12 – Landscape and Visual Impact
- Chapter 13 – Traffic and Transportation

During the operational phase, the proposed development will not create employment opportunities and is expected to have an ***imperceptible, long-term*** impact on businesses and residences.

4.5.2.2 Potential Impacts on Landscape, Amenity and Tourism

The proposed development once operational will have no impact on local tourism or shopping amenities. There will be no impact on the local parks or the larger amenity areas.

Visual impacts and amenity impacts perceived by individual persons are highly subjective and difficult to characterise; however, it is considered following landscape guidelines that the overall impact of the proposed development on the local landscape will be ***moderate, negative-neutral*** and ***permanent*** during operation. Visual impacts will vary depending on where the view is observed. A review of 12 views are assessed in Chapter 12 (Landscape and Visual Impact) section 11.5.6. During operation, these vary from ***imperceptible*** (viewpoint from Newgrange Passage Tomb) to **moderate slight** (local road at Knockharley).

4.5.2.3 Potential Impact from Land and Water Emissions on Human Health

With reference to Chapter 6 (Hydrology and Hydrogeology), there is no potential for off-site flooding as a result of increased runoff, due to the existing and proposed design and drainage infrastructure. There are no recorded recreational waters, bathing waterbodies, or surface water abstraction points (see Section 6.3.5) located downstream of the proposed development site. In addition, there are no recorded Public Supply Source Protection Areas or Group Scheme Preliminary Source Protection Areas, as defined by the GSI, within which development is restricted to protect drinking water supplies from pollution (see Section 6.3.10.3).

As there are no recreational waters, bathing waterbodies, downgradient surface water abstraction points, or designated source protection areas in the vicinity, and no potential for off-site flooding, the operational phase impacts on Population and Human Health, in relation to Hydrology and Hydrogeology, are ***neutral, imperceptible,*** and ***long-term.***

4.5.2.4 Potential Impact from Air Emissions on Human Health

As outlined in Chapter 8 (Air Quality and Odour), odour dispersion modelling was undertaken to assess potential impacts of the Proposed Development in line with EPA guidance (*Odour Emissions Guidance Note (AG9)*, EPA 2019; *Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)*, EPA 2020). Odour threshold values are expressed as odour units (OUE/m³), with 1 OUE/m³ representing the concentration at which 50% of a test panel can detect the odour. The relevant guideline value for assessment is 1.5 OUE/m³.

Modelling results (Chapter 8, Table 8-12) show that predicted ground-level concentrations are generally below the 1.5 OUE/m³ guideline. Under the worst-case maximum emissions scenario (Chapter 8, Section 8.8.2.1), the 98th percentile of mean hourly odour concentrations ranges from 0.03–3.58 OUE/m³ across sensitive receptors. At the most impacted receptor, concentrations reach up to 238% of the guideline value (Figure 8-3).

Of the modelled receptors, 63 are predicted to remain below the guideline, while 46 may exceed it. Exceedances are expected to be occasional and short-lived, as odour dispersion is strongly influenced by varying meteorological conditions such as wind speed and direction.

Where exceedances occur, receptors may experience direct, negative, brief, and significant effects. However, given their likely infrequent and short duration, the overall operational odour impact is assessed as ***direct, negative, long-term, and slight,*** and therefore ***not significant.***

4.5.2.5 Potential Impact from Noise and Vibration Emissions on Human Health

Exposure to excessive noise is becoming recognised as a large environmental health concern. According to the 2015 European Commission report 'Noise Impacts on Health', (European Commission, 2015), the most common effects of noise on the vulnerable include;

- Annoyance
- Sleep Disturbance
- Heart and circulation problems
- Quality of Life
- Cognitive Process
- Hearing

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. Noise and vibration impacts associated with the development have been fully considered within Chapter 10 of the EIA Report.

The operational activities associated with the operation of the proposed development will be capable of generating noise to some degree. As per Chapter 10 (Noise and Vibration), the review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact likely to be ***negative***, ***slight*** *to* ***moderate*** and ***long term*** in the absence of specific mitigation.

The proposed development will not give rise to any significant levels of vibration off site and therefore the associated impact on human health is ***not significant.***

As there will be no change in the quantity of waste material or inclusion of additional waste streams at the site as part of the operational phase of the Proposed Development, the operational traffic will remain consistent with the current traffic which takes into account traffic for the existing Knockharley Landfill facility. There is no change to traffic noise impacts along the existing access road or along roads outside of the site.

4.5.2.6 Potential Impact from Traffic and Transportation on Human Health

The World Health Organisation Report 'Health Effects and Risks of Transport Systems: The Hearts Project' (World Health Organisation, 2006) states that road traffic is a major cause of adverse health effects - ranking with smoking and diet as one of the most important determinants of health in Europe. The report states:

"Traffic-related air pollution, noise, crashes and social effects combine to generate a wide range of negative health consequences, including increased mortality, cardiovascular, respiratory and stress-related diseases, cancer and physical injury. These affect not only transport users but also the population at large, with particular impact on vulnerable groups such as children and elderly people, cyclists and pedestrians"

In the Department of Communications, Climate Action & Environment document *Cleaning Our Air – Public Consultation to Inform the Development of a National Clean Air Strategy* vehicle emissions are included as a key source of health impacts in Ireland (DOCCA&E, 2017).

An assessment of the additional traffic movements associated with the proposed development during the construction and operational phases is presented in Chapter 13 (Traffic and Transportation). The traffic

modelling results show that in the absence of mitigation measures, the operational development traffic will have a ***negative, not significant*** and ***long-term*** impact in comparison to the baseline scenario.

4.5.2.7 Potential Impacts from Major Accident Hazards and/or Natural Disasters on Population and Human Health

The proposed development has been designed with consideration given to the health and safety risks of people living and working in the vicinity. The facility has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience.

As outlined in Section 4.3.3 there is a negligible risk of external natural disasters; including seismic activity, volcanic activity and sea level rise. There is a negligible risk of landslides occurring.

COMAH-related impacts are considered negligible, as the nearest notified Seveso site is the Lower Tier establishment of Grassland Agro, located approximately 7.7 km from the Proposed Development.

As outlined in the SSFRA (AWN, 2025) and Section 4.3.3, the site lies primarily within Flood Zone C, with smaller areas of Flood Zones A (1% AEP) and B (0.1% AEP). The FRA concludes that there is a medium risk of fluvial flooding, and a low risk of pluvial, coastal, and groundwater flooding. A Justification Test was carried out, as the landfill is classified as highly vulnerable. The test found no residual risk, as the Proposed Development will not alter the site's existing hydrological, morphological, or hydraulic characteristics, nor will it affect Knockharley Stream or its floodplain. The development will incorporate a network of Sustainable Urban Drainage System (SUDS) measures, reducing flood risk and safeguarding water quality.

The potential effect is therefore ***imperceptible***, and unlikely, in respect of Major Accident Hazards or Natural Disasters on Population and Human Health during the Operational Phase of the proposed development.

4.6 Mitigation Measures

4.6.1 Construction Phase

The mitigation measures to address the potential impacts on population and human health from the proposed development have been assessed within the corresponding specialist chapters; Chapter 5 (Land, Soils, Geology and Hydrogeology); Chapter 6 (Hydrology); Chapter 8 (Air Quality), Chapter 10 (Noise and Vibration); Chapter 11 (Townscape / Landscape and Visual); Chapter 13 (Traffic and Transportation).

4.6.1.1 Businesses and Residences

There are no potential likely significant impacts on Businesses and Residences therefore additional measures are not required. Any impact will be further mitigated by the use of binding hours of construction as well as the measures set out in Chapter 5 (Land, Soils and Geology); Chapter 6 (Hydrology and Hydrogeology); Chapter 8 (Air Quality), Chapter 10 (Noise and Vibration); Chapter 12 (Landscape and Visual); Chapter 13 (Material Assets - Traffic and Transportation).

4.6.1.2 Landscape, Amenity and Tourism

With regard to landscape and visual there are limited construction-stage mitigation measures as the site is well established and heavily screened from surrounding receptors. As such, there is no requirement for site hoarding or additional screening to screen the construction stage effects as much of the construction stage works will be heavily screened by the existing surrounding vegetation.

4.6.1.3 Land and Water Emissions

All mitigation measures outlined within the Chapter 5 (Land, Soils, Geology) and Chapter 6 (Hydrology and Hydrogeology) will be implemented in accordance with Construction Environmental Management Plan (CEMP), as well as any additional measures required pursuant to planning conditions which may be imposed. The construction phase mitigation measures set out in the CEMP, will be implemented by the construction contractor to ensure that pollution and nuisances arising from site clearance and construction activities is prevented where possible and managed in accordance with best practice environmental protection.

4.6.1.4 Air Emissions

A suite of best practice dust mitigation measures appropriate for sites with a medium risk of dust impacts are outlined in Section 8.9.1 of Chapter 8. These include measures for dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. The measures draw on best practice guidance from Ireland (DCC (2018), DLRCC (2022)), the UK (IAQM (2024), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

The dust mitigation measures proposed in Chapter 8 will reduce dust emissions and thus dust-related human health effects.

4.6.1.5 Noise and Vibration Emissions

Construction-phase noise and vibration impacts are predicted to range from not significant to slight to moderate at the nearest off-site sensitive buildings. Given the separation between the works and the nearest NSLs, no specific mitigation is required. However, best practice noise and vibration controls will be implemented on site as standard, including:

- selection of quieter plant;
- noise control at source;
- use of screening;
- liaison with the public; and
- monitoring.

4.6.1.6 Traffic and Transportation

During the Construction Phase, a Construction Traffic Management Plan (CTMP) will be prepared and agreed with the local authority prior to the commencement of works, in compliance with the relevant planning condition should permission be granted.

The CTMP will define designated HGV routes to avoid local residential areas and sensitive receptors. Access will be restricted to approved haul routes, with the R150 between Kentstown Village and O'Brien's Cross on the N2 specifically excluded from use.

The plan will also set out measures to ensure clear communication with affected parties. This will include advance notification to land and property owners of any required diversions. Local access will be maintained at all times. Where necessary, and in consultation with the Road Authority, temporary signage will be installed to minimise disruption and ensure that all road users are aware of construction activities.

In addition, construction deliveries will be scheduled, where possible, to avoid peak periods on the local road network.

4.6.1.7 Major Accident Hazards and/or Natural Disasters

All mitigation measures outlined in the submitted CEMP will be implemented throughout the construction phase of the development. This will include mitigation measures outlined within this EIAR. The CEMP includes emergency response procedures for environmental incidents. It will be continuously updated to manage risks during construction.

4.6.2 Operational Phase

The mitigation measures to address the potential impacts on population and human health from the proposed development have been assessed within the corresponding specialist chapters; Chapter 5 (Land, Soils and Geology); Chapter 6 (Hydrology and Hydrogeology); Chapter 8 (Air Quality), Chapter 10 (Noise and Vibration); Chapter 12 (Landscape and Visual); Chapter 13 (Material Assets - Traffic and Transportation).

4.6.2.1 Businesses and Residences

There are no potential likely significant impacts on Businesses and Residences therefore additional measures are not required.

4.6.2.2 Landscape, Amenity and Tourism

The primary mitigation-by-avoidance measure is the siting of the proposed development within the existing, well-established landfill facility, which is already screened by mature perimeter vegetation. The development does not introduce a new land use to the area but represents an intensification within the existing site. Existing perimeter hedgerows will be retained and, where necessary, strengthened through under-planting and inter-planting to ensure effective long-term screening. Full details of mitigation measures are set out in Chapter 11 – Landscape and Visual.

4.6.2.3 Land and Water Emissions

The design of the development and its drainage infrastructure will ensure that runoff rates are restricted to greenfield conditions through the use of SuDS and an attenuation system.

As there are no recorded recreational waters, bathing waterbodies, surface water drinking water abstraction points, or designated source protection areas downstream or in the vicinity of the site, there is no source–pathway–receptor linkage. Further mitigation measures are detailed in Chapter 6 (Hydrology and Hydrogeology).

4.6.2.4 Air Emissions

The Knockharley Landfill operates under an existing IED Licence (W0146-04) issued by the EPA, which requires compliance with conditions for monitoring and managing emissions, including odour, to protect human health and the environment. These odour management requirements will also apply to the Proposed Development, and the Applicant will continue to comply with them. Beyond these licence conditions, no additional operational phase mitigation measures are proposed.

4.6.2.5 Noise and Vibration Emissions

The site layout and design incorporate inherent noise mitigation through screening berms along sensitive boundaries, strategic placement of fixed plant away from NSLs, and restricted operating hours.

There is potential for temporary exceedances of the daytime Emission Limit Values (ELVs) set out in the IEL (W0146-04) during tree felling and berm construction along the northern boundary, closest to nearby NSLs. Although these works will be short in duration and limited in extent, the following mitigation measures are proposed to reduce impacts:

- orientating plant to minimise noise at receptors, where practicable;
- erecting temporary localised mobile noise screens during tree felling;
- avoiding extended use of noisy plant and equipment;
- phasing works and reducing percentage on-time;
- conducting regular noise monitoring in line with licence requirements and additional monitoring during critical periods; and
- investigating and recording noise complaints, with mitigation where levels exceed licence limits, consistent with current Knockharley operations.

The development of the screening berms once in place will assist in reducing overall operational noise levels from the existing and proposed development at the closest NSLs.

4.6.2.6 Traffic and Transportation

During the Operational Phase, HGV deliveries to the landfill will be evenly distributed throughout the day to avoid clustering and minimise the risk of congestion. Site access and internal circulation have been designed to safely and efficiently accommodate HGV movements. A delivery management system will continue to be operated to monitor and manage HGV scheduling.

Regular inspections and maintenance of the site entrance and adjoining road network will be carried out to ensure safety and maintain cleanliness at the road interface.

Chapter 10 (Traffic and Transportation) outlines additional mitigation measures, including proposed driver induction training. At the commencement of operations, all HGV drivers accessing the site will be required to attend an induction session. This training, already successfully implemented by the Applicant at this and other similar facilities, is considered an effective means of ensuring that drivers are fully aware of the site's rules and expectations. These include strict adherence to designated haul routes, observance of speed limits, a focus on safety, and courteous behaviour towards other road users.

4.6.2.7 Major Accident Hazards and/or Natural Disasters

The potential effect is imperceptible, and unlikely, in respect of major accident hazards or natural disasters on population and human health during the operational phase of the proposed development. Therefore, no specific mitigation measures are required.

4.7 Residual Impacts of the Proposed Development

4.7.1 Construction Phase

4.7.1.1 Businesses and Residences

It is predicted that there will be a slight positive impact on local business activity during the construction phase with the increased presence of construction workers using local facilities. This job creation will result in a ***positive, local to regional, imperceptible, long-term*** socioeconomic impact.

There will also be slight economic benefits for providers of construction materials and other supporting services. This is predicted to result in a ***positive, local to regional, indirect, not-significant, long-term*** socioeconomic impact.

The residual impacts on local businesses and residences in relation to air quality, noise, visual impact, and traffic has been summarised in the below sections.

4.7.1.2 Landscape, Amenity and Tourism

The main construction stage landscape and visual impacts will arise from heavy machinery, tower cranes, temporary material storage, and the gradual emergence of the development. At the site level, effects will also result from woodland removal, landfill construction, and the realignment of overhead cable corridors. However, due to the site's contained setting and existing vegetation, these impacts will be diminished and ***long-term***. Overall, construction-stage landscape effects are assessed as ***Moderate-Slight*** and ***Negative***, while visual effects are assessed as ***Moderate*** and ***Negative*** within the immediate surrounds, reducing rapidly with distance. Residual effects are considered ***not significant.***

The proposed development will have no discernible effect on local tourism or amenities during construction stage.

4.7.1.3 Land and Water Emissions

Implementation of the mitigation and monitoring measures outlined in Sections 5.6.1, 5.7.1, 6.6.1, and 6.7.1 will ensure that potential impacts on land, soils, geology, surface water, and groundwater during the construction phase are effectively managed. With these measures in place, no changes are anticipated to overall flow or quality within the hydrological or hydrogeological regime.

The resulting residual effects are assessed as ***neutral, imperceptible***, and ***long-term.***

4.7.1.4 Air Emissions

Best practice mitigation measures are proposed for the construction phase of the Proposed Development, which will focus on the proactive control of dust and other air pollutants, to minimise generation of emissions at source. The mitigation measures that will be put in place during construction will ensure that the impact complies with all EU ambient air quality legislative limit values (set out in Directive 2008/50/EC), which are based on the protection of human health (Table 8-1). Therefore, the predicted residual, dust-related, human health impact of the construction phase of the Proposed Development is ***long-term, direct, negative, localised*** and ***not significant***.

4.7.1.5 Noise and Vibration Emissions

During the construction phase of the project there may be some slight impacts on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impacts are kept to a minimum. The residual noise impact on human health is determined to be ***negative, not significant*** to ***moderate*** and ***temporary*** to ***long-term.***

4.7.1.6 Traffic and Transportation

Given the nature of the traffic increase, and with the implementation of the mitigation measures outlined above, no significant residual effects are anticipated. During the construction phase of the proposed development, traffic impacts are expected to be ***negative, not significant*** and ***long-term.***

4.7.1.7 Major Accident Hazards and/or Natural Disasters

There are no significant potential impacts on human health from major accident hazards and/or natural disasters; therefore, there are no residual impacts.

4.7.2 Operational Phase

4.7.2.1 Businesses and Residences

The Proposed Development will result in an ***imperceptible*** and ***long-term*** impact on the surrounding businesses and residences, as it does not give rise to additional employment opportunities.

The predicted impacts on local businesses and residences in relation to air quality, noise, visual impact, and traffic has been summarised below.

4.7.2.2 Landscape, Amenity and Tourism

In terms of landscape impacts, the proposed development is of notable scale and extent but is contained within an existing, established landfill facility and well enclosed by perimeter vegetation. This vegetation will be enhanced through earthen screening berms and additional native woodland planting. The development therefore represents an intensification of an existing land use rather than the introduction of a new or unfamiliar one. While there will be a clear intensification at the site scale, this will not extend to the wider landscape, as the development will be well screened and contained within the landfill facility, considerably limiting its potential to alter the surrounding rural character.

Overall, the proposed development does not conflict with current landscape and visual policies and objectives of the CDP and represents the continuation and intensification of a well-established land use. The operational-phase landscape effect is deemed Moderate, of Negative-Neutral quality, and Permanent in duration. As per Chapter 11, the residual landscape effects are deemed ***not significant***.

The proposed development will have no discernible effect on local tourism or amenities during operational stage.

4.7.2.3 Land and Water Emissions

Implementation of the mitigation and monitoring measures outlined in Sections 5.6.2, 5.7.2, 6.6.2, and 6.7.2 will ensure that potential impacts on land, soils, geology, surface water, and groundwater during the operational phase are effectively mitigated. As there is no source–pathway linkage, the residual effects are assessed as ***neutral, imperceptible,*** and ***long-term.***

4.7.2.4 Air Emissions and Odour

Detailed odour dispersion modelling of emissions from the Proposed Development predicted exceedances of the relevant odour guideline value at several sensitive receptors which may experience direct, negative, brief and significant effects due to odour nuisance. However, taking the likely brief duration and infrequent nature of any potential odour nuisance into account, as well as the required mitigation and monitoring measures outlined in Section 8.10.2 and Section 8.11.2, the overall impact of the Proposed Development in terms of odour can be considered ***direct***, ***negative, long-term*** and ***slight***, which is overall ***not significant*** in EIA terms.

4.7.2.5 Noise and Vibration Emissions

Considering the implementation of the indicated mitigation measures the residual noise impact on human health associated with the proposed development operations is expected to be ***negative, not significant to moderate and temporary*** to ***long-term*** at the nearest sensitive receptors.

4.7.2.6 Traffic and Transportation

The implementation of mitigation measures will ensure that there will be no significant residual effects of proposed development during operational phase. The overall effect of the operational phase traffic will be ***negative, not significant*** and ***long-term.***

4.7.2.7 Major Accident Hazards and/or Natural Disasters

There are no significant potential impacts on Human Health from Major Accident Hazards and/or Natural Disasters; therefore, there are no residual impacts.

4.8 Cumulative Impact Assessment

This section assesses the potential cumulative impacts of the proposed development in combination with other planned or permitted developments in the surrounding area. Details of the developments considered are provided in Chapter 2, Section 2.9 of this EIA Report.

Two relevant projects are located near the proposed development:

- A 180 MW gas-fired peaking power plant proposed immediately southwest of the site; and
- A 165 ha solar farm planned in the vicinity, currently at non-statutory pre-planning consultation stage.

Existing operational developments already contribute to the baseline environmental conditions. Therefore, any additional effects arising from the proposed development in combination with these are addressed in the preceding sections of this chapter.

4.8.1 Construction Phase

In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase and contribute to additional impacts in terms of traffic, dust, and noise.

Contractors for the proposed development will be contractually required to operate in compliance with a project-specific CEMP and Construction Traffic Management Plan which will include the mitigation measures outlined in this EIA Report. The construction phase for the overall development of the applicant owned lands would be restricted by the binding limits for noise, dust, and emissions to water.

In the event that construction activities at nearby sites are taking place concurrently with the construction of the proposed development, there is potential for cumulative noise impacts to occur as outlined in Chapter 10 (Noise and Vibration). In the event that construction works are occurring at other permitted or proposed developments, the noise contribution will depend on their proximity to individual NSLs. Under a highly worst case scenario, assuming the same construction noise level associated with the Proposed Development is also contributed from the developments above, an increase in 3 dB would be experienced at each NSLs. This highly unlikely scenario has the potential to result in a 1 dB exceedance of the construction noise significance threshold at NSLs to the north within 70m of the site. At all other locations there is no predicted exceedance of the construction noise threshold. On the basis of the above, cumulative construction noise impacts associated with the proposed development and other adjacent developments would be ***negative, slight to moderate*** and ***short-term***.

With respect to Chapter 13 (Traffic and Transportation), given the location of other permitted and planned developments and the likely potential for traffic generation it is not considered likely that there will be a perceptible cumulative impact other than that arising from improvement and associated management of the national road network.

With respect to Chapter 8 (Air Quality and Odour), according to the IAQM guidance (2024) should the construction phase of the proposed development coincide with the construction phase of any other development within 500m then there is the potential for cumulative construction dust impacts. The proposed development has been assessed as having at most a low risk of dust-related human health impacts during the construction phase. A number of mitigation measures have been proposed in order to

ensure significant dust impacts do not occur. Provided the mitigation measures outlined in Section 8.6.1 of Chapter 8 (Air Quality and Odour), are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. Impacts are predicted to be ***long-term, direct, localised, negative*** and ***not significant***.

4.8.2 Operational Phase

Overall, whilst the proposed development and existing permitted landfill development will present as one of the most notable built developments within the immediate site context, it is not considered that there will be any significant cumulative impacts arising from the proposed development in conjunction with the permitted development or other existing, consented or planned developments.

The potential cumulative impacts of the proposed development during the operational phase in terms of air emissions, noise generation and traffic generation in the context of the Permitted Development have been considered in Chapter 8 (Air Quality and Odour), Chapter 10 (Noise and Vibration) and Chapter 13 (Traffic and Transportation).

As outlined in Chapter 8 (Air Quality and Odour), a detailed odour dispersion modelling assessment has been undertaken in accordance with EPA guidance. The site operates under IE Licence No. W0146-04, which includes specific conditions relating to odour emissions, monitoring, and control. These existing odour management measures will continue to be implemented as part of the Proposed Development. Given the controls in place and the findings of the odour assessment, no significant cumulative odour impacts are anticipated during the operational phase.

The noise limits set for off-site noise sensitive locations are designed to avoid any significant increase in the prevailing background noise environment. Operational noise limits included in this report refer to cumulative noise from all fixed installations on site. The design of plant and other fixed installations will be progressed during the design stage to ensure the noise limits at off-site noise sensitive locations are not exceeded. Traffic volumes assessed take account of the additional traffic from other permitted developments and therefore the traffic noise assessment presented is already assessing the cumulative impact. This assessment has concluded there will be no significant noise impact due to operational traffic.

Given the location of other permitted developments and the likely potential for traffic generation it is not considered likely that there will be a perceptible cumulative impact other than that arising from improvement and associated management of the national road network.

The potential for cumulative impact of the emissions from the proposed development with Industrial Emissions (IE) licenced or Integrated Pollution Control (IPC) installations has been considered, in line with the methodology of AG4 (EPA, 2020). The closest IPC or IE licenced facilities are over c. 2 km from the proposed development. At this distance it is unlikely that the emission plumes from the proposed development and the licenced sites would significantly interact. Therefore, the potential for cumulative impacts is not predicted and a detailed cumulative air dispersion modelling assessment has been scoped out.

All known permitted developments in the study area have been considered to access the traffic impacts of the proposed development. Given the location of other permitted developments and the likely potential for traffic generation it is not considered likely that there will be a perceptible cumulative impact other than that arising from improvement and associated management of the national road network.

4.9 References

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Chapter 5 – Land, Soils and Geology

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5. LAND, SOILS AND GEOLOGY

5.1 Introduction

This chapter of the EIAR evaluates the likely significant effects, if any, which the Proposed Development will have on Land, Soils and Geology. This chapter contains necessary information as defined in the Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022). Reference is made to hydrogeology, but hydrogeology is not covered in this chapter. Refer to Chapter 6 (Hydrology & Hydrogeology).

The chapter initially provides a description of the receiving environment of the site and the potential impacts of the Proposed Development. When assessing the potential impacts, this assessment considers the significance of the environmental attributes, and the predicted scale, and duration of the likely effects.

The chapter also outlines the proposed mitigation measures that will reduce or eliminate the identified potential impacts and defines the residual effects of the Proposed Development (the effect after the implementation of mitigation measures).

5.2 Methodology

The assessment follows the procedures set out in the Institute of Geologists of Ireland (IGI) Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements (2013) and other relevant guidelines set out below to assess and evaluates land, soils and geology within the context of the Proposed Development. This assessment includes a review of the existing environment, the potential impacts of the Proposed Development, mitigation measures, and the potential impacts.

In the EIA assessment, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that attribute.

The Transport Infrastructure Ireland (TII) (formerly National Roads Authority) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes criteria is used for estimating the importance of the soil, geology and hydrogeological attribute (Table 1 and 2 in Appendix 5.1).

The magnitude of the potential environmental impacts effects on the land, soil and geological environment is based on the TII matrix presented in Table 3 in Appendix 5.1 and the quality, significance and duration of potential impacts are described in this chapter in accordance with the criteria provided in the Chapter 1 (Introduction), Table 1.2.

In assessing likely potential and predicted impacts, account has been taken of both the importance of the attributes and the predicted scale and duration of the likely impacts. Where an impact is identified, planned mitigation measures are identified and assessed.

The principal attributes (and impacts) to be assessed are derived from the TII and EPA guidance which includes the following:

- Geological heritage sites in the vicinity of the perimeter of the subject site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural uses of soil around the site;
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves; and,
- The extent of topsoil and subsoil cover and the potential use of this material on site as well or requirement to remove it off-site as waste for disposal or recovery.

5.2.1 Forecasting Methods and Difficulties Encountered

No difficulties were encountered in the development of this document.

5.2.2 Legislation, Guidance & Planning Policy

The baseline study and impact assessment were undertaken in accordance with the following key guidance and established best practice:

- Environmental Protection Agency (EPA) Advice notes on current practice in the preparation of Environmental Impact Statement (EPA, 2003) and Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022a).
- TII/National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII/formerly NRA, 2009).
- Transport Infrastructure Ireland - Road Drainage and Water Environment (TII, 2015).
- Institute of Geologists Ireland (IGI) -Geology in Environmental Impact Statements, a guide (IGI, 2002) and Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW).

Land soil and geology resource management in Ireland is dealt with in the following key pieces of legislation and guidelines:

- Institute of Geologists Ireland (IGI) -Geology in Environmental Impact Statements, a guide (IGI, 2002) and Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).
- Waste Management Acts 1996 as amended.
- Environment Agency UK (EA), Land contamination: risk assessment (EA 2020).
- BS 10175:2011 + A2:2017 Investigation of potentially contaminated sites. Code of practice (British Standards Institute 2017).
- CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice (CIRIA 2001).
- TII/National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII/formerly NRA, 2009).
- Transport Infrastructure Ireland, The Management of Waste from National Road Construction Projects (TII 2017).
- Environmental Protection Agency, Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA 2013).
- Local Authority planning guidance as applicable.
- Consolidated EIA Directive 2011/92/EU as amended by 2014/52/EU.

5.2.3 Desktop Study

In line with the above guidance, the assessment considers the existing land soil and geological regime within 2km study area of the Proposed Development as outlined in section 5.3 below. A detailed description of the existing and Proposed Development is outlined in Section 2.2 in Chapter 2 – Description of the Proposed Development of this EIAR. The data source to aid in assessing the existing baseline environment are as follows:

- An Foras Talúntais (1980) General Soil Map of Ireland (An Foras Talúntais 1980);
- Teagasc Irish Soil Information System online map (Teagasc);
- Historic Mine Sites – Inventory and Risk Classification (EPA and Geological Survey Ireland (GSI);
- GSI online geology viewer (GSI);
- 1:500,000 scale – Quaternary Geological Map of Ireland (GSI);

- 1:1,000,000 scale – Bedrock Geology of Ireland (GSI);
- Topographic-map.com online viewer (topographic-map);
- GeoHive, Ordnance Survey Ireland online spatial data viewer (OSI);
- Current and historical mapping;
- EPA Interactive Map (EPA 2025); and
- NPWS Interactive Map (NPWS 2025).

Site specific data is derived from:

- Environmental Impact Statement for the Intensification of Waste Intake at Knockharley Landfill, Co. Meath (Fehily Timoney and Company, 2008)
- Environmental Impact Assessment Report (EIAR) For the Proposed Development at Knockharley Landfill (Fehily Timoney and Company, 2018)
- Site Investigation Report (K.T. Cullen & Co. Ltd, 2000)
- Site Investigation Report (Priority Geotechnical, 2017)
- Geophysical Survey (Priority Geotechnical, 2016)
- Site Investigation Report (GII, 2025)
- Geophysical Investigation Report (Apex Geophysics, 2025)
- Drainage and SuDS Design Report (WSP, 2025)
- Construction Environmental Management Plan (WSP, 2025)
- Engineering Design and Drawings (WSP, 2025)

This Chapter will assess the potential effects of the Proposed Development on the following topics:

- Soils and superficial geology;
- Bedrock geology;
- Karst Landforms;
- Landslide Susceptibility;
- Current and historic mining sites;
- Irish Geological Heritage Sites; and
- Contaminated land.

5.3 Receiving Environment

5.3.1 Land Use, Topography and Site History

The Proposed Development site is located within the townlands of Knockharley, Flemingstown and Tuitrath, Navan, Co. Meath and is operating as an active licensed landfill. The site is located c. 800m from the N2 National Primary Road and landfill facility has its own private entrance off the N2.

The site is surrounded at all sides by agricultural land which is the primary land use of the wider region. There are dispersed residential properties in the vicinity of the site, with the nearest residential houses located c.30m along the Knockharley road to the immediate north of the site and along the Rathdrinagh/Flemingstown road (L5056) c.10m to the east of the site.

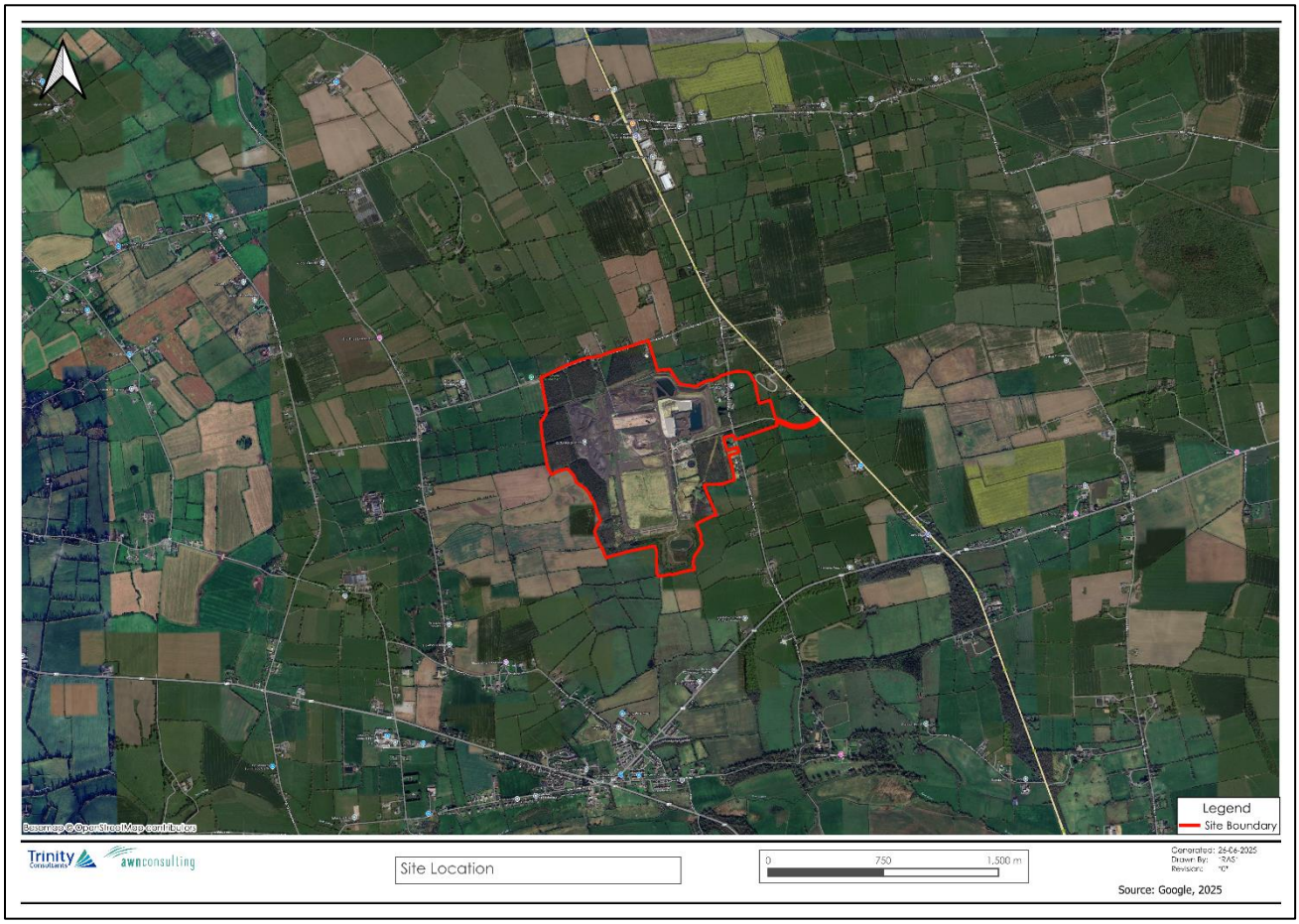
The Knockharley Stream (EPA Name: Flemingstown 08, EPA Code: 08F05) flows west to east through the northern portion of the site and then flows along the eastern boundary of the site where it the travels south /southeast away from the site and joins the Nanny River (EPA Name: Nanny (Meath), EPA Code: 08_757) c. 3km downstream. The Knockharley stream (Flemingstown Steam) traverses or runs along the boundary of the site for c.3km. A portion of the Knockharley Stream to the north of the landfill was diverted as part of the permitted ABP-303211-18 application.

The Kentstown Stream (EPA Name: Kentstown 08, EPA Code: 08K18) flow along the southern boundary of the site for c.90 m before turning south and joining the Knockharley Stream c. 550 m downstream as shown in Figure 5-1.

The site currently comprises a licenced landfill facility (EPA licence W0146-04) where waste disposal and recovery activities are undertaken with waste acceptance commencing in December 2004 and an area of undeveloped land to the west of the landfill. A detailed description of the existing and Proposed Development is outlined in Section 2.2 in Chapter 2 – Description of the Proposed Development of this EIAR.

The site is currently a mix of constructed landfill and associated facilities with some woodland and wet grassland. Soil stockpiles from the excavation of the natural ground for the adjacent landfill are located on the open grassland. Prior to development as a landfill, the land was used for agriculture, and a network of field drains were installed to improve the land.

Figure 5-1 Site Location & Surrounding Land Use (Google Satellite, 2025)



5.3.2 Soils and Subsoils

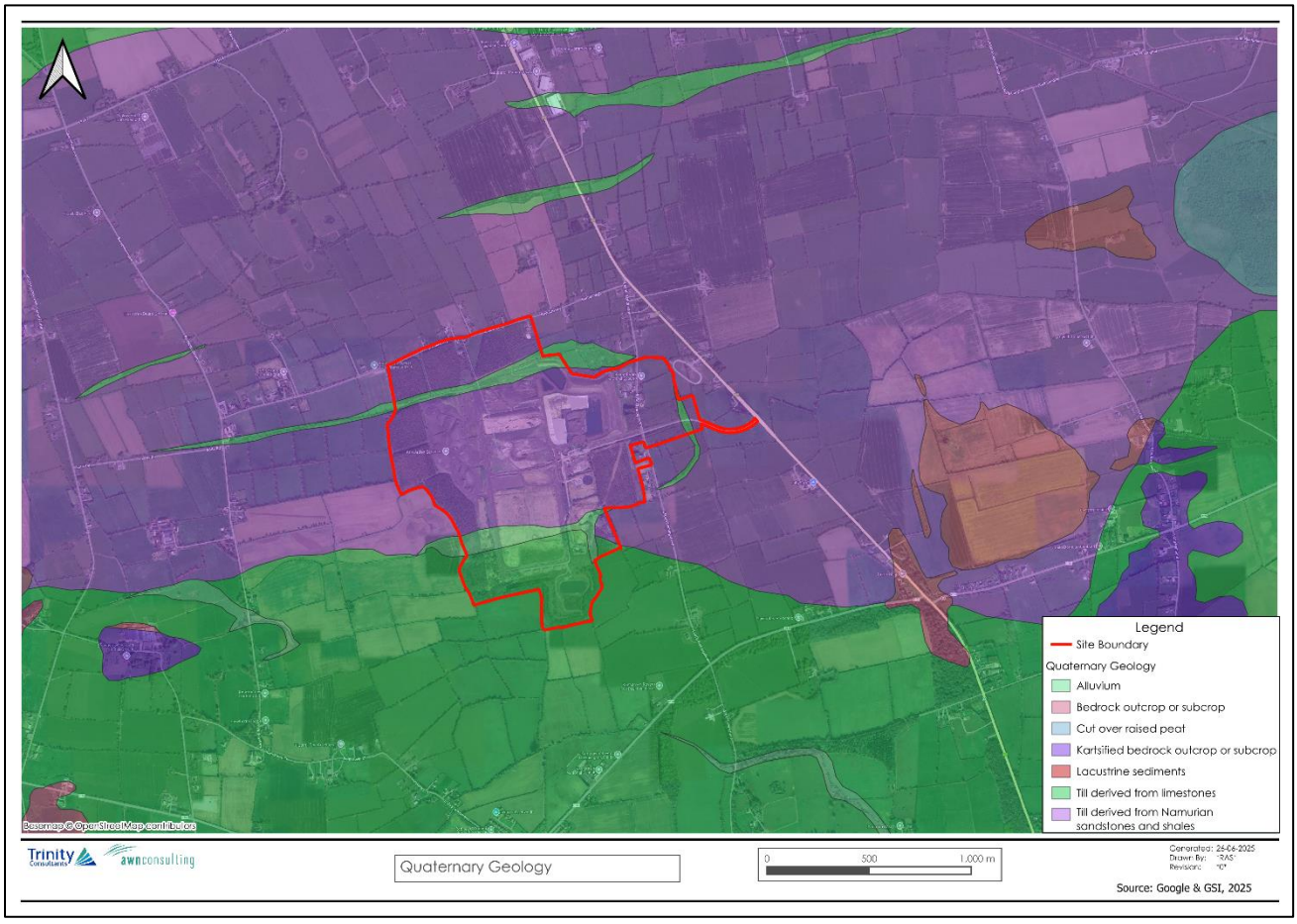
The Teagasc online mapping (2025) for the site indicates that the soils underlying the site and the surrounding area mainly comprise poorly drained acidic mineral soils consisting of surface water gleys. The northeastern section of the site is underlain with well drained mineral soils north of Flemingstown Stream. Pockets of alluvium have been identified within the site in the northern and southern part of the site.

Based on a review of GSI online mapping, the site is predominantly underlain by tills from Namurian Sandstone and shale in the north and central portion of the site while the southern portion is underlain by tills from Limestones. Alluvium was identified along the northern and southern section of site in the vicinity of the watercourses as shown in Figure 5-2 (GSI, 2025). This was confirmed during the ground investigation carried out by Ground Investigation Ireland (GII) in 2025. Cohesive deposits were encountered from ground level at most locations and beneath the soil stockpiles and were described typically as brown slightly sandy gravelly CLAY with low cobble and boulder content overlying a grey / dark grey slightly sandy gravelly CLAY.

A review of historic site investigations pertinent to the development of the original landfill from 2001 and recent 2025 site investigations has shown that the glacial tills vary in thickness from 12 to 21.5 m across the site, with the thickest deposits being encountered to the west and thinnest to the east of the site.

The till comprises cobbles and boulders in a silty Clay matrix with minor sand content. The till has a low permeability in the range of 1 x 10-9 m/sec to 4.63 x 10-11 m/sec, determined by permeability testing conducted by K.T Cullen for the EIS submitted as part of the original landfill application in 2001.

Figure 5-2 Quaternary Geology (GSI, 2025)



5.3.3 Bedrock Geology

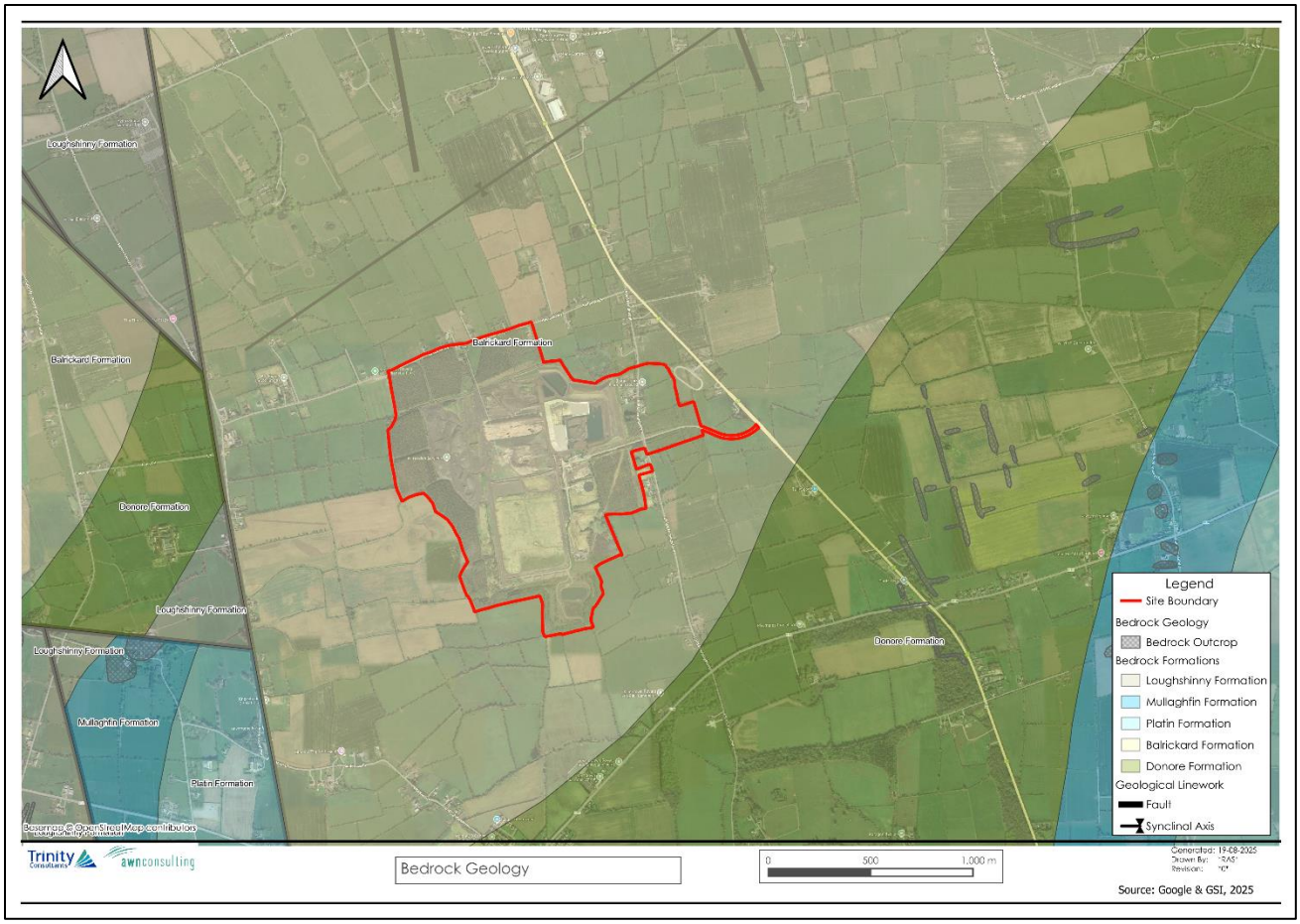
According to GSI (2025), it was identified that the site is underlain by Balrickard Formation which is described as coarse Sandstone and Shale rocks. No bedrock outcrops were identified within the site boundary as shown in Figure 5-3.

During the 2025 ground investigation, the rotary core boreholes recovered very weak to weak thinly to medium bedded grey fine to medium grained SANDSTONE with interbeds of Siltstone. This is typical of the Balrickard Formation, which is noted on Geological Survey Ireland's (GSI) geological mapping of the site. The degree of weathering ranged from slightly to highly weathered. The depth to rock varies from 14.30m BGL in BH106S (North eastern section of the proposed landfill extension footprint) to a maximum of 28.00m BGL in BH105S (southern section of the proposed landfill extension footprint) as presented in Figure 5-11.

Bedrock recovered from the boreholes undertaken for the site investigation from 2000 and 2004 comprised fine grained light-coloured sandstone and darker coloured siltstone / mudstone. The elevation of the bedrock surface varies from 40 to 50 mOD, falling away towards the south, following the slope of the topography. The depth to bedrock encountered in the boreholes varies between about 12 m bgl towards the east of the site to about 21.5 m bgl towards the west of the site.

Similar geological characteristics were reported during the 2016 site investigation. Of the 9 no. boreholes advanced in the northern portion of the site, 1 no. borehole reported identifying slate / mudstone bedrock at 17.0 mbgl. The geophysical survey indicated a variation in elevation across the bedrock profile from 45 – 60 mAOD.

Figure 5-3 Bedrock Geology (GSI, 2025)



5.3.4 Geological Heritage Areas

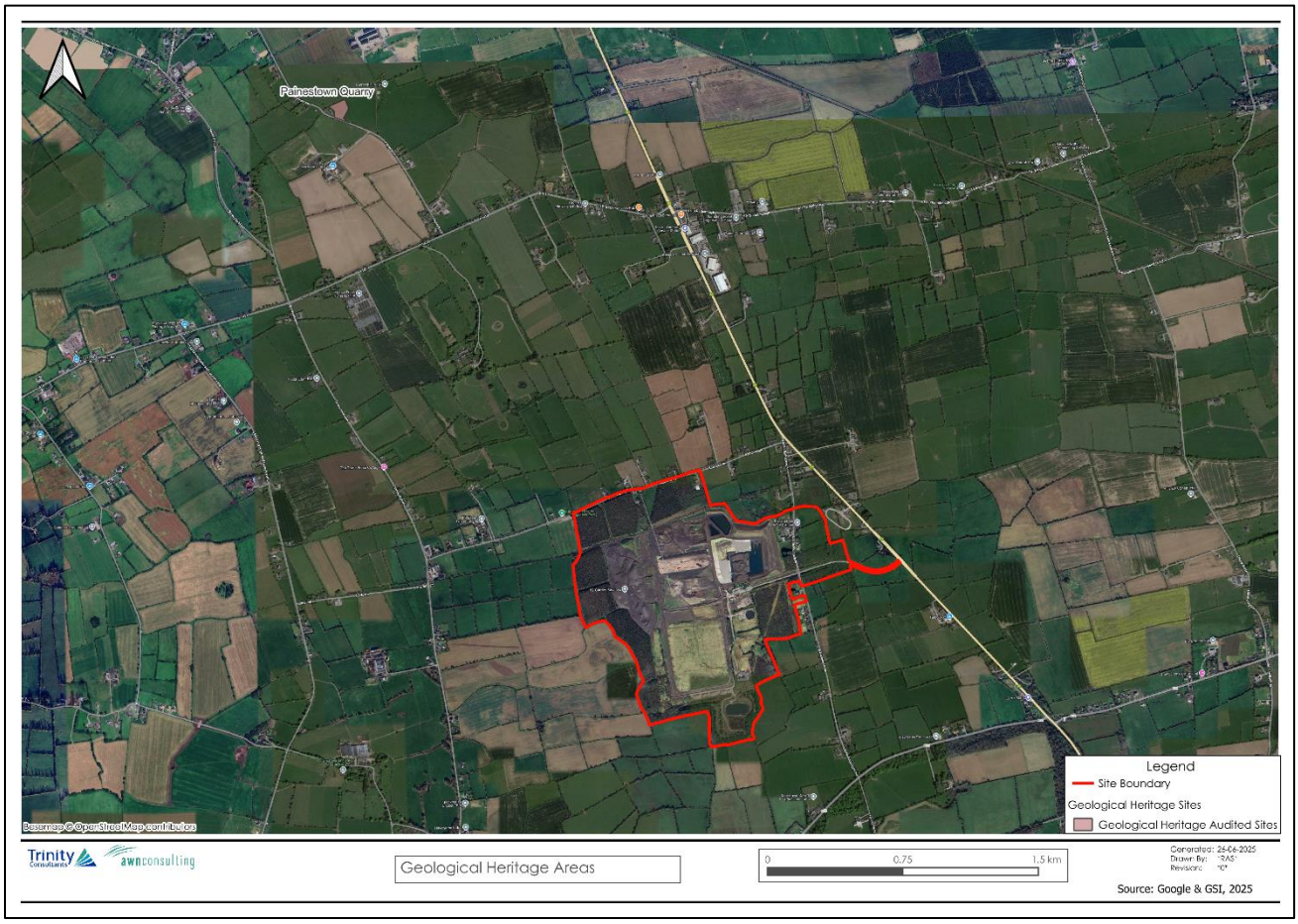
No geological heritage areas are identified within the site boundary or in close proximity of the site (GSI, 2025). The closest geo-heritage area is located c. 2.5 km north of the site and is identified as Painestown Quarry as shown in Figure 5-4.

The Painstown Quarry is a spectacular and easily accessible example of chevron folds, which could make an excellent teaching locality. It complements the example of coastal geology at Loughshinny. It should become a County Geological Site based on unique geology identified within the quarry (Meath County Geological Site Report).

The geological heritage site is described as "*This disused quarry has cut into thinly bedded limestone and shale, which displays a series of angular, zig-zag folds called chevron folds. These occur when pressure is exerted on thinly bedded sequences of alternating rocks, where one rock type (limestone) is competent and the other (shale) is incompetent. These features are also found in the same rock formation along the coast at Loughshinny.*"

Based on the nature of the development and receptors and distance to this receptor, there is no potential for any detrimental effect as a result of the Proposed Development.

Figure 5-4 Geological Heritage Sites (GSI, 2025)



5.3.5 Economic Geology

The GSI (2025) mineral database was consulted to determine whether there were any mineral sites in close proximity of the study area. There are 2 no. recorded mineral localities within a 2 km radius. The closest identified is a non-metallic mineral locality c. 1.4 km east of the site in the townland of Sicily while a metallic quarry is located c. 1.5 km west of the site in the townland of Brownstown.

Based on the nature of the development and receptors and distance to these receptors there is no potential for any detrimental effect on mineral sites as a result of the Proposed Development.

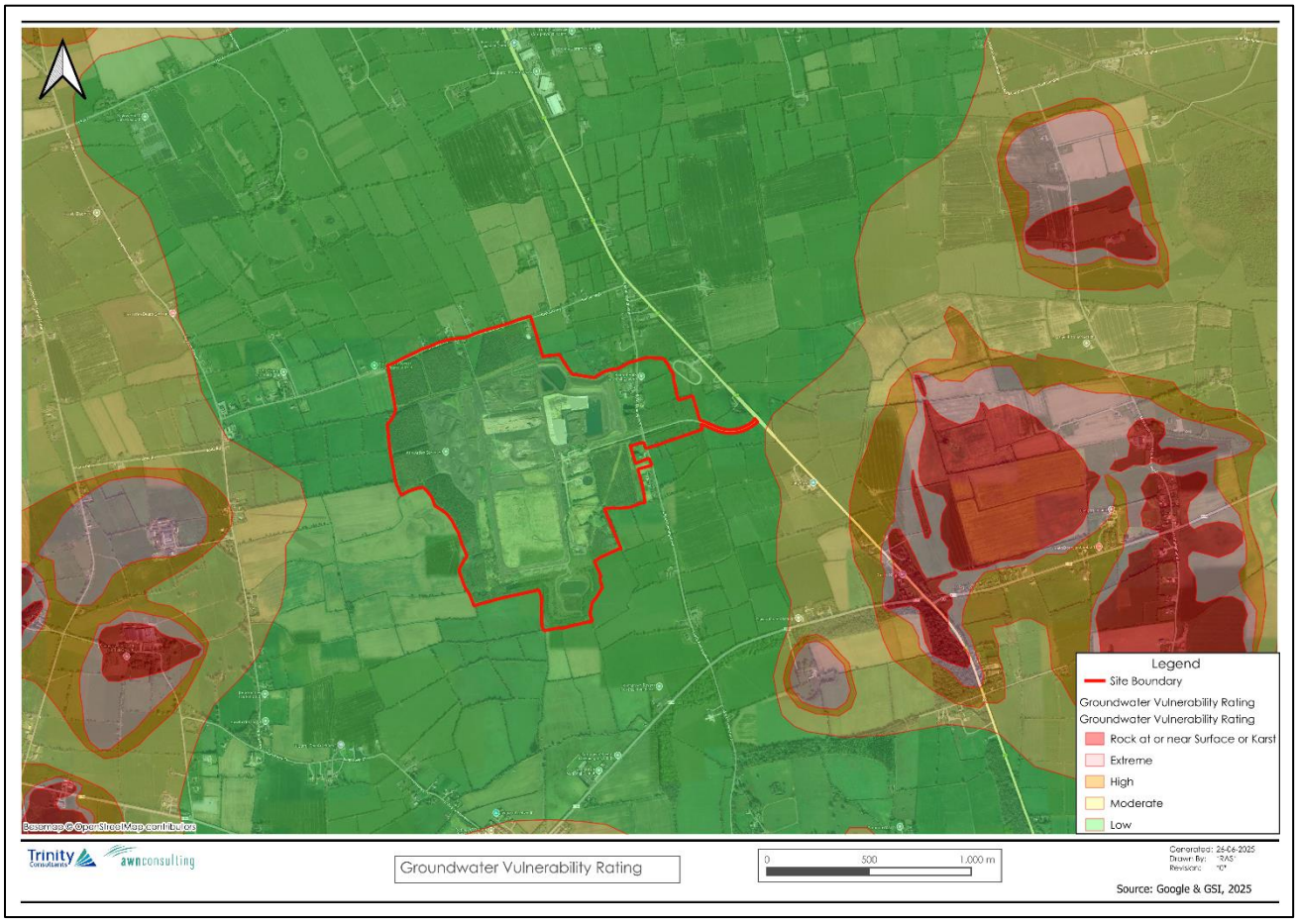
5.3.6 Groundwater Vulnerability Rating

Groundwater vulnerability is a term used to represent the natural ground, intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures/ fractures, the main feature that protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of/ or of mixtures of peat, sand, gravel, glacial till, clays or silts).

Groundwater vulnerability is an indication of how easily the aquifer can become contaminated by human activity. It depends on the thickness and permeability of the overlying soils and depth to the water table. For example, a bedrock aquifer with minimal thickness of overburden or with a thin layer of permeable overburden will be more vulnerable to contamination than a bedrock aquifer which has a thick layer of low permeability overburden. Extreme groundwater vulnerability is also associated with karst landforms as these are a direct pathway for water and contaminants to enter the aquifer from the surface.

The GSI presently classifies the groundwater vulnerability of the entire site as 'Low' vulnerability as shown in Figure 5-5. Based on the subsoil type and description, the expected depth to bedrock is expected to be greater than 10m. This was confirmed during the ground investigation carried out by GII in 2025. The depth to rock varies from 14.30m BGL in BH106S to a maximum of 28.00m BGL in BH105S.

Figure 5-5 Groundwater Vulnerability Rating (GSI, 2025)



Aquifer vulnerability classifications are primarily based on the permeability and thickness of subsoils. Refer to **Error! Reference source not found.** below.

Table 5-1. Vulnerability Mapping Guidelines (Source: DoELG, EPA, GSI, 1999)

Vulnerability Rating	Hydrogeological Condition				
	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)	(<30 m radius)
Extreme (E)	0 – 3 m	0 – 3 m	0 – 3 m	0 – 3 m	-
High (H)	>3 m	3 – 10 m	3 – 5 m	>3 m	n/a
Moderate (M)	n/a	>10 m	5 – 10 m	n/a	n/a
Low (L)	n/a	n/a	>10 m	n/a	n/a
Notes: (1) n/a: Not applicable (2) Precises permeability values cannot be given at present (3) Release point of contaminants is assumed to be 1 – 2 m below ground surface					

5.3.7 Karst Landforms

Karst is a landscape with distinctive hydrology and landforms that arise when the underlying rock is soluble. Although karst can develop on evaporate rocks such as gypsum and siliceous rocks such as quartzite, the vast majority of karst landforms are found on carbonate rocks, such as limestones. Karst landscapes may have sinkholes, caves, enclosed depressions, disappearing streams, springs and sinkholes.

No karst landforms have been identified within the site boundary or in the vicinity of the Proposed Development, confirmed by site investigation and geophysics The closest karst feature is a swallow hole located c. 5.7 km north of the site (GSI, 2025).

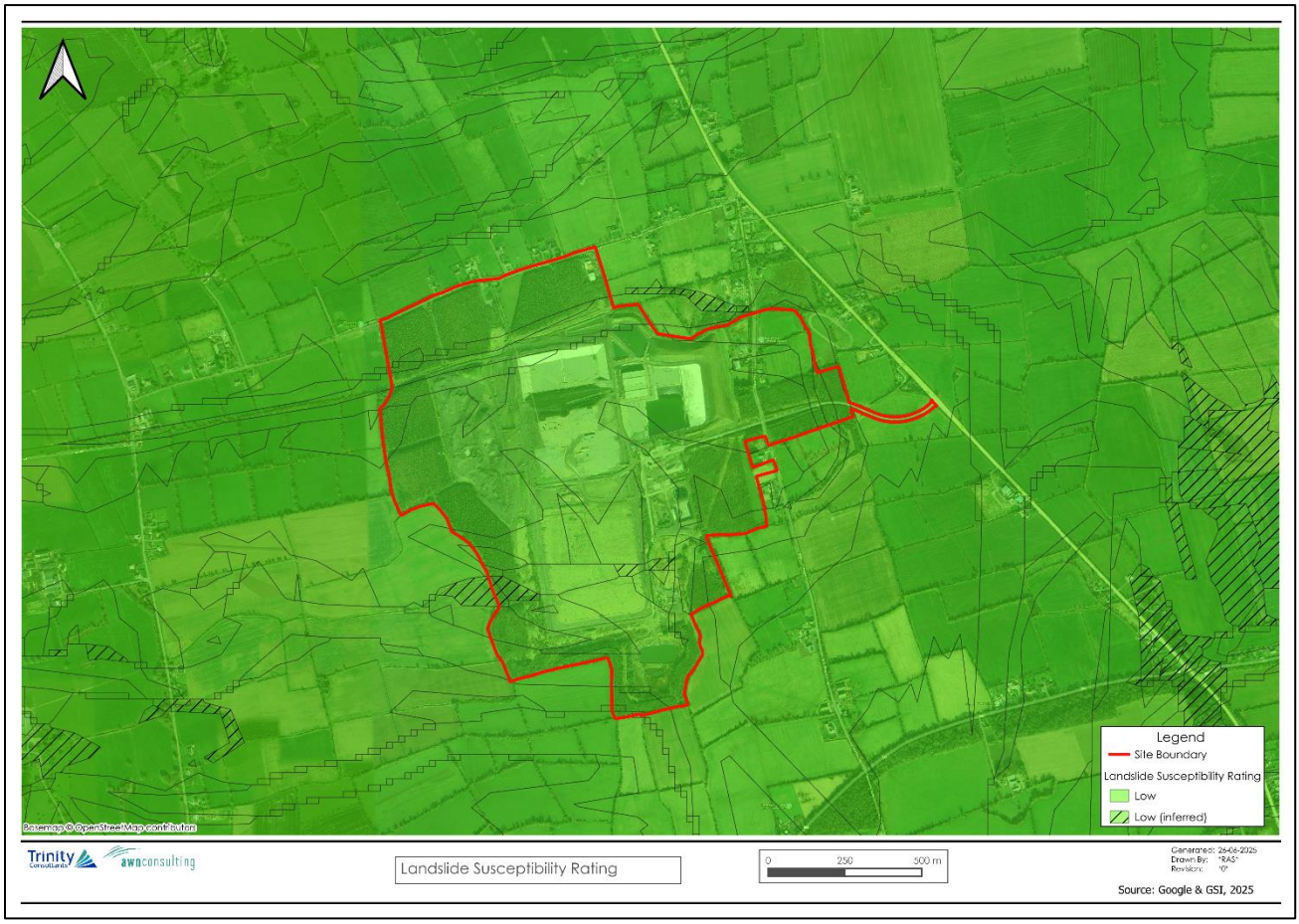
5.3.8 Geohazards

Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating the slope failure. Instability is often significantly increased by man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) and debris flows are a result. In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff landslides and falls lead to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities.

A landslide susceptibility map identifies areas which are subject to landslides and is measured from low to high. The landslide susceptibility classification takes into account where the landslides occur and what causes them (slope, soil type and the impact of the flow of water in an area).

The landslide susceptibility classification of the site ranges between 'Low' and 'Low Inferred' as shown in Figure 5-6 (GSI, 2025).

Figure 5-6 Landslide Susceptibility Classification (GSI, 2025)



5.3.9 Historical Land Use and Environment

The site currently includes a licensed landfill facility where waste disposal and recovery activities are undertaken with waste acceptance commencing in December 2004. A detailed description of the existing development is outlined in Section 2.2 in Chapter 2 – Description of the Proposed Development of this EIAR.

Upon review of historical 6-inch first edition, 6-inch last edition and 25-inch Cassini map, no geological features or constraints were identified on site.

The review of Aerial maps from 1995 to 2013 revealed that the overall land use was agricultural prior to construction of the landfill in 2004 as shown in Figure 5-7 to Figure 5-9 (OSI, 2025).

Figure 5-7 Land Use 1995 Aerial Map (OSI, 2025)



Figure 5-8 Land Use 1996 to 2000 Aerial Map (OSI, 2025)



Figure 5-9 Land Use 2001 to 2005 Aerial Map (OSI, 2025)



5.3.10 Historical Site Investigations and Soil Quality

As part of the initial landfill planning application, an intrusive site investigation was conducted by KT Cullen & Co. in November 2000 to verify the geological succession beneath the site. This investigation involved excavating 20 trial pits to a maximum depth of 4.7 mbgl, drilling 14 shallow shell and auger boreholes up to 10.0 mbgl, and 8 deep rotary boreholes reaching depths of up to 30.0 mbgl.

Topsoil was found across the site to an approximate depth of 1.0 mbgl, underlain by a low-permeability boulder clay layer extending between 12.5 and 21.5 mbgl. This layer primarily consisted of stiff, gravelly, silty clay with frequent cobbles, minor sand content, and occasional sand lenses.

Bedrock was encountered at eight locations and was described as interbedded siltstone/mudstone and fine-grained sandstone interbedded with siltstone/mudstone. Core samples described the bedrock as light-coloured, fine-grained sandstone and darker-coloured siltstone/mudstone. Where weathered rock head was present, shallow fractures were filled with clay to a depth of approximately 1 m.

A further site investigation in August 2004 aimed to install a deeper replacement groundwater monitoring well (MWS16d) and 19 shallow ground gas monitoring wells. This investigation again identified low-permeability boulder clay across the site, reaching a maximum depth of 12.1 mbgl (at MW16d), composed of stiff, gravelly clay with frequent cobbles. Beneath this, dark black weathered siltstone/mudstone was found between 12.1 and 15.6 mbgl, with black mudstone encountered down to 30.0 mbgl.

Additional geotechnical investigations were carried out by Priority Geotechnical Ltd (PGL) in August and September 2016 to support the planning and design of the Proposed Development. These works included drilling one rotary cored borehole (RC01) to 27.0 mbgl and ten shallow shell and auger boreholes (BH01–

BH10) to a maximum depth of 15.0 mbgl. Boreholes BH01, BH02, and BH03 encountered firm to stiff, slightly sandy, gravelly clay between 6.0 and 15.0 mbgl. BH04 to BH10 encountered dense, clayey, sandy gravel from 3.5 to 7.1 mbgl. In borehole RC01, clayey/silty, gravelly sand was identified between 7.0 and 17.0 mbgl, with bedrock encountered at 17.0 mbgl.

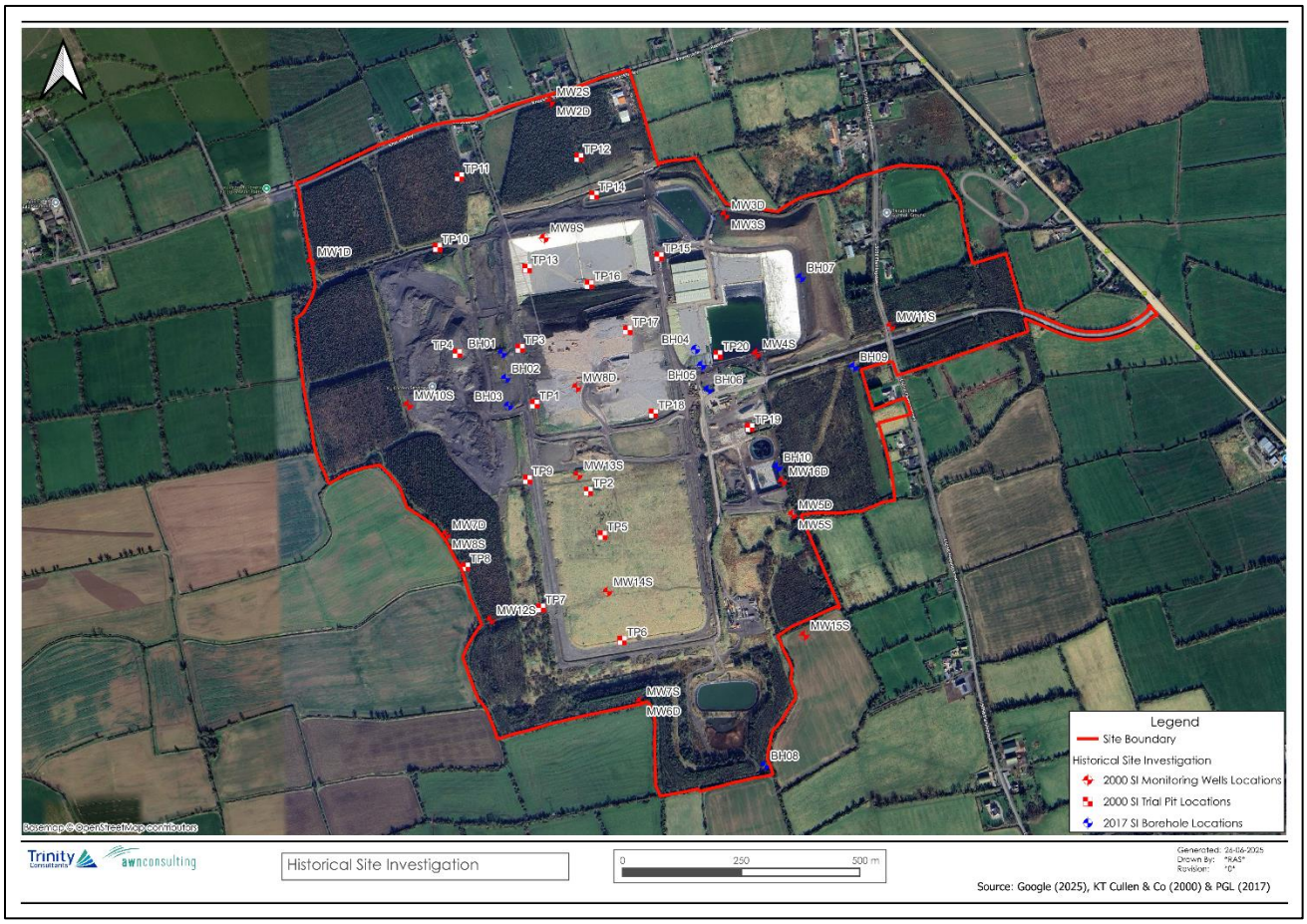
Alongside these intrusive works, PGL conducted a geophysical survey in 2016 to characterise the overburden layers and confirm the depth to bedrock. The survey employed 2D Electrical Resistivity Tomography (ERT), Seismic Refraction Profiling, and Multi-Channel Analysis of Surface Waves (MASW) along preselected transects within the proposed northern cell development area.

Resistivity values in the overburden were relatively low, generally ranging between 75 and 100 ohm-m, with peaks around 150 ohm-m. These consistent readings indicate a relatively homogeneous Glacial Till deposit (sandy gravelly clay), as confirmed by intrusive investigations.

Seismic velocities increased rapidly to over 1000 m/s below 2.0 mbgl, indicating stiff overburden. P-wave velocities ranged from 2000 to 2600 m/s, typical of very stiff materials. Geophysical data suggested that Glacial Till thickness varied between 15 and 20 m, with an average of around 17 m.

In areas lacking a clear resistivity contrast, P-wave velocity was used to distinguish the Glacial Till/bedrock boundary. Bedrock was identified by a sharp increase in P-wave velocity to over 2900 m/s, characteristic of unweathered rock. This boundary was found to range from 42 to 52 mAOD. The bedrock is interpreted to consist of shale/mudstone based on the low resistivity and seismic velocity data.

Figure 5-10 Historical Site Investigation Location Plan



5.3.10.1.1 Permeability Parameters

Determination of Permeability in a Triaxial Cell test was undertaken on 8 no. samples of Glacial Till collected during the site investigation carried out in 2000.

Direct measurement of permeability (k) in hydraulic triaxial cell indicated values of 7.26 x 10^{-11} ms-1 to 1.12 x 10^{-10} ms^{-1}. This is indicative of impermeable 'intact' Clay deposit (CIRIA 1986).

5.3.10.1.2 Soil Contamination

During the previous investigations, no contamination was identified. No known soil contamination exists within the Proposed Development area. Site walkovers carried out in July and august of 2016 and historical OSI mapping indicate the land has been used for agriculture, with no evidence of industrial activity.

While minor past fuel spills or leaks cannot be entirely ruled out, only one recorded incident occurred—a small fuel spill in 2016 near the bunded fuel storage area. It was promptly addressed and cleaned up with EPA approval.

5.3.11 Current Site Investigation and Soil Quality

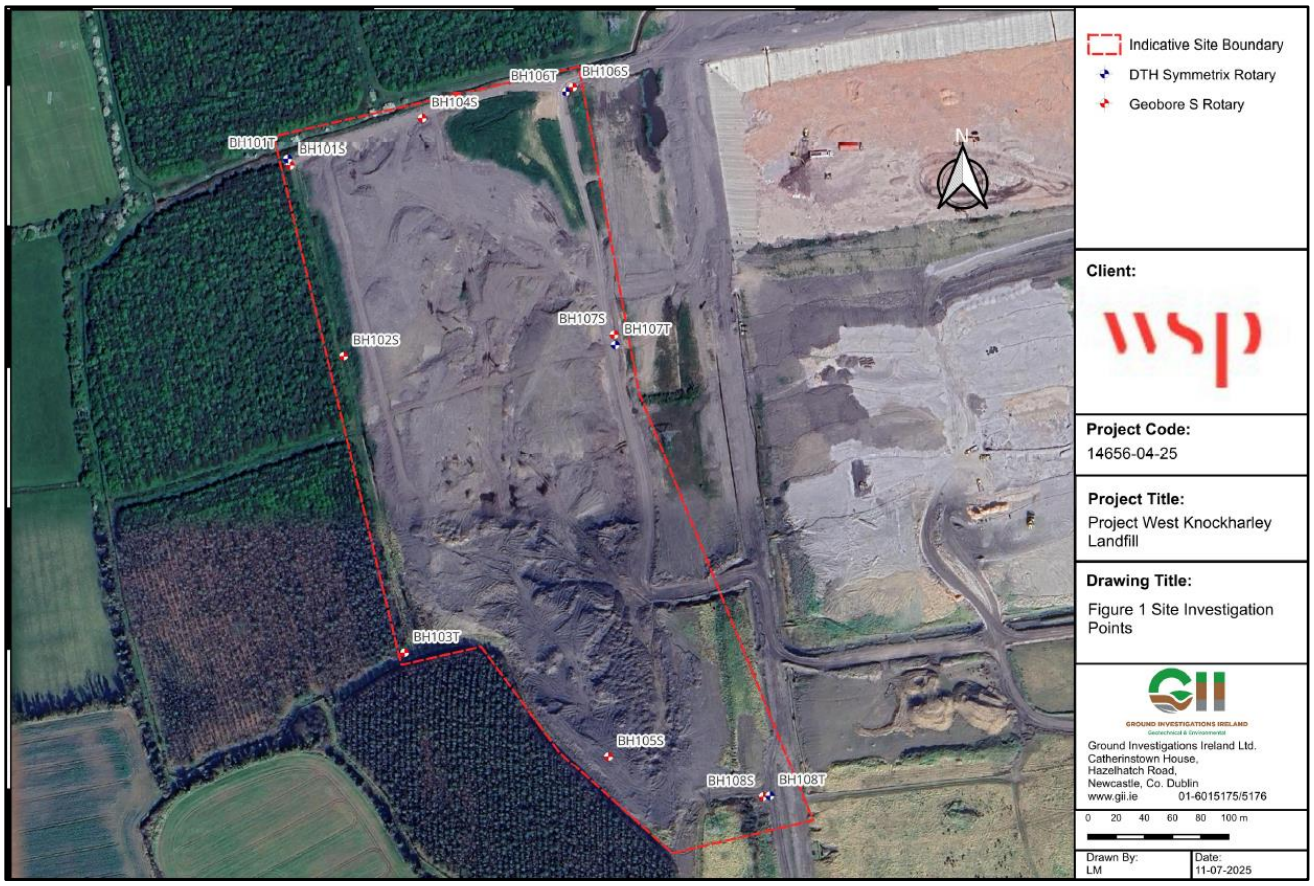
5.3.11.1 Ground Investigation 2025

As part of the Knockharley landfill extension present application, a ground investigation was undertaken by GII between May and July of 2025.

The scope of works included the following and presented in figure 5-11.

- 8 No. rotary core Geobore S boreholes to a maximum depth of 29.50m BGL
- 4 No. rotary core *DTH Symmetrix* boreholes to a maximum depth of 14.00m BGL

Figure 5-11. Ground Investigation Location Plan (GII, 2025)



The sequence of strata encountered was variable across the Proposed Development site but generally comprised;

- Made Ground
- Cohesive Deposits
- Granular Deposits
- Bedrock

MADE GROUND: Made Ground deposits were encountered from ground level at BH105S and extended to a depth 8.00m BGL. These deposits were described generally as brown slightly sandy gravelly Clay with low cobble and boulder content.

COHESIVE DEPOSITS: Cohesive deposits were encountered from ground level at most locations and beneath the made ground at BH105S and were described typically as brown slightly sandy gravelly CLAY with low cobble and boulder content overlying a grey / dark grey slightly sandy gravelly CLAY with low cobble and boulder content.

GRANULAR DEPOSITS: Granular deposits were noted within the cohesive deposits at BH102S and were typically described as SAND and GRAVEL on the logs. This was due to the poor recovery of the material in the geobore S liners.

BEDROCK: The rotary core boreholes recovered very weak to weak thinly to medium bedded grey fine to medium grained SANDSTONE with interbeds of Siltstone. This is typical of the Balrickard Formation, which is noted on Geological Survey Ireland's (GSI) geological mapping of the site. The degree of weathering ranged from slightly to highly weathered. The depth to rock varies from 14.30m BGL in BH106S to a maximum of 28.00m BGL in BH105S.

A site walkover was carried out on 20th March 2025 to confirm the pattern of existing drainage on the site and to record any significant hydrological features including the section of Knockharley stream which requires diversion. The site walkovers involved an initial review of available information gathered in the desk study phase followed by a site visit.

5.3.11.1.1 Permeability Parameters

Determination of Permeability in a Triaxial Cell test was undertaken on 8 no. samples of Glacial Till collected during the site investigation carried out by GII in 2025.

Direct measurement of permeability (k) in hydraulic triaxial cell indicated values of 6.5 x 10^{-11} ms^{-1} to 9.6 x 10^{-11} ms^{-1}. This is indicative of impermeable 'intact' Clay deposit (CIRIA 1986).

These results are inline with the historical investigation carried out in 2020.

5.3.11.1.2 Soil Contamination

During the 2025 site investigation, no physical evidence of contamination was observed and upon review of the groundwater laboratory analysis, no evidence of leaching of any contamination was identified. The laboratory results can be found in Appendix 5.2 and 5.3.

5.3.11.2 Geophysical Investigation 2025

The combined geophysical data has been interpreted as follows:

Layer	Seismic Velocity (m/s)	Average Seismic Velocity (m/s)		Interpretation	Estimated Stiffness/ Rock Quality
1	289-880	418	<50	PEAT/SILT/CLAY	Soft-Firm
			50-250	Sandy gravelly CLAY	
2	720-1269	924	<50	SILT/CLAY	Firm-Stiff
			50-250	Sandy gravelly CLAY	
3	2120-2389	2254	50-250	Sandy gravelly CLAY	Very Stiff
4	2597-3300	2941	<50	Slightly Weathered – Fresh SANDSTONE with interbeds of SILTSTONE	Good
			50-150	Slightly Weathered – Fresh SANDSTONE	

The combined geophysical and borehole data indicate 3 soil layers:

Layer 1 - an upper layer comprising soft to firm sandy gravelly clay with pockets of peat/silt/clay. This layer ranges in thickness from 0 m (R1 and R2) in the west and northwest to 5.0 m (R6 m) on the elevated made ground in the centre of the site.

Layer 2 - a layer of firm to stiff sandy gravelly clay with pockets of silt/clay. This layer ranges in thickness from 0.5m (R1) in the west to 13.4 m (R5 m) on the elevated made ground in the centre of the site,

Layer 3 - underlain by a thick layer of very stiff sandy gravelly clay. This layer ranges in thickness from 7.9 to 24.0 m (average 15.1 m).

Variations in bedrock resistivity have been interpreted in conjunction with the boreholes as indicating two rock types across the site; low resistivity (<50 Ohm-m) sandstone with interbedded siltstone and higher resistivity (50- 150 Ohm-m) sandstone. These values are lower than would typically be expected for sandstone and for sandstone with interbedded siltstone. This interpretation has been made based on the findings of the boreholes.

5.3.12 Conceptual Site Model

Based on available data, AWN has developed a conceptual site model (CSM) in order to identify any likely Source-Pathway-Receptor linkages relating to the existing Knockharley Landfill site and the Proposed Development. This is presented in Chapter 6 section 6.3.10.1.

In summary (for Soils and Geology) the existing and proposed landfill area is underlain by:

- Alluvium was identified along the northern and southern section of site in the vicinity of the watercourses elsewhere low permeability cohesive deposits were encountered comprising brown slightly sandy gravelly CLAY with low cobble and boulder content overlying a grey / dark grey slightly sandy gravelly CLAY. Refer to soil permeability assessment carried out by KT Cullen in 2000 and by GII in 2025.
- Depth to bedrock (coarse Sandstone and Shale rocks – slightly weathered to highly weathered) encountered between the depths of 12 to 28m metres across the entire site while in the proposed landfill expansion site, bedrock was encountered between the depths of 14.3 to 28 metres. Variations in bedrock resistivity have been interpreted in conjunction with the boreholes as indicating two rock types across the site; low resistivity (<50 Ohm-m) sandstone with interbedded siltstone and higher resistivity (50- 150 Ohm-m) sandstone. These values are lower than would typically be expected for sandstone and for sandstone with interbedded siltstone.
- Excavation to a depth of 54mOD will be required for the new cells. Overall on site, there will be an excavation of c. 1,807,499 m^3 of material to facilitate the Proposed Development. Approximately 1,746,402 m^3 will be excavated for landfill cell construction, including the removal of existing stockpiles of site. Of this quantity, the estimated volumes of reuse for fill, clay liner, landscaping and berms is 1,440,434 m^3 with approximately 367,065 m^3 of material needing to be removed and transported off site. Bedrock will not be encountered.
- The existing stockpiles on site will be reused for landscaping and berms.

5.4 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction phase and operational phase of the Proposed Development which can have a potential impact on land soils and geological environment. The information presented in this section is informed by the project design, but it is not a complete description of the Proposed Development. The details included in this chapter are only relevant to soils and geology. Therefore, it should be read in conjunction Chapter 2 'Description of the Proposed Development' of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the Proposed Development.

5.4.1 Construction Phase

The activities required for the construction phase of the Proposed Development represents the greatest risk of potential impact on the land, soils and geological environment. These activities primarily pertain to the site preparation, excavation and infilling activities required to facilitate construction of the Proposed Development.

5.4.1.1 Proposed Site Levelling and Excavations

Table 5.2. Total cut on site

Cut Soil	Volume (m^3)
Cell Construction Cut Volume	1,331,548
Knockharley Stream Diversion Volume	7,386
Lower Road Cut Volume	1,071
Existing Stockpiles Volume	414,854
South Attenuation Pond Extension	52,640
Total Cut volume	**1,807,499**

Table 5.3. Total fill on site

Fill Soil	Volume (m^3)
Non Permitted Screening Berms North Volume	339,416
Permitted Screening Berms Permitted Volume	288,266
Lower Road Fill	46,375
Capping Volume (Proposed Cells)	301,977
Cell Construction Fill Volume	120,689
Clay Liner - Volume Cells and South Attenuation Pond Extension	168,443
Clay Liner Volume - South Attenuation Pond Extension	12,943
Capping Volume (Existing Cells)	162,325
Total Fill Soil	**1,440,434**

Excavations and levelling of the site to the necessary foundation base levels for the proposed landfill extension, and all ancillary works, will require the excavation of an estimated c. 1,807,499 m^3 of material. The estimated volumes for fill, clay liner, landscaping and berms is 1,440,434 m^3 with approximately 367,065 m^3 of material needing to be removed and transported off site. The construction will require excavations down to approximately 55 mOD at the high internal corners and approximately 54.0 mOD at the low external corner where the sump is located.

Clay liner will be placed at the base of the landfill cells which will prevent any leachate migration to the underlying geology.

The Proposed Development will require the diversion of the existing Flemingstown Stream which will also require the construction of a culvert to facilitate access to the landfill.

Table 5-4: Proposed Culvert Details (WSP, 2025)

Form	Size (m) (H:W)	Length (m)	US Invert Level (m)	DS Invert Level (m)	Slope
Box Culvert	2 m x 2.5 m (0.5 embedded below ground level)	8	59.52	59.46	0.008

Local minor dewatering and groundwater management will be required during excavation works and groundworks at the proposed landfill extension site. During the site investigations carried out by GII (2025), the groundwater levels recorded in the overburden were recorded and are presented in Table 5-5 below. Therefore, shallow groundwater is anticipated to be encountered during excavation works at this location.

Table 5-5. Groundwater Levels in Overburden (GII, June, 2025)

Borehole ID	Depth (mBGL[1])	Date	Water Level (mBSTP[2])	Water Level (mOD[3])
BH101T	14	20/06/2025	5.1	58.8
BH103T	19	20/06/2025	0.89	68.09
BH106T	11	20/06/2025	9.4	52.62
BH107T	14	20/06/2025	13.56	50.45
BH108T	13.5	20/06/2025	9.6	53.61

1. mBGL: Metres below Ground Level
2. mBTSP: Metres below Standpipe
3. mOD: Metres Ordnance Datum

5.4.1.2 Storage of soils/aggregates

The employment of good construction management practices and full adherence to the Construction & Environmental Management Plan (CEMP) will minimise the risk of pollution of soil, storm water run-off, seawater or groundwater. Such practices include the proper storage of spoil / loose materials on site, such as stockpiled excavated materials to be used for landscaping purposes; Aggregate materials such as sands and gravels will be stored in clearly marked receptacles in a secure compound area within the contractors' compound on site.

Temporary storage of spoil will be managed to prevent accidental release of dust emissions and uncontrolled surface water run-off which may contain sediment and solid matter. Any excavated material temporarily stockpiled onsite for re-use during reinstatement will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment etc.

Soil requiring removal offsite will be removed from site regularly to ensure there is minimal need for stockpiling. Some of the topsoil removed will be re-used on site for backfill. Any surplus topsoil, subsoil and bedrock material will be transported off site and disposed of at a fully authorised soil recovery site or licenced landfill based on the waste soil classification.

There will be a requirement for deliveries and refuelling of imported engineering fill (sands and gravels), and other construction materials include, steel structure, concrete, cladding, ducting and piping. Construction materials will be brought to site by road. Refuelling will be completed in accordance with the best standard practice refuelling procedure. To support the construction of proposed roads, car parks, and buildings, additional fill material may need to be imported.

A 'Just in Time' delivery system will operate to minimise storage of materials. Construction materials will be transported in clean vehicles. Lorries/trucks will be properly enclosed or covered during transportation of friable construction materials and spoil to prevent the escape material along the public roadway. Where possible it is proposed to source general construction materials from the local area to minimise transportation distances.

5.4.1.3 Storage of hazardous material

Liquid materials i.e., fuel storage will be located within the site compound in temporary designated bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage.

5.4.2 Operational Phase

As the cells are developed in a phased basis the construction and operation components overlap as elaborately explained in Chapter 2. As such the construction phase activities are not repeated in this section.

The quantity of waste received at the facility will not change and will be as per the existing IED Licence (W0146-04), i.e. acceptance of up to 435,000 tonnes per annum of non-hazardous wastes and up to 5,000 tonnes per annum of stable non-reactive hazardous waste. The non-hazardous waste accepted at the site comprises up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables. The waste will be placed within the lined cells.

Pipework will be placed in the drainage stone layer above the HDPE barrier which has been designed to collect any leachate runoff from the landfill cells. Management of leachate is addressed in Chapter 6.

No bulk fuel storage is required during the operation phase of the landfill.

5.4.3 Decommissioning & Remediation Phase

Decommissioning and remediation will be carried out in accordance with the existing IED Licence (W0146-04), the CRAMP for the facility and the planning applications permitted by the planning authority, including planning conditions. As part of this phase, the following activities will be undertaken.

On completion of the deposit of waste at the facility, final capping shall be restored over the waste mass. Following completion of the final capping and establishment of interim restoration of the site, all structures, plant and equipment that are not required for restoration purposes will be decontaminated in accordance with recognised standard procedures and regulatory requirements and removed from the site.

During decommissioning of the development, the potential of contamination is associated with the following sources similar to the construction phase:

- Accidental release of suspended solids (muddy water with increased turbidity (measure of the degree to which the water loses its transparency due to the presence of suspended particulates) – arising from capping and ground disturbance;
- Accidental release of contaminated runoff containing hydrocarbons and other construction chemicals (ecotoxic) – accidental spillages from construction plant or onsite storage; and
- Accidental release of wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms. Construction phase sewerage will be contained in a tank and taken by tanker off site for disposal at a licensed waste management facility.

Throughout the aftercare period, leachate within the landfill would be maintained at or below the levels required by the IED licence. It is planned that leachate would be treated on site to allow for use in the

IBA Facility. This is expected to consume approximately 90% of the treated leachate. The remaining leachate will be tankered off site for disposal or recirculated. When agreed with the EPA as part of licence closure, the leachate management infrastructure is decommissioned, all buried pipework and cables will be grubbed up and removed from site.

Environmental monitoring will continue after the closure of the facility for surface and groundwater along with maintenance and inspection of drainage ditches to ensure that all discharges are adhering to the EPA Licence.

5.5 Potential Impacts of the Proposed Development

An analysis of the potential impacts of the Proposed Development on the land, soils and geology environment during the construction and operation is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water (hydrology) the following impacts discussed will be considered applicable to both Chapter 5 and 6 of the EIA Report. Mitigation measures included in the design of this project to address these potential impacts are presented in Section 5.6.

5.5.1 Do Nothing Scenario

If the proposed development was not constructed, it is likely that the facility will continue to operate as a landfill as permitted. The impact on the land, soils and geology would remain largely unaltered as a result.

5.5.2 Construction Phase

5.5.2.1 Potential impacts on Land, Soils and Geology

Soil requiring removal offsite will be removed from site regularly to ensure there is minimal need for stockpiling. Some of the material will be re-used on site for backfill. It is predicted that excavation of approximately 1,807,499 m^3 of material will be required with 367,065 m^3 of material needing to be removed and transported off site and c. 1,440,434 m^3 being reused on site for landscaping and berms.

The construction of the Proposed landfill extension will require excavations down to an elevation of 54mOD from existing ground levels. This material will be disposed of at a licenced facility or if suitable the material may be classed as by-product under Regulation 27 of the European Communities (Waste Directive) Regulations 2011, as amended. To support the construction of proposed roads, car parks, and buildings, additional fill (sands and gravels) material will need to be imported.

There is very little potential for bedrock to become locally contaminated with pollutants associated with construction activity as the aquifer vulnerability is '*Low*' for the entire Proposed Development site. There is a potential for shallow soils to become locally contaminated if not adequately mitigated for the following sources:

- Accidental discharges or spillages during the construction phase;
  - Cement/concrete (increase turbidity and pH) – arising from construction materials;
  - Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage
  - Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

As stated above, the excavation of topsoil and subsoil will be required for levelling of the site. Local removal cover across the landfill extension area will temporarily increase the aquifer vulnerability from 'Low' to 'Moderate' during construction prior cell development and installation of drainage system and leachate collection system. However, installation of Clay liner during the cell development will minimise the potential for contamination of the aquifer beneath the site.

Local minor dewatering and groundwater management will be required during excavation works and groundworks. However, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the Proposed Development site due to the discrete nature of fracturing within the bedrock and high retention time in the overburden due to low permeability glacial clay allowing time for attenuation and dispersion.

In the absence of mitigation measures the potential impacts of the Proposed Development during the construction phase on land, soils and geology in accordance with EPA guidelines are ***negative***, ***slight*** and ***long term.***

5.5.2.2 Potential Impacts on Human Health and Populations

A reduction in soil quality via unmitigated pollutants entering the soil has the potential to lead to negative impacts on human health during construction. Hydrocarbons and petroleum products for example have a risk for humans by inhaling the fumes / dust from contaminated soil. Depending on the type of contaminant and the level of exposure, soil contamination can have serious health implications.

As discussed above, during the site investigation carried out by GII (2025), no physical evidence of contamination was observed during drilling. Upon review of the groundwater laboratory analysis, no evidence of leaching of any contamination was identified. As a result, there is no likely potential for human health impact from contaminated soils in the absence of source pathway receptor linkage.

In the absence of mitigation measures the potential impacts to human health during the construction phase on land, soils and geology are ***neutral***, ***imperceptible*** and ***long term***.

5.5.3 Operational Phase

5.5.3.1 *Potential impacts on Land, Soils and Geology*

As discussed earlier, there is an overlap between construction and operation due to the phased development of the cells. As such the potential impacts during construction are similar for operation. There is no potential impact on the natural soil beneath the liner as any leakage from the waste would be collected in the engineered landfill liner and leachate collection system. The natural soil is protected by a HDPE liner, engineered low permeability clay, a leachate collection system, and an under-cell drainage system, leachate recording and monitoring programme. An Environmental Management System currently operates at the licenced facility as required by the licence and includes measures for maintenance, inspections of containment etc, management of monitoring, reporting and spill response training and reporting.

Therefore, on this basis in the absence of mitigation measures the potential impacts during the operational phase on Land, Soils and Geology due to the potential for contamination of soils are ***neutral***, ***imperceptible*** and ***long term***.

5.5.3.2 Potential Impacts on Human Health and Populations

There are no sensitive economic features, potential contamination or historical geological features at the site. During the operational phase of the Proposed Development there is no potential for impact on human health and populations due to changes in land, soil, and geology.

Therefore, on this basis in the absence of mitigation measures the potential impacts during the operational phase on human health and populations due to the potential for contamination of soils are ***neutral***, ***imperceptible*** and ***long term***.

5.5.4 Decommissioning & Remediation Phase

The potential impacts are as outlined in the Construction Phase. The primary impact is the potential for a localised spill/leak during decommissioning and restoration works.

In the absence of mitigation measures the potential impacts of the Proposed Development during the construction phase on land, soils and geology in accordance with EPA guidelines are ***negative***, ***slight*** and ***long term.***

No contaminated soils were identified during the ground investigation carried out by GII in 2025. Hence, no source pathway receptor link exists.

In the absence of mitigation measures the potential impacts during the decommissioning phase on human health and populations due to the potential for contamination of soils are ***neutral***, ***slight*** and ***long term***.

5.6 Mitigation Measures

5.6.1 Construction Phase

5.6.1.1 Construction & Environmental Management Plan

A Construction & Environmental Management Plan (CEMP) has been prepared in respect of the Proposed Development. The CEMP outlines and explains the construction techniques and methodologies which will be implemented by the contractor during construction of the Proposed Development.

Construction works and the proposed mitigation measures are informed by best practice guidance on the prevention of pollution during development projects including but not limited to:

- Construction Industry Research and Information Association (CIRIA), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016);
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (4th edition), (C741);
- Enterprise Ireland Best Practice Guide, Oil Storage Guidelines (BPGCS005).
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board);
- Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers;
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors;
- CIRIA C648 Control of Water Pollution from Constructional Sites;
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2008); and
- Inland Fisheries Ireland (IFI) – A Guideline on Planning for Watercourses in the Urban Environment.
- Environmental Protection Agency (EPA)- Landfill Manuals: Landfill Site Design

The CEMP sets out the proposed procedures and operations to be utilised on the proposed construction site to protect soil quality. The CEMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

During the project planning phase, a comprehensive emergency response plan will be developed by the construction contractor. This plan will outline a well-defined procedure for effectively managing emergencies as they arise. Furthermore, it's imperative to disseminate this emergency protocol to all site personnel during the site induction process. This plan will include for events such as:

- Pollution incidents: These may involve spillages, the malfunction of temporary structures, embankment collapse, acts of vandalism, fires, and other related events.
- Extreme weather occurrences: Events such as heavy rainfall, flooding, are important factors to consider due to their potential impact on the construction process.

All mitigation measures outlined below and in the CEMP will be implemented during the construction phase, as well as any additional measures required pursuant to planning conditions which may be imposed.

- Standing water present in excavations will be pumped into the site drainage system (including attenuation ponds and wetland);
- The site wheelwash will be used throughout the Proposed Project;
- A designated refuelling area equipped with appropriate spill containment measures will be established in accordance with the EPA Licence. All plant refuelling activities will be confined to this area.
- All fuels, including diesel and fuel oils will be stored in bunded areas. Bunds will have a capacity of at least 110% of the largest storage tank, in compliance with the EPA Licence.
- Only emergency breakdown maintenance will be permitted on site to minimise the risk of environmental contamination.
- A concrete wash-down area will be constructed within the temporary site compound. All concrete delivery trucks must use this facility before leaving the site.
- Construction personnel will receive training on pollution incident control procedures as required by the EPA Licence.
- Portable sanitation facilities, such as portaloos or containerised toilets, will be provided as needed to supplement existing welfare facilities. Waste from these units will be removed from site by a licensed waste disposal contractor.

5.6.1.2 Soil Excavation, Removal and Infill

Material that is exported from site, if not correctly managed or handled, could impact negatively on human beings (onsite and offsite) as well as soil environments. All excavated materials will be visually assessed by suitably qualified persons for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. No stockpiling will be permitted within 20 m buffer zones of watercourses and existing attenuation ponds.

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.

To minimise dust during construction the following mitigation measures will be implemented during the construction phase.

- During earthworks and excavation works care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.
- Silt reduction measures on site will include a combination of silt fencing and settlement measures.
- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate,
- The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection.
- Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination.
- Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.
- Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations.
- Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site.
- Any surface water run-off collecting in excavations will likely contain a high sediment load. This will not be allowed to directly discharge to any stormwater sewer, drainage ditch or watercourse.

5.6.1.3 Cement/concrete works

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil.

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within buffer zone. Wash-outs will only be allowed to take place in designated areas with an impervious surface where all wash water is contained and removed from site by road tanker or discharged to waste leachate lagoon

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. Relevant personnel working on the site will be suitably trained in the implementation of the procedures.

5.6.1.4 Hydrocarbons and other construction chemicals

The following mitigation measures will be implemented during the construction phase in order to prevent any spillages to ground of fuels and other construction chemicals and prevent any pollution resulting to surface water (and groundwater) systems:

- Designation of bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used, the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers to carry a spill kit and relevant operatives must have spill response training;
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;

- Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be stored within temporary bunded areas, doubled skinned tanks or bunded containers to a volume of 110% of the capacity of the largest tank/container. Drainage from the bunded area(s) shall be diverted for collection and safe disposal.
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the Site, they will be secured and on spill pallets; and
- Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated bunded refuelling areas, which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained in the implementation of the procedures.

5.6.1.5 Human Health and Populations

It has been established that no contaminated soils have been identified on site or through groundwater monitoring. However, to mitigate potential community disturbance during enabling and construction stages, the final Construction Environmental Management Plan (CEMP) will be implemented in full. The main measures to be undertaken in relation to population and human health are outlined below.

- Access to the construction site will be restricted to authorised personnel only. Hoarding and fencing will be erected along boundaries as appropriate.
- The health and safety considerations and hazards present during the construction phase will be managed by the Contractor and their nominated 'Project Supervisor Construction Stage' (PSCS).
- The PSCS role will remain in place at the site from the beginning of works until the project has been completed.
- The Contractor will develop a site health and safety management plan to protect personnel working on the site and other members of the public who may be affected by the construction works.

5.6.1.6 Environmental Procedures

There will be comprehensive emergency response procedures and standard operating procedures to respond to chemical spillage of all types. All employees will be provided with such equipment, information, training and supervision as is necessary to implement the emergency response procedures and standard operating procedures as outlined in section 6 of the CEMP.

5.6.2 Operational Phase

An application will be made to incorporate the proposed landfill extension within the existing EPA licence. Once the EPA licence has been extended to cover the new landfill, all of the operations on site will be required to operate under EPA licence conditions similar to that which operates for the existing landfill.

The development of cells and filling is on a phased basis so many of the mitigation measures outlined in section 5.6.2 for Construction apply during Operational Phase but will be managed within the landfill licence conditions and Environmental Management System

5.6.2.1 Land, Soils and Geology

During the operational phase, the waste intake will take place within the clay lined cells. The cells will include the leachate collection system. Pipework will be placed in the drainage stone layer above the HDPE barrier which has been designed to collect any leachate runoff from the landfill cells. This will minimize the potential for contamination of the soils beneath the site during the operational phase.

There will be an engineered landfill liner and leachate collection system, an under-cell drainage system and leachate recording and monitoring programme. An Environmental Management System currently operates at the facility as required by the licence and includes measures for maintenance, inspections of containment etc, management of monitoring, reporting and spill response training and reporting.

Therefore, the risk of accidental discharge has been adequately addressed through design.

Refer to Chapter 6 (Hydrology and Hydrogeology) of the EIAR for further information on the proposed drainage, leachate collection system, monitoring requirements and SUDs design measures.

5.6.2.2 Human Health and Populations

As there is no source pathway linkage, no mitigation is required.

5.6.3 Decommissioning & Remediation Phase

Decommissioning and remediation will be carried out in accordance with the existing IED Licence (W0146-04), the CRAMP for the facility and the planning applications permitted by the planning authority, including planning conditions.

These mitigation measures will be the same as the Construction Phase mitigation measures apart from:

- Final remediation of leachate collection system once agreed with the EPA
- Rehabilitating hard stand areas and promoting revegetation

5.7 MONITORING

5.7.1 Construction Phase

During construction phase the following monitoring measures will be implemented:

- Regular inspection of water run-off and sediments controls (e.g., silt traps);
- Soil sampling to confirm disposal options for excavated soils to ensure correct disposal
- Regular inspection of construction / mitigation measures (e.g., concrete pouring, refuelling, etc) to minimise potential for discharge to ground

5.7.2 Operational Phase

Monitoring as per Construction Phase and maintenance of the surface water drainage system, including interceptors, and leachate collection system to minimise any accidental discharges to the underlying soils. An Environmental Management System currently operates at the facility as required by the licence and includes measures for maintenance, inspections of containment etc, management of monitoring, reporting and spill response training and reporting.

5.7.3 Decommissioning and Remediation Phase

Monitoring as per Construction phase and any further measures identified in the CRAMP which is required for licence closure.

5.8 Residual Effects of the Proposed Development

5.8.1 Construction Phase

5.8.1.1 Land, Soils and Geology

The implementation of the mitigation and monitoring measures detailed in Section 5.6.1 and 5.7.1, will ensure that the potential impacts on land, soil and geology during the construction phase are adequately mitigated. The residual effect on land, soils and geology during the construction phase is considered to be ***neutral, slight*** and ***long-term***.

Following the TII and EPA criteria (refer to Appendix 5.1) for rating the magnitude and significance of impacts on the soils and geology related attributes, the magnitude of impact is considered ***negligible***.

5.8.1.2 Human Health and Populations

As there is no source pathway linkage, there are no potential impacts on human health and populations during the construction phase. The residual effect on human health and populations during the construction phase is considered to be ***neutral, imperceptible*** and ***long-term.***

5.8.2 Operational Phase

5.8.2.1 Land, Soils and Geology

The implementation of the mitigation and monitoring measures detailed in Section 5.6.2 and 5.7.2, will ensure that the potential impacts on land, soils and geology once the Proposed Development is constructed and operational are adequately mitigated. The residual effect on soils and geology during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term.***

Following the TII and EPA criteria (refer to Appendix 5.1) for rating the magnitude and significance of impacts on the soils and geology related attributes, the magnitude of impact is considered ***negligible***.

5.8.2.2 Human Health and Populations

As there is no source pathway linkage no mitigation is required. The residual effect on human health and populations during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term.***

5.8.3 Decommissioning and Remediation Phase

The implementation of the mitigation and monitoring measures detailed in Section 5.6.3 and 5.7.3, will ensure that the potential impacts on land, soils and geology once the Proposed Development is constructed and operational are adequately mitigated. The residual effect on soils and geology during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term.***

5.9 Cumulative Impacts of the Proposed Development

The cumulative impact of the Proposed Development with any/all relevant other planned or permitted developments are discussed below. For details on the developments considered refer to Chapter 2, Section 2.9 and Appendix 2.1.

Two projects of note in the proximity to the development are the proposed 180 Megawatt gas fired peaking power plant proposed to be located to the immediate southwest of the Proposed Development site, and a planned 165 ha solar farm in the vicinity of the Proposed Development site, however this has not yet within the planning system. The project is at non-statutory pre-planning community consultation stage.

Existing developments that are already built and in operation contribute to the characterisation of the baseline environment. As such any further environmental impacts that the Proposed Development may have in addition to these already constructed and operational developments has been assessed in the preceding sections of this chapter.

Any future application on these lands will be subject to planning approval and environmental assessment as required. Any new development proposed on the lands after the submission of the Proposed Development would be accompanied by an EIA, or EIA Screening as required and take into consideration the development of this site.

The developments in Table 5-5 below are considered to be the project which could most likely result in cumulative effects with the Proposed Development. This table summarises the potential for combined residual cumulative effects of each of these developments during the construction, operational and decommissioning and remediation phases of the Proposed Development

5.9.1 Construction Phase

The cumulative impact of the Proposed Development with any/all relevant other planned or permitted developments are discussed below. For details on the developments considered refer to Chapter 2, Section 2.9 and Appendix 2.1.

Existing developments that are already built and in operation contribute to the characterisation of the baseline environment. As such any further environmental impacts that the Proposed Development may have in addition to these already constructed and operational developments has been assessed in the preceding sections of this chapter.

Any future application on these lands will be subject to planning approval and environmental assessment as required. Any new development proposed on the lands after the submission of the Proposed Development would be accompanied by an EIAR, or EIA Screening as required and take into consideration the development of this site.

The implementation of mitigation and monitoring measures previously detailed above in section 5.6.1; and 5.7.1 as well as the compliance of the above permitted development with their respective planning conditions, will ensure the cumulative impact will be not significant to the land, soils and geology environment during the construction phase of the Proposed Development.

The residual cumulative impact of the Proposed Development in combination with other planned or permitted developments can therefore be considered to be ***neutral, imperceptible*** and ***long-term***.

5.9.2 Operational Phase

In relation to the potential cumulative impacts on land, soils, and geology during the operational phase, there is no risk of accidental spills, leaks, and discharges into the underlying soil since all risk is mitigated by design measures. However, the mitigation measures outlined in Section 5.6.2 will be implemented to prevent and control these risks, ensuring the protection of the soil and the underlying bedrock aquifer.

The implementation of mitigation and monitoring measures detailed in Section 5.6.2; as well as the compliance of permitted developments listed in Appendix 2.1 of Chapter 2 and any future permitted developments with their respective planning conditions, will ensure the cumulative impact will be not significant to the land, soils and geological environment during the operational phase of the Proposed Development .

The residual cumulative impact of the Proposed Development in combination with other planned or permitted developments can therefore be considered to be ***neutral, imperceptible*** and ***long-term.***

5.9.3 Decommissioning and Remediation Phase

The potential for cumulative impacts during the Decommissioning and Remediation Phase has been considered; however, there are no known projects or developments that could interact with the site given the long-term time horizon for this phase. The existing landfill forms part of the baseline environment, and the proposed development represents an extension to that activity. Key site-specific activities during the Decommissioning and Remediation Phase are consistent with those required for the existing landfill and include:

- Final landfill capping, undertaken in accordance with the CEMP;
- Ongoing post- landfilling site activities, carried out in accordance with the CRAMP.

Through implementation of the CEMP and CRAMP, adherence to EPA guidance, and regulatory oversight, decommissioning and remediation will be managed to ensure that no significant environmental effects arise. Given the long-term time horizon, any future proposed developments will be required to ensure that cumulative impacts in combination with this development remain at an acceptable level.

In relation to the potential cumulative impacts on land, soils, and geology during the decommissioning and remediation phase, there is a risk of accidental spills, leaks, and discharges into the underlying soil since all risk is mitigated by design measures. However, the mitigation measures outlined in Section 5.6.3 will be implemented to prevent and control these risks, ensuring the protection of the soil and the underlying bedrock aquifer.

The implementation of mitigation and monitoring measures detailed in Section 5.6.3; as well as the compliance of permitted developments listed in Appendix 2.1 of Chapter 2 and any future permitted developments with their respective planning conditions, will ensure there will be minimal cumulative potential for change to the land, soils and geological environment during the decommissioning and remediation phase of the Proposed Development.

The residual cumulative impact of the Proposed Development in combination with other planned or permitted developments can therefore be considered to be ***neutral, imperceptible*** and ***long-term.***

Table 5-6. Cumulative Potential Impact and Rationale

Project	Distance from Project Site	Potential Cumulative Impacts	Rationale	Construction Schedule
Curraghtown Gas-fired power plant (Planning ref: Meath County Council - 2460842)	Adjoining the site	The residual cumulative impact of the proposed development in relation to land, soils and geology for Construction, operation and decommissioning and remediation phase in combination are therefore considered to be neutral, imperceptible and long-term.	The proposed project will have to adhere and implement their own CEMP and mitigation measures in order to protect the underlying soils and geology. Hence, no interaction is likely to occur between the sites.	Overall, the construction period is assessed to be 36 months. Noting also that the proposed works on the north side of the river up to the N51 is assessed to be 27 months duration and works on the south side of the river to be 33 months. No details on commencement
165 ha. Solar farm (not yet submitted for planning)	Adjoining the site	The residual cumulative impact of the proposed development in relation to land, soils and geology for Construction, operation and decommissioning and remediation phase in combination are therefore considered to be neutral, imperceptible and long-term.	The proposed project will have to adhere and implement their own CEMP and mitigation measures in order to protect the underlying soils and geology. Hence, no interaction is likely to occur between the sites.	N/A

5.10 References

- CIRIA (2005). Environmental Good Practice on Site (C650).
- CIRIA (2007). CIRIA 697: The SUDS Manual.
- EPA (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA (2025). EPA Maps.
- GSI (2025). GSI Map Viewer.
- Institute of Geologists of Ireland (2013). Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.
- NPWS (2025). Designations Viewer.
- NRA (2009). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- OPW (2009). The Planning System and Flood Risk Management: Guidelines for Planning Authorities.
- Institute of Geologists of Ireland (2013). Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.
- Teagasc (2025). Teagasc Map Viewer.
- National Roads Authority (NRA) (2009). Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

Chapter 6 – Hydrology & Hydrogeology

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6. HYDROLOGY & HYDROGEOLOGY

6.1 Introduction

This chapter of the EIAR evaluates the likely significant effects, if any, which the proposed development will have on hydrology (surface water) and hydrogeology (groundwater). In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects. A flood risk assessment and a water framework directive assessment is also included as appendices as both have informed the conclusions of this chapter.

6.2 Methodology

6.2.1 Relevant Legislation & Guidance

As outlined in Chapter 1 section 1.2 the information provided complies with all relevant EU and Irish legislation and includes consideration of the objectives as outlined in the Waterford County Development Plan 2022-2028. Relevant legislation and guidance includes:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022).
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009, previously NRA). The TII criteria for rating the hydrogeological and hydrological related attributes are presented in Appendix 6.1 and 6.2 of this EIAR.
- Water Framework Directive (WFD) 2000/60/EC.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation, regulations and guidelines. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003).
- European Communities (Drinking Water) Regulations 2023 (S.I. 99 of 2023).
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended SI No. 77 of 2019).
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 S.I. No. 366 of 2016).
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2022.
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011).
- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988.
- Local Government (Water Pollution) Acts 1977-2007.
- (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and amendments) and European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and amendments).
- Water Services Guidelines for Planning Authorities Draft (Department of Housing, Planning and Local Government, 2018).
- Water Environment (Abstractions and Associated Impoundments) Act 2022
- Water Environment (Abstractions and Associated Impoundments) Regulations 2024 (S.I. No. 419/2024)
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board);
- Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers;
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors;

- CIRIA C648 Control of Water Pollution from Constructional Sites;
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2008); and
- Inland Fisheries Ireland (IFI) – A Guideline on Planning for Watercourses in the Urban Environment.

6.2.2 Sources of Information

Desk-based hydrological and hydrogeological information in the vicinity of the site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Latest EPA Envision water quality monitoring data for watercourses in the area.
- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping.
- River Basin Management Plan for Ireland 2018-2021 (Department of Housing, Planning and Local Government, 2018).
- Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024).
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW, 2009).
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie).
- Office of Public Works (OPW) historical mapping (www.geohive.ie)
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports.
- National Parks and Wildlife Services (NPWS) – Protected Site Register.
- Meath County Council Development plan 2021-2027.
- Soil Geochemical Atlas of Ireland – Teagasc and EPA, 2007

Site specific data was derived from the following sources:

- Environmental Impact Statement for a residual landfill at Knockharley- KT Cullen and Co. Ltd, 2000
- Environmental Impact Statement for the Intensification of Waste Intake at Knockharley Landfill, Co. Meath (Fehily Timoney and Company, 2008)
- Environmental Impact Assessment Report (EIAR) For the Proposed Development at Knockharley Landfill (Fehily Timoney and Company, 2018)
- Site Investigation Report (K.T. Cullen & Co. Ltd, 2000)
- Site Investigation Report (Priority Geotechnical, 2017)
- Geophysical Survey (Priority Geotechnical, 2016)
- Site Investigation Report (GII, 2025)
- Geophysical Investigation Report (Apex Geophysics, 2025)
- Knockharley Landfill Expansion Services Report (WSP, 2025)
- Construction Environmental Management Plan (WSP, 2025)
- Engineering Design and Drawings (WSP, 2025)

The principal attributes (and effects) assessed include the following:

- Water Framework Directive (WFD) Status and potential for increased risk of deterioration of this status due to the activities of the site.
- River and aquifer water quality in the vicinity of the site (where available).
- Surface, transitional and coastal watercourses near the site and potential impact on surface water quality arising from Proposed Development related works including any discharge of surface water run-off.
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

- High-yielding water supply springs/ wells in the vicinity of the site to within a 2km radius and the potential for increased risk presented by the Proposed Development.
- Classification (regionally important, locally important etc) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the Proposed Development e.g. removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality.
- Natural hydrogeological/ karst features in the area and potential for increased risk presented by the activities at the site; and,
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporarily.

6.2.3 Forecasting Methods & Difficulties Encountered

No difficulties were encountered in the production of this chapter.

6.3 Receiving Environment

6.3.1 Existing & Historical Land Use & Topography

The proposed developed is located in Tuitrath, Navan, Co. Meath and part of the site is operating as an active licensed landfill. The site is located c. 800m from the N2 National Primary Road and landfill facility has its own private entrance off the N2.

The site is surrounded at all sides by agricultural land which is the primary land use of the wider region. There are dispersed residential properties in the vicinity of the site, with the nearest residential houses located along the Knockharley road to the immediate north of the site and along the Rathdrinagh/Flemingstown road (L5056) to the east of the site.

The Knockharley Stream (EPA Name: Flemingstown 08, EPA Code: 08F05) flows west to east through the northern portion of the site and then flows along the eastern boundary of the site where it the travels south /southeast away from the site and joins the Nanny river (EPA Name: Nanny (Meath), EPA Code: 08_757) c. 3km downstream. The Knockharley stream (Flemingstown Steam) traverses or runs along the boundary of the site for c. 3km. A portion of the Knockharley Stream to the north of the landfill was diverted as part of the permitted ABP-303211-18 application.

The Kentstown Stream (EPA Name: Kentstown 08, EPA Code: 08K18) flow along the southern boundary of the site for c. 90 m before turning south and joining the Knockharley Stream c. 550 m downstream as shown

The site currently comprises a licensed landfill facility (IED Licence W0146-04) where waste disposal and recovery activities are undertaken with waste acceptance commencing in December 2004. A detailed description of the existing development is outlined in Section 2.2 in Chapter 2 – Description of the Proposed Development of this EIAR.

The site is currently a mix of, constructed landfill and associated facilities with some woodland and wet grassland. Prior to development as a landfill, the land was used for agriculture, and a network of field drains were installed to improve the land.

Upon review of historical 6-inch first edition, 6-inch last edition and 25-inch Cassini map, no geological features or constraints were identified on site.

The review of aerial maps from 1995 to 2013 revealed that the overall land use was agricultural prior to construction of the landfill in 2004 as shown in Figure 6-2 to Figure 6-4 (OSI, 2025).

Figure 6-1. Site Location and Surrounding Use (Google, 2025)

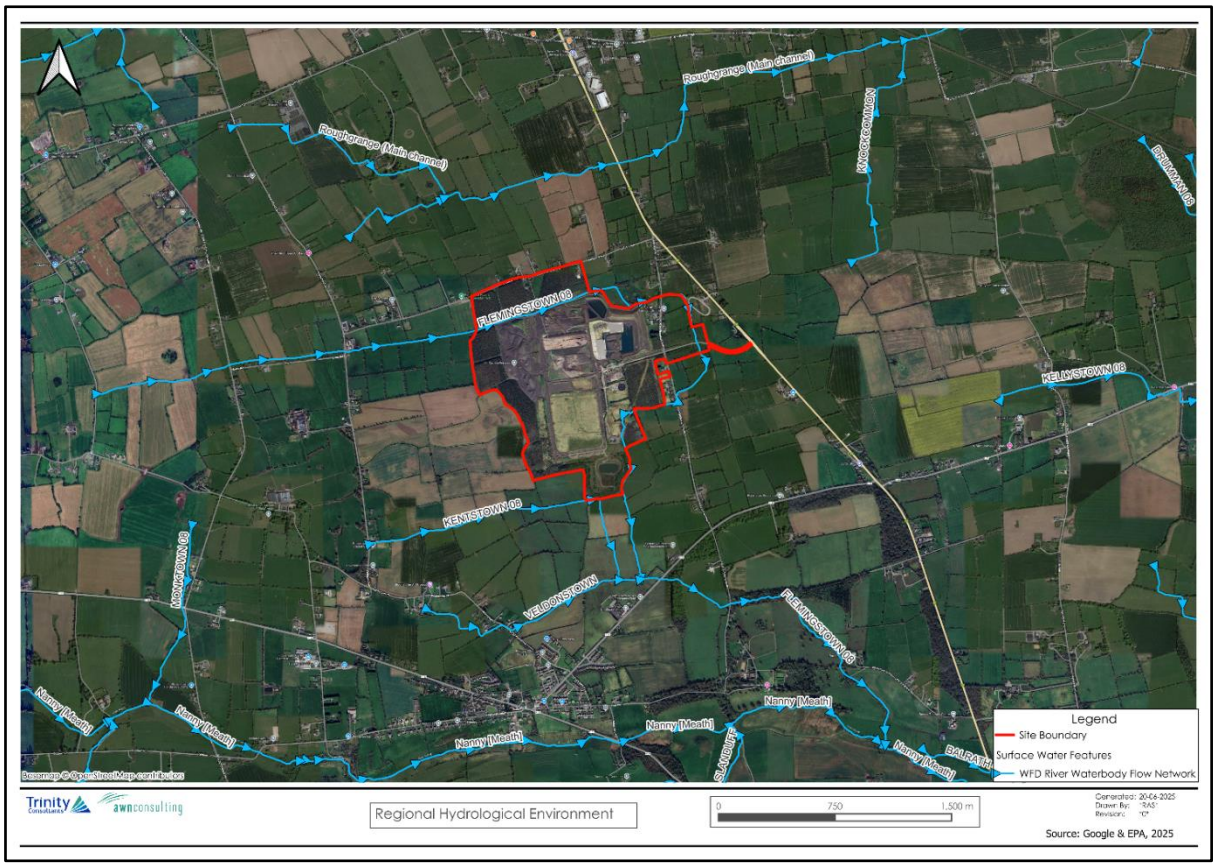


Figure 6-2. Land Use 1995 Aerial Map (OSI, 2025)



Figure 6-3. Land Use 1996 to 2000 Aerial Map (OSI, 2025)



Figure 6-4. Land Use 2001 to 2005 Aerial Map (OSI, 2025)



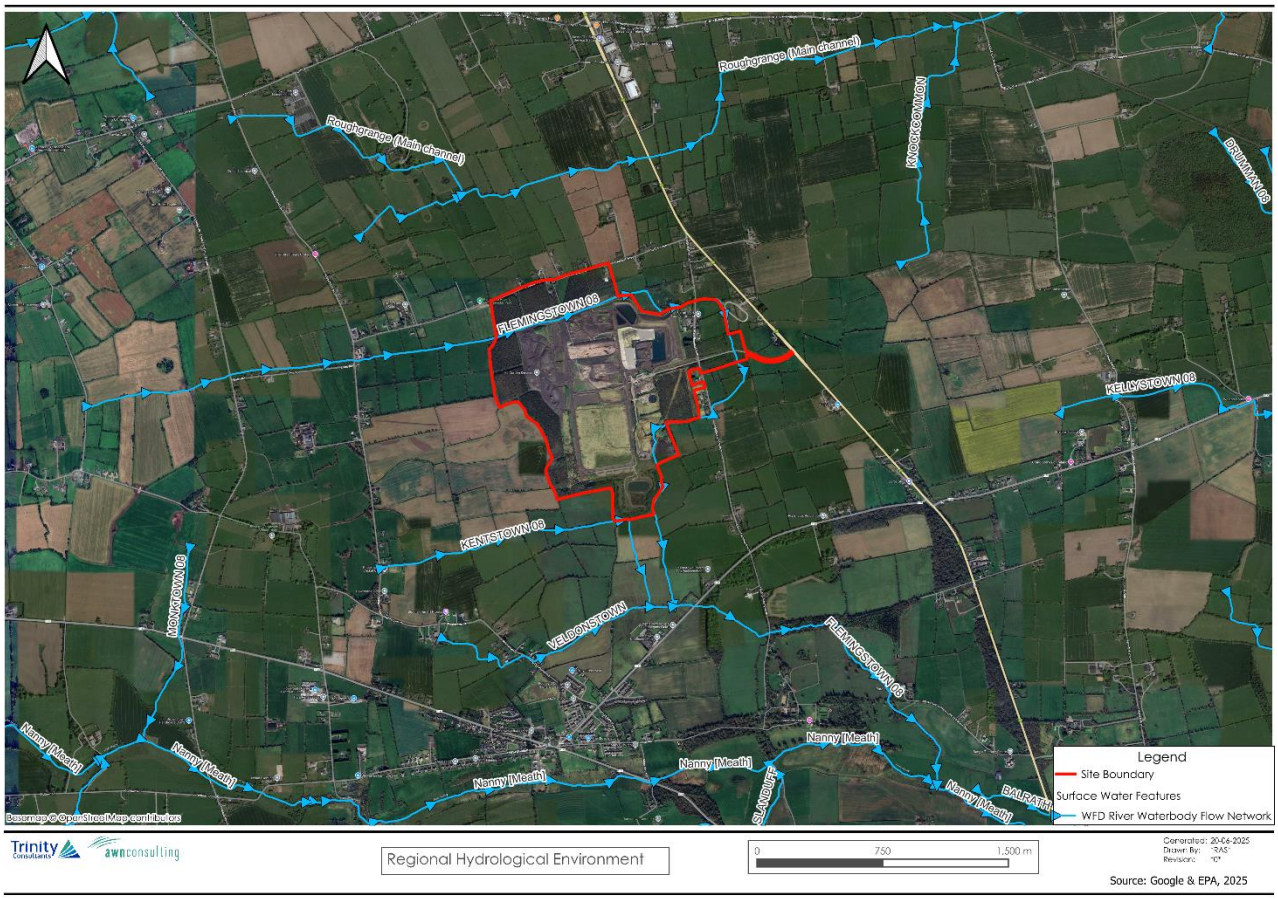
6.3.2 Hydrology

6.3.2.1 Regional Hydrological Environment

The proposed development site is located within the former Eastern River Basin District (ERBD) (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD). The site is located in Hydrometric Area No. 08.

The proposed development site lies within the Nanny-Delvin Catchment (Catchment ID: 08) and the Nanny [Meath]_SC_010 Sub-Catchment (Sub-Catchment ID: 08_4). The current EPA watercourse mapping shows two watercourses flowing adjacent to the site as shown in Figure 6-5

Figure 6-5. Regional Hydrological Environment (EPA, 2025)

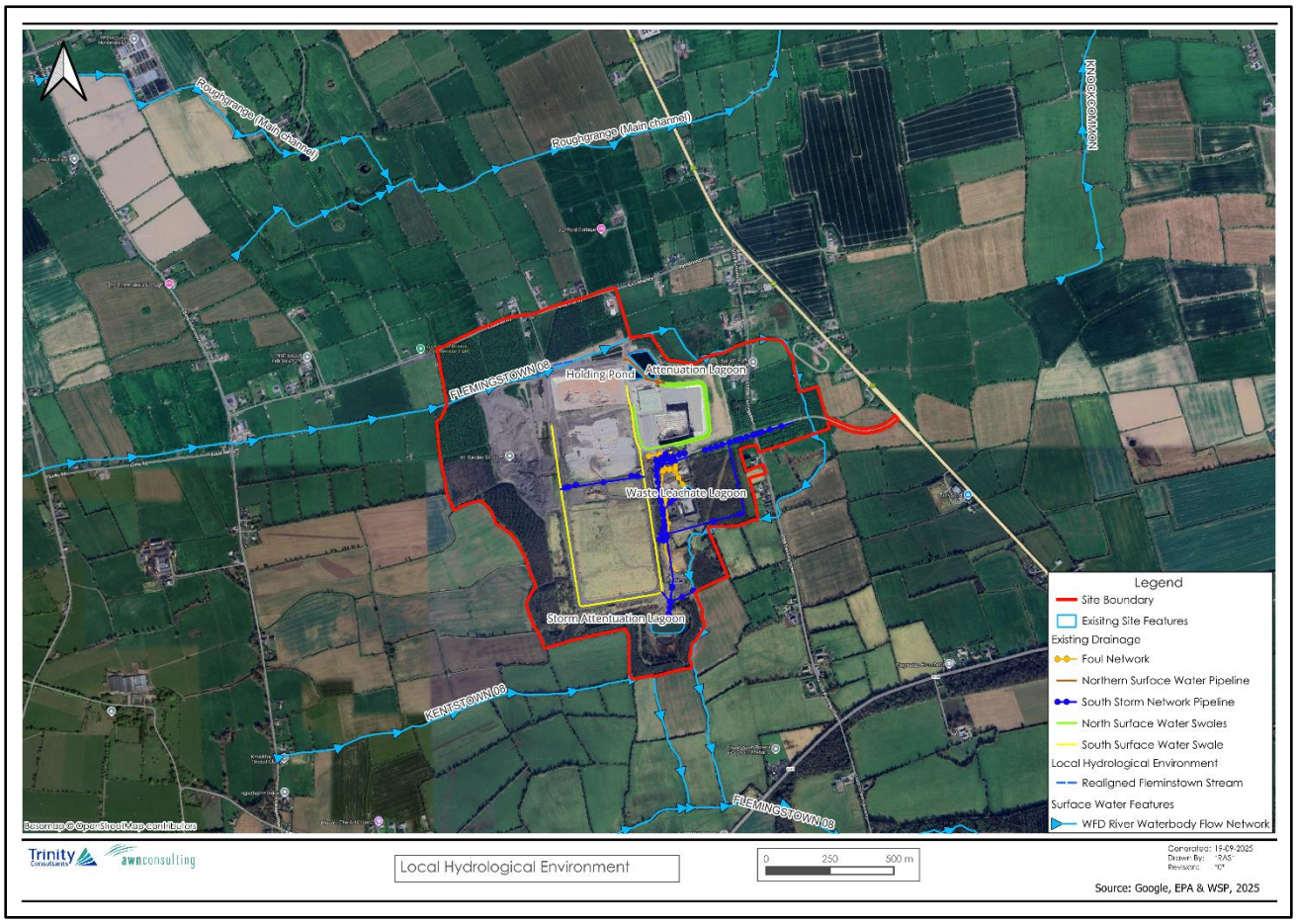


6.3.2.2 Local Hydrological Environment

Figure 6-6 presents the local hydrological environment on and around the site. The Knockharley Stream transverses the northern section of the site, flowing in a easterly direction before turning south and transverses the south section of the site, passing through the Balrath Woods pNHA downstream of the landfill before discharging to Nanny [Meath]_SC_010 (European Code: IE_EA_08N010280) c.2.8km south of the site. The onsite attenuation pond discharges through a wetland to Knockharley Stream.

A second tributary, the Kentstown Stream flows east along the southern licensed boundary before turning south and joining the Veldonstown Stream, just upstream of its confluence with the Knockharley Stream

Figure 6-6. Local Hydrological Environment



The current surface water infrastructure system (ref Figure 6-6) on the landfill site is split into two catchments, the northern catchment system, which includes a holding pond, the northern attenuation pond and wetland, and the southern catchment system which includes the southern attenuation pond and wetland. The proposed development will continue to drain to both these catchments for surface water management.

Swales are vegetated channels over which flows are conveyed at low non-erosive velocities to store and convey run-off and remove any collected pollutants. The existing swales drain collected rainwater run-off from capped areas of the landfill and the perimeter of the landfill footprint, IBA cell footprint and embankments surrounding the cells. These swales are of approximate depth 600 mm with a bottom width of 1000 mm and side slopes of 1 in 3. As the landfill cells develop further, the surface water swales will continue to be constructed around the landfill footprint and embankments.

Surface water from the landfill footprint is drained via the main landfill perimeter swale to a purpose-built storm water attenuation pond and constructed wetland to the south of the site – known as the southern attenuation pond and wetlands. Surface water runoff from roads and hard standing areas discharge to a surface water trunk main collection pipe. This surface water trunk is located on the eastern side of the perimeter access road and runs between the administration building to the southern surface water attenuation pond. This below ground pipe main varies from 225 mm diameter up to 750 mm diameter. There is also a 450 mm diameter spur from this pipe main to the north of the permitted C&D Fines Treatment Facility building which runs from east to west and turns north to receive runoff from the main site access road. The pipe discharges to an existing attenuation pond and wetland at the south of the site, via a Class 1 bypass proprietary oil/water separator. This petrol interceptor treats any accidental discharge of hydrocarbons within stormwater run-off prior to stormwater run-off discharging to the attenuation pond and further treatment provided by a wetland.

Surface water from the IBA cells and adjacent screening berm to the east is drained via the perimeter swales adjacent to these features to a purpose-built attenuation pond, holding pond and wetlands to north of the IBA cells and to the northeast of the existing landfill footprint – known as the northern attenuation pond, holding pond and wetlands.

A system of leachate drains exists above the liner collecting leachate, which is pumped to a lined leachate lagoon, which is disposed of to a treatment facility off site. A network of foul drainage collects foul waste from the existing buildings and is treated in the biotreatment plant on site prior to discharge into the waste leachate lagoon which is then Tankered offsite for further treatment.

6.3.3 Bathing Waters and Recreational Waterbodies

A review of the Environmental Protection Agency's (EPA) online mapping that includes the Register of Protected Areas (RPA) under the Water Framework Directive (WFD) has shown that there are no Recreational Waters or Bathing Waterbodies located in the vicinity of the site. The nearest bathing waterbody is Laytown/Bettystown (BW ID: IEEABWC020_0000_0700) located c. 19km east of the site and has an indirect hydrological connection through River Nanny and Nanny Estuary.

6.3.4 Surface Water Quality

6.3.4.1.1 Regional Surface Water Quality

The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2027. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. In 2009 the first River Basin Management Plan (RBMP) 2009-2015 was published. The second cycle river basin management plan was carried out between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland (Dept. of Housing Local Government & Heritage, Sept 2024) has since been published.

During the development of this plan, a prioritisation exercise was undertaken by the local authorities, the EPA and other stakeholders to identify those water bodies that require immediate action within this plan cycle to 2027. During the catchment characterisation, the EPA has carried out an analysis of the likely water quality outcomes that may be achieved as a result of the measures outlined in the third-cycle River Basin Management Plan. The analysis forecasts the number of water bodies that are likely to achieve their 2027 status objectives, and those that are likely to show improvements, so that an assessment can be made of the gap to achieving Water Framework Directive (WFD) environmental objectives. The forecast analysis is a snapshot in time based on the best available information on the measures being implemented as of September 2023. It depends on assumptions being made about how the measures in the plan will be implemented, for example, where measures are voluntary. Improved information on the measures being implemented will allow the forecasts to be further refined over time. The 2021 characterisation assessment identified there were 2,610 water bodies, out of a total of 4,842 water bodies (54%), which had met their objectives. These water bodies require ongoing basic measures to protect water quality. Of the remainder, 1,649 (34% of the total) were categorised as being 'At Risk' of not achieving their objectives and had evidence available to determine the water quality issue(s) and the pressure(s) that needs to be addressed. These water bodies are prioritised in the Plan for measures to restore water quality. The other 583 water bodies are in 'Review', which means additional evidence is required to confirm the nature of any water quality issues and the impacts from any relevant pressures.

The third cycle river basin management plan (2022-2027) i.e. "Water Action Plan 2024 - A River Basin Management Plan for Ireland" has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the proposed development. Refer to Appendix 6.3 for WFD assessment.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations and are included in section 6.2.1.

The Knockharley Stream, the Kentstown stream and the Veldonstown Stream belong to the River Nanny [Meath] _SC_010 WFD surface waterbody (European Code: IE_EA_08N010280). The Nanny [Meath]_SC_010 WFD surface waterbody has a most recent WFD surface water status (WFD Period: 2016-2021) of '*Poor*' as shown in Figure 6-7 and its current WFD risk score (3rd risk cycle) of '*At risk*' of not achieving good status. The EPA have identified that the '*Poor*' status is related to its ecological status or potential, biological status or potential and supporting chemistry conditions. The most recent EPA Sub-Catchment Assessment (December 2018) carried out by the EPA on the Nanny [Meath]_SC_010 Sub-Catchment states the main pressure identified on the Nanny [Meath]_SC_010 WFD surface waterbody is from agriculture, hydromorphology, industry and urban waste water, likely attributing to the poor ecological and biological status or potential, particularly invertebrate status or potential.

Surface water quality is monitored periodically by the EPA at various regional locations along with principal and other smaller watercourses. The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality.

In relation to the proposed development site, the operational EPA quality monitoring station point in closest proximity to the site are 'as follows and presented in Figure 6-7:

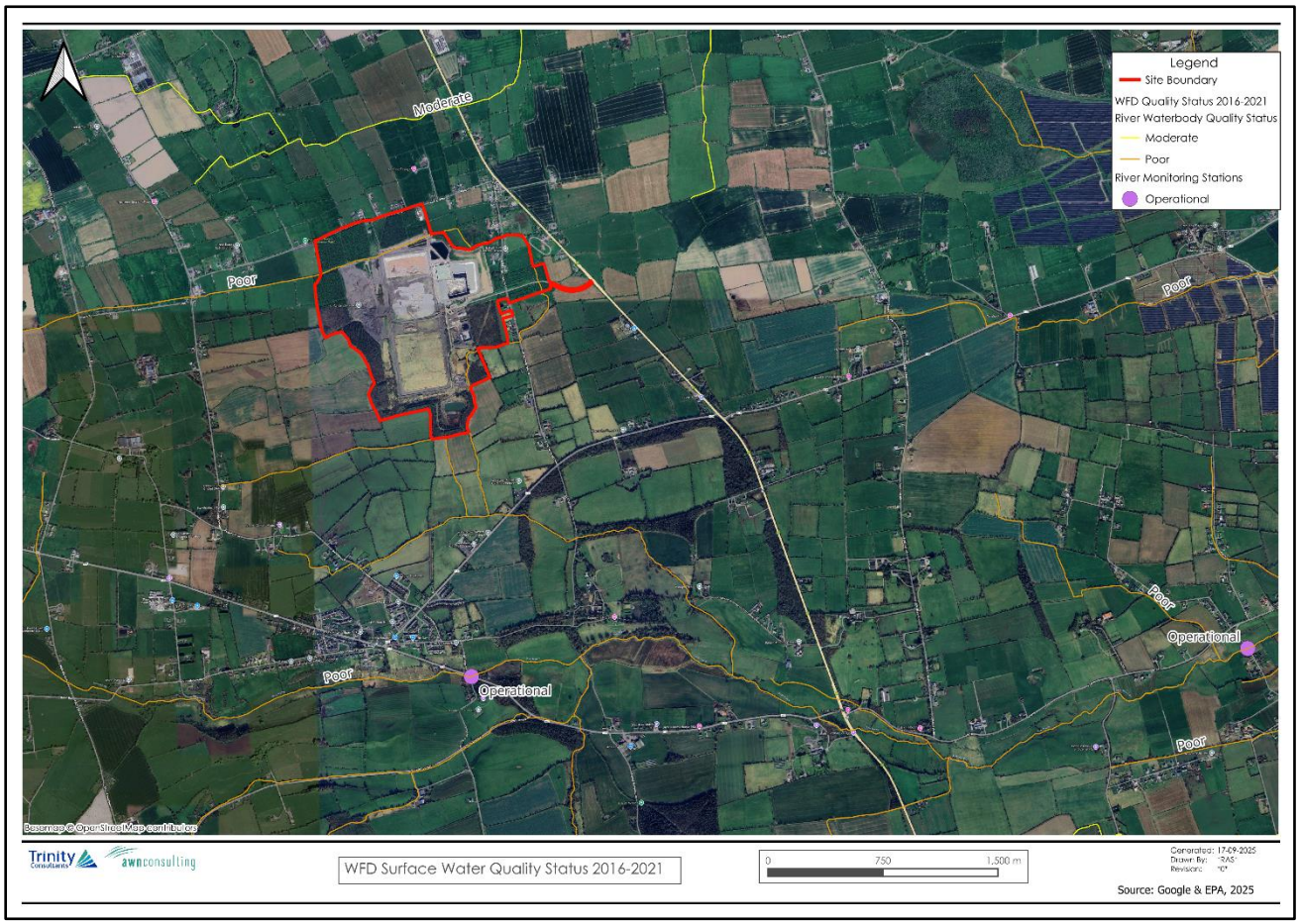
- River Nanny (Meath)- East Bridge Kentstown (Station Code: RS08N010110), located c. 1.6km south (linear distance) upstream of the site. However, this monitoring station is upstream of the discharge point of Flemingstown Stream. The most recent Q Value Score recorded at this station is in 2024 is 'Q3', which denotes a 'Poor' WFD status and moderately polluted pollution status and unsatisfactory conditions.

- River Nanny (Meath)- Bridge Downstream of Nanny bridge (Station Code: RS08N010280), located c. 5.3 km south (linear distance) and c. 6.5km downstream of the site. The most recent Q Value Score recorded at this station is in 2024 is 'Q3-Q4', which denotes a 'Moderate' status and slightly polluted status and unsatisfactory conditions.

Table 6-1. EPA Biological Q Rating System

Q Value	WFD Status	Pollution Status	Condition
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2	Bad	Seriously polluted	Unsatisfactory

Figure 6-7. WFD Surface Waterbody Status 2016-2021 and EPA River Monitoring Stations



6.3.4.2 Local Surface Water Quality

A summary of local water quality is provided based on an analysis of trended water quality data which has been collected as part of the licence requirements as stated in section 6.3.1. Water quality is currently monitored by the license holder on a quarterly basis at 9 locations at Knockharley Landfill. Emission limit values have been conditioned in the licence for the two discharge points (SW9 and SW10) set out under licence condition D.1 of the existing Industrial Emissions (IE) Licence, W0146-02 along the Knockharley and Kentstown stream. This data is reported in the annual environmental reports (AERs).

Monitoring data for last 5 years was analysed to establish range and trend of parameters which are monitored under the licence requirements. The parameters were screened against the ELV's established in 2023, however, in the absence of ELV for certain parameters, the results were compared against the baseline range,

The Licence specifies nine monitoring locations (SW-1, SW-2, SW-3, SW-5, SW-6, SW-7, SW-8, SW-9 (Wetland), SW-10 and SW-11) as shown in Figure 6-8. Sampling points SW-1, SW-2 and SW-3 are upstream of the facility, SW-5 and SW-6 are side-on to the facility and SW-7, SW-8 and SW-11 are downstream of the facility. SW-9 is the discharge point from the wetland in the south of the site discharging to the Knockharley Stream. SW-10 is a new discharge point from a northern surface water lagoon and wetland that was constructed during Q1 2025. Sampling did not take place from SW-10 in Q1 2025 as water was not discharging from site via SW-10 at the time of sampling.

Figure 6-8. Surface water Monitoring Locations (OCM, 2025)



The results are screened against the Emission Limit Values (ELVs) set out in Schedule B.2 of the License as presented in Table 6-2 below. The ELV's were established in 2023 as part of the licence revision prior to that all results were measured against baseline range. The baseline surface water quality was established during previous monitoring events including sampling rounds carried out prior to waste acceptance on site, refer to Table 6-3.

Table 6-2. Emission Limit Values

B.2 Emissions to Water

Emission Point Reference No:	SW9 SW10
Name of Receiving Waters:	Knockharley Stream (Flemingstown River, IE_EA_08F050930 /08_226)
Location:	SW9 (297587E, 266621N) SW10 (To be determined)
Volume to be emitted:	SW9 Maximum in any one day: 24,581 m^3 SW9 Maximum in any one hour: 1,024 m^3 SW10 Maximum in any one day: 22,032 m^3 SW10 Maximum in any one hour: 918 m^3

Parameter	Emission Limit Value	
pH	6.0 – 9.0	
Toxicity	10 TU	
	SW9 Emission Limit Value mg/l	SW10 Emission Limit Value mg/l
BOD	2.6	2.6
Total Suspended Solids	15	25 Note 1
Total Ammonia (as N)	0.14	0.14
Orthophosphate (as P)	0.075	0.075
Arsenic Note 2	0.025	0.025
Cadmium Note 3	0.0009	0.0009
Chromium III	0.032	0.032
Chromium VI Note 2	0.0034	0.0034
Copper Note 2	0.03	0.03
Lead Note 3	0.014	0.014
Nickel Note 3	0.034	0.034
Mercury Note 3	0.00007	0.00007
Zinc Note 2	0.1	0.1
Sulphate	400	400

Table 6-3. Baseline Surface Water Quality

Parameter	Units	SW-1	SW-2	SW-3	SW-5	SW-6	SW-7	SW-8
pH	units	7.94 - 8.20	7.7 - 8.44	7.54 - 7.98	7.61 - 8.07	7.6 - 8.06	7.42 - 8.37	7.63 - 8.02
Conductivity	µS/cm	613 - 730	653 - 682	593 - 688	549 - 726	625 - 698	590 - 694	662 - 720
Chloride	mg/l	21 - 31	23 - 56	29 - 36	29 - 35	28 - 33	24 - 36	30 - 54
Ammoniacal Nitrogen	mg/l	<0.2 - 0.6	<0.2	<0.2 - 1.1	<0.2 - 0.5	<0.2 - 0.5	<0.2 - 1.7	<0.2 - 0.4
BOD	mg/l	<2 - 2	<2 - 12	<2 - 5	<2 - 4	<2 - 3	<2 - 3	<2 - 3
COD	mg/l	<15 - 41	<15 - 25	<15 - 46	<15 - 43	<15 - 41	<15 - 29	<15 - 31
TSS	mg/l	<10 - 48	<10 - 46	<10 - 34	<10	<10 - 11	<10 - 10	<10 - 15
DO	mg/l	5.3 - 9.4	4.7 - 8.9	5.1 - 8.6	4.4 - 8.4	5.0 - 8.9	5.0 - 8.7	4.6 - 8.5

Table 6-4. Continuous Monitoring Trigger Levels

Trigger Level/Criteria	pH	TOC (mg/l)	Conductivity (us/cm)
	5.5-9.5	20	2100

6.3.4.2.1 Water quality trends at discharge from Southern Attenuation Pond.

Water quality trend graphs (from 2021 to current) for representative parameters are presented in the Appendix 6.5 and the data demonstrates no overall impact on receiving water quality. As part of the ongoing monitoring, trend graphs starting in 2021 to assess the trend of the parameters for quarterly parameters with (ELVs) at the surface water discharge point (SW-9). These include pH, sulphate, ammonia, BOD and Total Suspended Solids (TSS). Trend graphs have also been prepared for parameters measured by continuous monitoring at the surface water lagoon inlet point, including average, maximum and minimum trends.

Below is the summary of the parameters trending between 2021 to 2025.

The pH levels at all monitoring location were in compliance with the ELVs between 2021 and 2025.

Sulphate was analysed annually up until Q3 2023 which was amended to quarterly monitoring during the license revision in 2023. In Q4 2021 the concentration exceeded the ELV's set in 2023 at SW6 and SW9. However, at the time no ELV were established at the time. Hence the incident was not reported as an exceedance. Furthermore, the sulphate concentrations for Q1 of 2022 were in compliance with the ELV's. The sulphate concentration exceeded the ELV's at SW9 in Q1 of 2025 however the exceedance was within 1.2 times of the ELV. Hence the exceedance was not reported to the EPA and the sulphate concentrations at SW9 in Q2 were in compliance with the ELV. No other exceedances for sulphate were recorded at any other monitoring locations and the results continue to show a downward trend.

The ammonia concentrations at all monitoring points were in compliance with the ELV's between 2021 and 2025 with the exception of the result at SW9 in Q3 of 2023. The likely cause noted in the incident report by EPA to be sampling error, or contamination by local wildlife and considered to be caused by the facility. The incident was reported to the EPA and was closed after the concentrations were in compliance with the ELV during Q4 sampling. The results since Q3 2023 are in compliance with the ELV's.

The BOD concentrations have exceeded the ELV's set in Q3 2023 on 5 occasions between 2021 and 2025. The exceedances were recorded in Q4 of 2022 at SW2, SW5, SW7, SW8 AND SW9. The incident was not reported to the EPA since at the time of monitoring the ELV's were not set for this parameter. However, the concentrations were recorded at 3mg/l against the ELV of 2.6mg/l. The exceedances recorded in Q4 of 2023 were identified at SW5, SW8 and SW9, in Q1 of 2024 at SW1, SW3, SW5, SW6 AND SW8 while in Q2 of 2024 at SW3, SW5 and SW6. The incident was reported to EPA but no likely cause was determined and the incident was closed in December of 2024 after the results for BOD were in compliance with the ELV's in Q3 and Q4 of 2024.

TSS has not exceeded the ELV over the monitoring period. TSS has not been detected since Q1 2022, therefore there is a downward trend over the monitoring period.

The TOC concentrations in the continuous monitoring at the surface water inlet to the lagoon did not exceed the trigger levels but show an increasing trend over the monitoring period.

The conductivity concentrations in the continuous monitoring at the surface water inlet to the lagoon did not exceed the trigger levels and show a decreasing trend over the monitoring period.

Dissolved Oxygen levels were broadly similar upstream and downstream of the facility between 2021 and 2025 and are within typical ranges for surface waters.

There are also ELV's for the annual parameters arsenic, cadmium, chromium III, chromium IV, copper, lead, mercury, nickel, zinc and orthophosphate (PO4). The ELV's for all the parameters mentioned above has been in compliance between 2021 and 2025 and are typically at concentrations that are below the laboratory's limit of detection (LOD).

6.3.4.2.2 Continuous Monitoring

As per Condition 6.13 and Schedule C.2.2 of the Licence, continuous monitoring is carried out at the surface water lagoon inlet at the northern pond. The criteria/trigger levels that determine when the automated penstock in the outlet from the surface water inlet to the wetland inlet is closed are pH, electrical conductivity and Total Organic Carbon (TOC). These parameters are continuously monitored and recorded by the Supervisory Control System on site. There were no exceedances of the continuous monitoring trigger levels during the monitoring carried out between 2021 and 2025.

6.3.5 Surface Water Public Water Supplies

A review of the Environmental Protection Agency's (EPA) online mapping, which includes the Register of Protected Areas (RPA) established under the Water Framework Directive (WFD), indicates Nanny [Meath]_SC_010 and its two tributaries namely Knockharley and Kentstown stream are not located within a designated Surface Water Drinking RPA. This classification of drinking water river lines has been delineated in accordance with the S.I. No. 99/2023 – European Union (Drinking Water) Regulations 2023. This regulatory framework aims to ensure the protection of water resources utilised for human consumption, thus safeguarding public health and the environment.

6.3.6 Flood Risk

The EU Floods Directive (2007/60/EC) required Member States to undertake a national preliminary flood risk assessment by 2011 to identify areas where significant flood risk exists or might be considered likely to occur. Members States were also required to prepare catchment-based Flood Risk Management Plans by 2018 that will set out flood risk management objectives, actions and measures. The OPW in co-operation with various Local Authorities produced a number of PFRAs which aimed to map out current and possible future flood risk areas and develop risk assessment plans. As part of the CFRAM programme provisional flood maps had been produced by the OPW which have been used in this assessment.

A Stage 1 Flood Risk Assessment (FRA) has been undertaken for the proposed development site by AWN Consulting in August 2025. Refer to Appendix 6.4 for the Flood Risk Assessment.

The purpose of the Stage 1 Flood risk identification process is to establish whether a flood risk issue currently exists or may exist in the future. The OPW CFRAM online mapping was consulted to consider the risk of flooding for the site. The Meath County Development Plan 2021-2027 – Strategic Flood Risk Assessment (SFRA, 2023-2029) has been reviewed and incorporated as part of the flood risk assessment.

In relation to the proposed development site, based on Stage 1 Flood risk identification findings the following conclusions can be drawn:

- The GSI groundwater flooding website was consulted however there were no groundwater related flooding illustrated on or near the proposed development site.
- The proposed development is located approximately 21km upstream from the nearest transitional/coastal waterbody on the River Nanny (Nanny Estuary). The proposed layout is therefore outside any coastal/tidal influence and the risk of coastal flooding can be considered low.
- The potential risk of flooding from surface water would arise from the accumulation of rainfall runoff across the site and the surrounding areas. The past flood events map created by the OPW does not present historical flood locations associated with the proposed layout. Small areas of indicative pluvial flooding are noted at the site and these areas are currently addressed by the existing surface water drainage in the landfill.
- The OPW mapping portal (www.floodinfo.ie) includes mapping showing the extent of the predicted Flood Zone A (1% AEP event) and Flood Zone B (0.1% AEP event) in the Study Area. The mapping was developed by hydraulic modelling during the CFRAM projects undertaken for the OPW and is in line with the Meath County Development Plan 2021-2027 Strategic FRA. A Flood Zone B area is indicated in the permitted landfill area, associated with the existing northern attenuation pond as well

as a Flood Zone A in its southern area associated with the existing wetland. However, part of the Flood zone B is now covered by the cell 25-26, therefore the extent of this zone may be obsolete. The Flood Risk Assessment prepared by the applicant as part of the 2021 Extent application in relation to Environmental Impact Assessment Report (EIAR) for the Proposed Development At Knockharley Landfill. Appendix 12.5. Flood Risk Assessment. Fehily and Timoney, November 2018. This process estimated a 1:1000-year compensation flood footprint that replaces the Flood Zone B initially estimated by the CFRAM projects

The conclusions of Stage 1 flood risk assessment are presented below.

- The assessment has identified that the proposed layout is located primarily in Flood Zone C. However, Flood Zones A and B extents are present within the site, associated with the existing northern settlement pond and southern wetland, respectively. Following the required Justification Test as required under DECLG/OPW Guidelines, it is concluded that no residual risk is foreseen as the proposed development will not affect the existing hydrological, morphological and hydraulic conditions that define the aforementioned Flood Zones.
- The proposed drainage system has been designed to accommodate the 1% AEP plus 20% increase due to climate change during operation and 30% post closure. The proposed layout will also have capacity to control and attenuate the 0.1% AEP event without additional flooding risk.
- The risk from pluvial, coastal and groundwater sources is considered low.

6.3.7 Designated Sites

The NPWS (2025) on-line database have been reviewed to determine the location of areas of conservation within proximity to the proposed development site, and there are no Special Protected Areas (SPA) established under the EU Birds Directive (79/409/EEC), or Special Areas of Conservation (SAC) established under the Habitats Directive on or within the boundary of the site. Furthermore, there are no Natural Heritage Areas (NHA), or proposed Natural Heritage Areas (pNHA) established under the Wildlife Acts, 1976 and 2000 (as amended).

The European site in closest proximity of the site is as follows:

- The River Boyne and River Blackwater SAC (Site Code: 002299) and SPA (Site Code: 004232), located c. 4.5km north (linear distance).

However, the proposed development has no hydrological pathway/connection to the River Boyne and River Blackwater SAC.

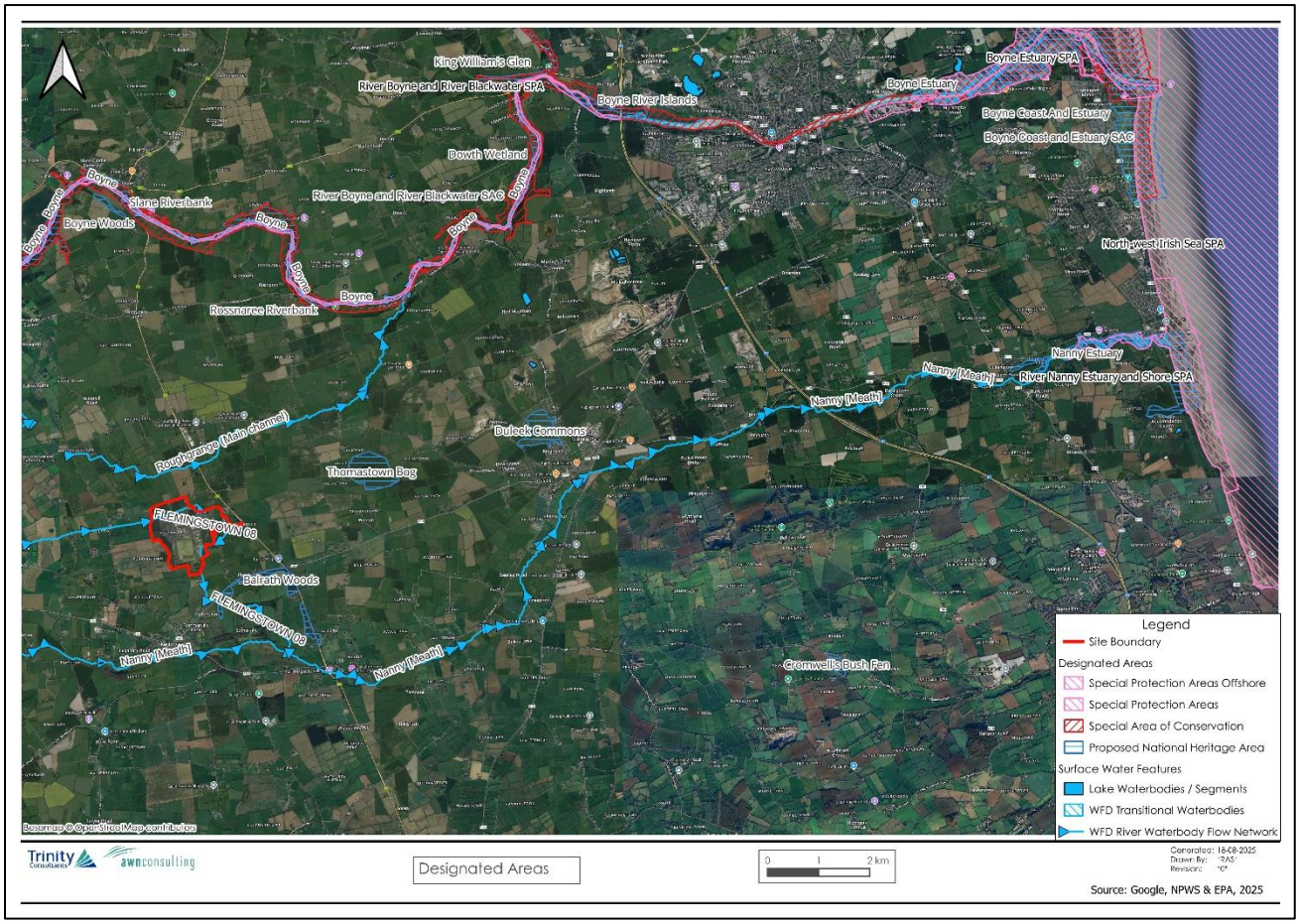
Other designated sites with hydrological connectivity to the proposed development are as follows:

- Balrath Woods pNHA (Site Code: 001519) located c. 550m south (linear distance) and c.800m downstream from the site. The pNHA has a direct hydrological connection through Knockharley Stream which transverses the pNHA before flowing in a south early direction and discharging to the River Nanny.

- The River Nanny Estuary and Shore SPA and North-west Irish Sea SPA lie approximately 22km and 27.8km downstream from the proposed development, respectively.

Refer to Figure 6-8 below for location of the River Boyne and River Blackwater SAC (Site Code: 002299) and SPA (Site Code: 004232) and the Balrath Woods pNHA (Site Code: 001519), River Nanny Estuary and Shore SPA (Site Code: 004158), North-west Irish Sea SPA (Site Code: 004236) and the hydrological connectivity in the context of the site. Further assessment is provided in the EIAR Chapter 7 Biodiversity.

Figure 6-9. Designated Sites (NPWS, 2025)



6.3.8 Rating of Importance of Hydrological Attributes

Based on the review of the receiving environment undertaken (Section 6.3.1 through Section 6.3.8) and based on the TII methodology (2009) (See Appendix 6.2), the importance of the hydrological features at this site can be rated as '*Medium*' importance with medium quality or value on a local scale, due to the status of the river waterbodies in the vicinity of the site (i.e. Knockharley Stream, Kentstown Stream and the River Nanny [Meath]_SC_010) which are classified as '*Poor*' by the WFD and are '*At Risk*' of not achieving a good status (WFD Period: 2016-2021) and the hydrological pathway to the Balrath Woods pNHA

6.3.9 Hydrogeology

6.3.9.1 Aquifer Classification

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater transmissivity (mm^3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

The GSI (2025) classifies the principal aquifer types in Ireland as:

Bedrock Aquifer

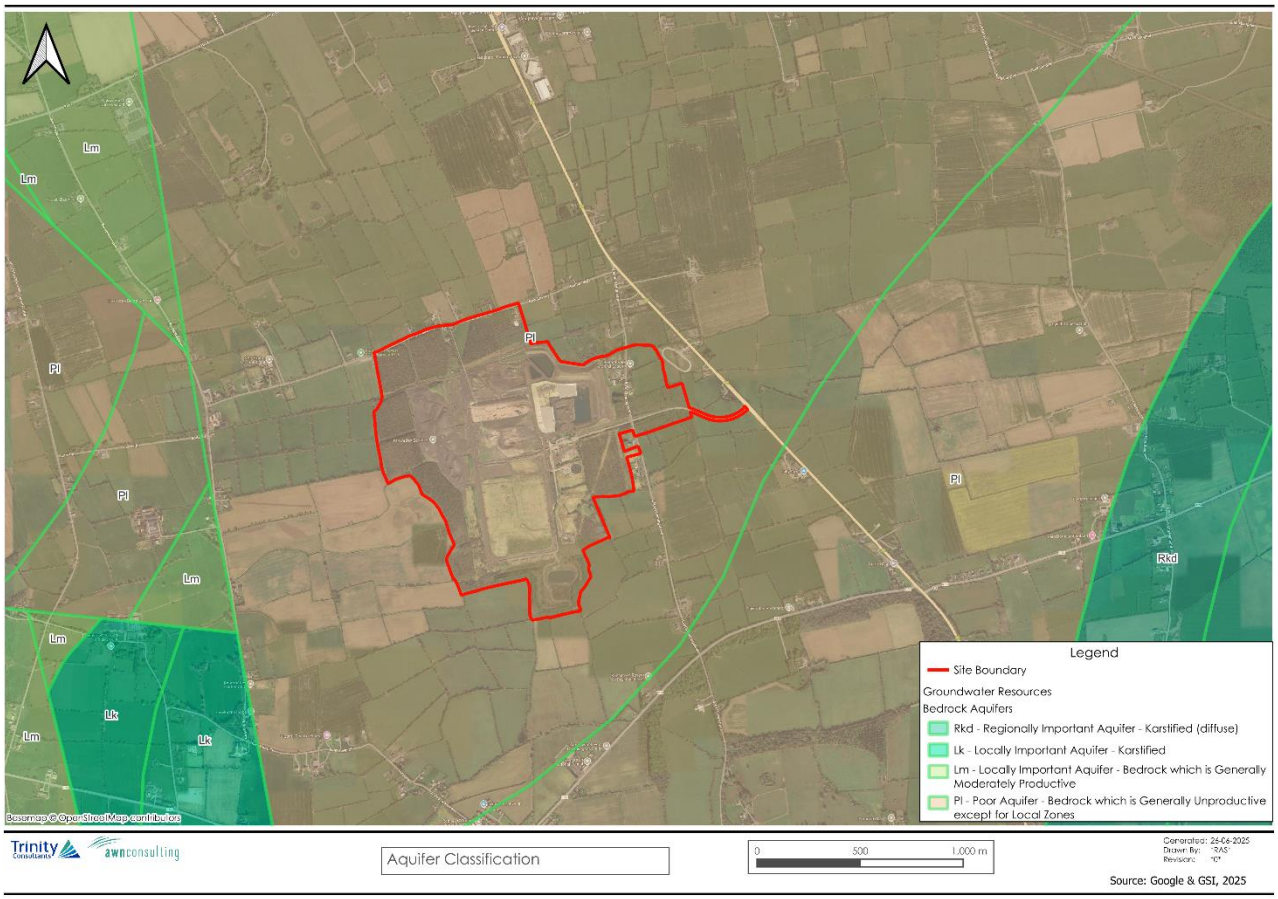
- Rkc – Regionally Important Aquifer – Karstified (conduit)
- Rkd – Regionally Important Aquifer – Karstified (diffuse)
- RK – Regionally Important Aquifer – Karstified
- Rf – Regionally Important Aquifer – Fissured bedrock
- Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive
- Lk – Locally Important Aquifer – Karstified
- LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones
- PI – Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones
- PU – Poor Aquifer – Bedrock which is Generally Unproductive

Gravel Aquifer

- Lg - Locally Important Aquifer - Sand & Gravel
- Rg - Regionally Important Aquifer - Sand & Gravel

The bedrock aquifer underlying the proposed development site, according to the GSI (www.gsi.ie/mapping) National Draft Bedrock Aquifer Map, is classified as a "*Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones*" as presented in Figure 6-10. The potential for vertical or horizontal migration within this type of aquifer is not significant and on local scale. The GSI map does not identify structural faults underneath the area of the subject site.

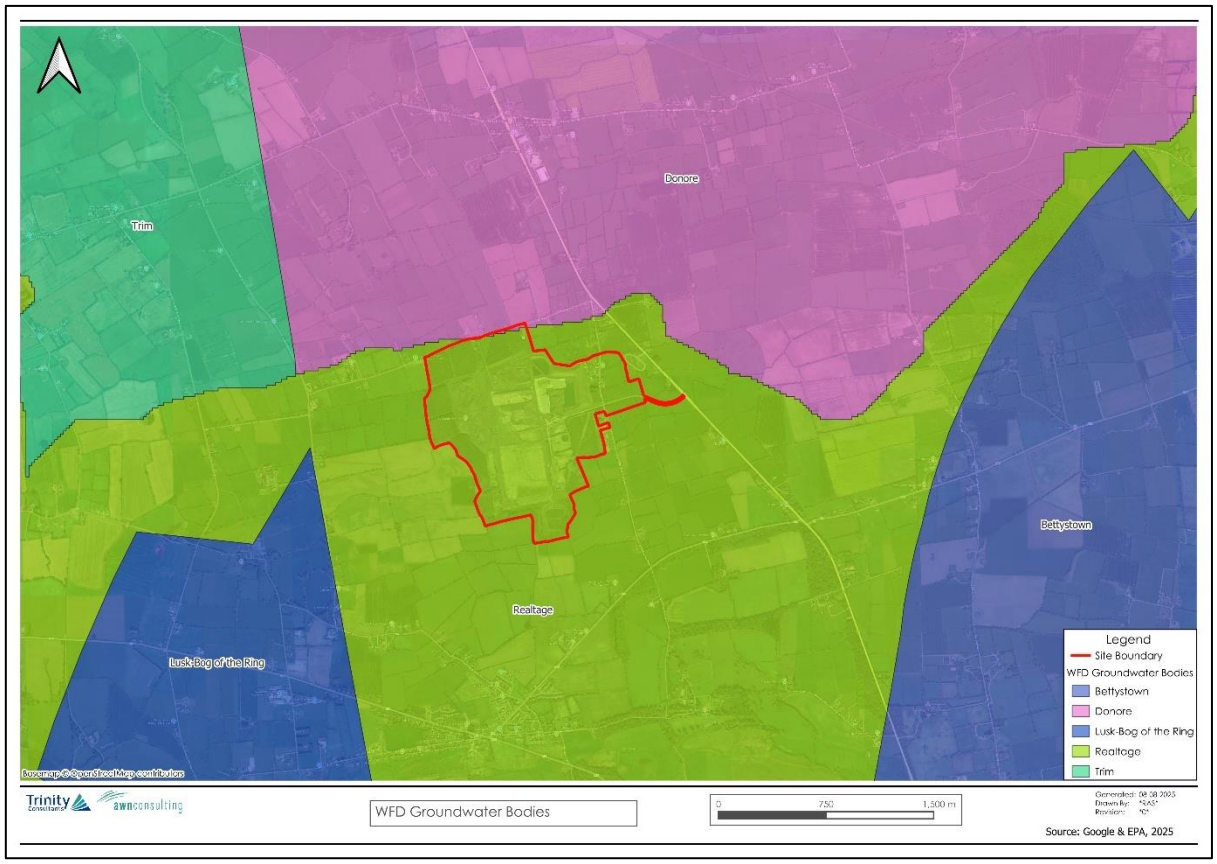
Figure 6-10. Aquifer Classification (GSI, 2025)



6.3.9.2 Groundwater Bodies

The Groundwater Body (GWB) underlying the site is Realtage GWB (European Code: IE_EA_G_020). Refer to Figure 6-11 below which indicates the groundwater bodies in the region / context of the site.

Figure 6-11. WFD Groundwater Bodies (EPA, 2025)



Realtage groundwater body (GWB): According to GSI (2004), The dominant subsoil lithology overlying this GWB is till, mainly derived from Namurian sediments, although some limestone-derived tills are seen closer to the contact with the limestone. There are smaller areas of alluvium and gravel deposits along the River Nanny floodplain. recharge will occur via rainfall percolating through the subsoil. The GWB is composed primarily of low permeability rocks, although localized zones of enhanced permeability do occur. Recharge occurs diffusely through the subsoils and via outcrops. It takes place mainly in the upland areas where subsoils are thinner and more permeable. The aquifers within the GWB are generally unconfined, but may become locally confined where the subsoil is thicker and/or lower permeability. Most flow in this aquifer will occur near the surface. In general, the majority of groundwater flow occurs in the upper 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep-water strikes in more isolated faults/ fractures can be encountered at 30-50 mbgl. Flow path lengths are relatively short, and in general are between 100 and 500 m. Groundwater discharges to the numerous small streams crossing the aquifer, and to the springs and seeps.

Based on the most recent data (www.epa.ie), Realtage GWB (European Code: IE_EA_G_020) for which the site is located entirely within, has a WFD status of "Good" (WFD Period: 2016-2021) and a WFD risk score (3rd Cycle) of "Not at Risk" of not achieving good status, meaning it has achieved its objectives and the overall status is considered good. However, the site also lies on the boundary of Donore GWB (European Code: IE_EA_G_021) which also has been assigned a WFD status of "Good" (WFD Period: 2016-2021) and a WFD risk score (3rd Cycle) of "Not at Risk" of not achieving good status. This" Good'"

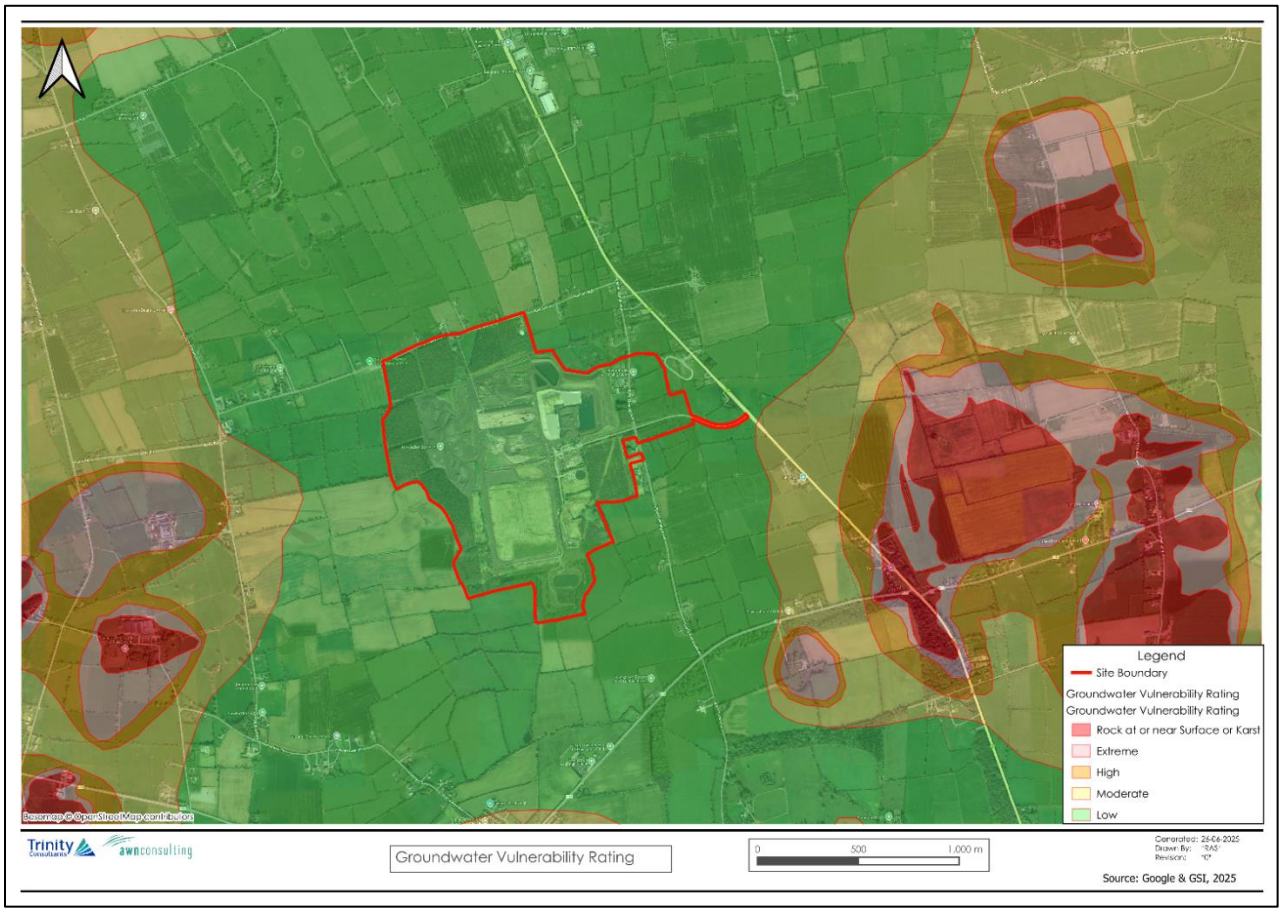
status is related to the overall groundwater status i.e. quantitative groundwater status and chemical groundwater status.

6.3.9.3 Aquifer Vulnerability

Groundwater vulnerability is an indication of how easily the aquifer can become contaminated by human activity. It is dependent on the thickness and permeability of the overlying soils and depth to the water table. For example, a bedrock aquifer with minimal thickness of overburden or with a thin layer of permeable overburden will be more vulnerable to contamination than a bedrock aquifer which has a thick layer of low permeability overburden. Extreme groundwater vulnerability is also associated with karst landforms as these are a direct pathway for water and contaminants to enter the aquifer from the surface.

The GSI presently classifies the groundwater vulnerability of the entire site as 'Low' vulnerability as shown in Figure 6-12. The GSI vulnerability classification is consistent with data obtained from the site investigations carried out by Ground Investigation Ireland (GII, 2025), at the proposed development site, where soft to stiff sandy gravelly glacial Clays with sand lenses were encountered. Bedrock was encountered at the site at depths ranging from 14.3m BGL at BH106S in the northeastern section of the proposed landfill extension, to 28m BGL at BH105S in the southern section of the proposed landfill extension.

Figure 6-12. Aquifer Vulnerability (GSI, 2025)



6.3.9.4 Ground Water Dependant Terrestrial Ecosystems (GWDTE)

No GWDTE has been identified in the vicinity of the proposed development. The Closest GWDTE is located c.6.5km east and is described as Alkaline Fen (ID: MF01_267).

6.3.9.5 Wells and Regional Flow Direction

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as under the European Union (Water Policy) (Abstractions Registration) Regulations 2018 (S.I. No. 261 of 2018), Water Environment (Abstractions and Associated Impoundments) Act 2022 and S.I. No. 419/2024 - Water Environment (Abstractions and Associated Impoundments) Regulations 2024 registration requirements, wells with abstraction volumes of 25m^3/day and above are obligated to register with EPA. Only 1no. registered well was identified with abstraction volume of 30m^3/day registered under Yellow Furze Nurseries Ltd (Reg no: R01646-1) for agricultural purposes (EPA, 2025). The well is located c.2km north of the proposed development site.

The current well index shows 14 no. boreholes are located within a 2km radius of the site. Figure 6-13 below presents the GSI well search for the area surrounding the proposed development site. To note the blue circles, show a 1 km radius circle around the individual well locations.

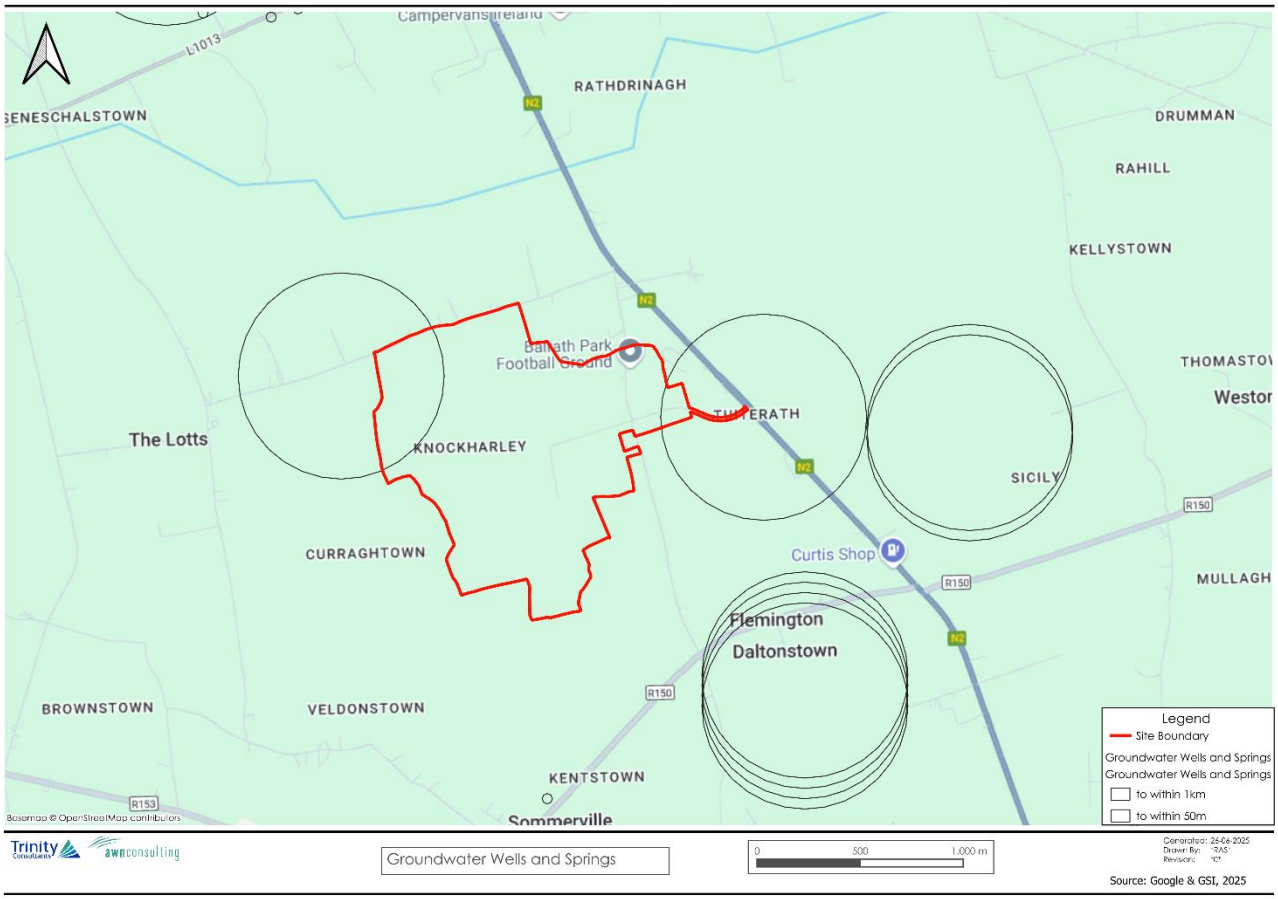
There are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas in the vicinity of the proposed development site.

The nearest Group Scheme Preliminary Source Protection area is Drybridge, located c. 12km north-east of the site. The nearest Public Supply Source Protection area is Slane PWS located c. 4.6km north of the site.

Neither of these areas share a hydrological or hydrogeological connection to the site and are located within separate Sub-Catchments i.e. Boyne_SC_130 (Sub-Catchment ID: 07_17) and Boyne_SC_110 (Sub-Catchment ID: 07_1), respectively.

Figure 6-12 below presents the GSI well search for the area surrounding the proposed development site. To note the blue circles, show a 1 km radius circle around the individual well locations.

Figure 6-13. Groundwater Wells & Springs (GSI, 2025)



From the GSI well card data presented in Table 6-3, it can be seen that the yield class ranges from predominately '*Poor*' to '*Moderate*'.

Table 6-5 GSI Well Card Data within 2km of the Site (GSI, 2025)

GSI Name	Type	Accuracy	Townland	Usage	Yield Class	Yield m3/d
2925NWW048	Dug well	to within 50m	Kentstown	Public supply		0
2925NWW012	Borehole	to within 50m	Painestown	Other		0
2925NWW017	Dug well	to within 50m	Painestown	Public supply	Poor	38
2925NWW020	Unknown	to within 50m	Kentstown	Unknown		0
2925NWW025	Dug well	to within 50m	Painestown	Public supply	Moderate	76
2925NWW026	Borehole	to within 1km	Painestown	Public supply	Moderate	76
2925NWW027	Borehole	to within 1km	Sicily	Unknown	Poor	32.7
2925NWW028	Borehole	to within 1km	Sicily	Domestic use only	Poor	14.2
2925NWW029	Borehole	to within 1km	Flemingstown	Agricultural & domestic use	Poor	32.7
2925NWW030	Borehole	to within 1km	Flemingstown	Agricultural & domestic use	Poor	21.8
2925NWW031	Borehole	to within 1km	Flemingstown	Agricultural & domestic use	Poor	32.7
2925NWW032	Borehole	to within 1km	Flemingstown	Unknown	Poor	24
2925NWW033	Borehole	to within 1km	Tuiterath	Unknown	Poor	11
2927SWW063	Borehole	to within 1km	Curraghtown	Unknown	Poor	27.3

The site is sloped with elevations generally ranging from 73 mOD in the northwest to 63 mOD in the southeast of the site. The groundwater flow direction likely follows the local topography to Knockharley and Kentstown Stream contributing to their baseflow and ultimately to River Nanny.

6.3.9.5.1 Local Groundwater Levels and Flows

As part of the license for the landfill, groundwater monitoring is required to be carried out on a quarterly basis since the landfill became operational. Based on the latest monitoring round, there were ten (10 No.) groundwater monitoring wells specified in the Waste Licence as presented in Figure 6-14 (MW-1d, MW-2d, MW-3d, MW-5d, MW-6d. MW-7d, MW-16d, MW-17d, MW-18d and MW-19d). The latest groundwater monitoring was undertaken on 5th of February (Q1) and 27th May (Q2) 2025. The groundwater levels are presented in Table 6-4 below.

Figure 6-14. Groundwater Monitoring Location Plan (OCM, 2025)

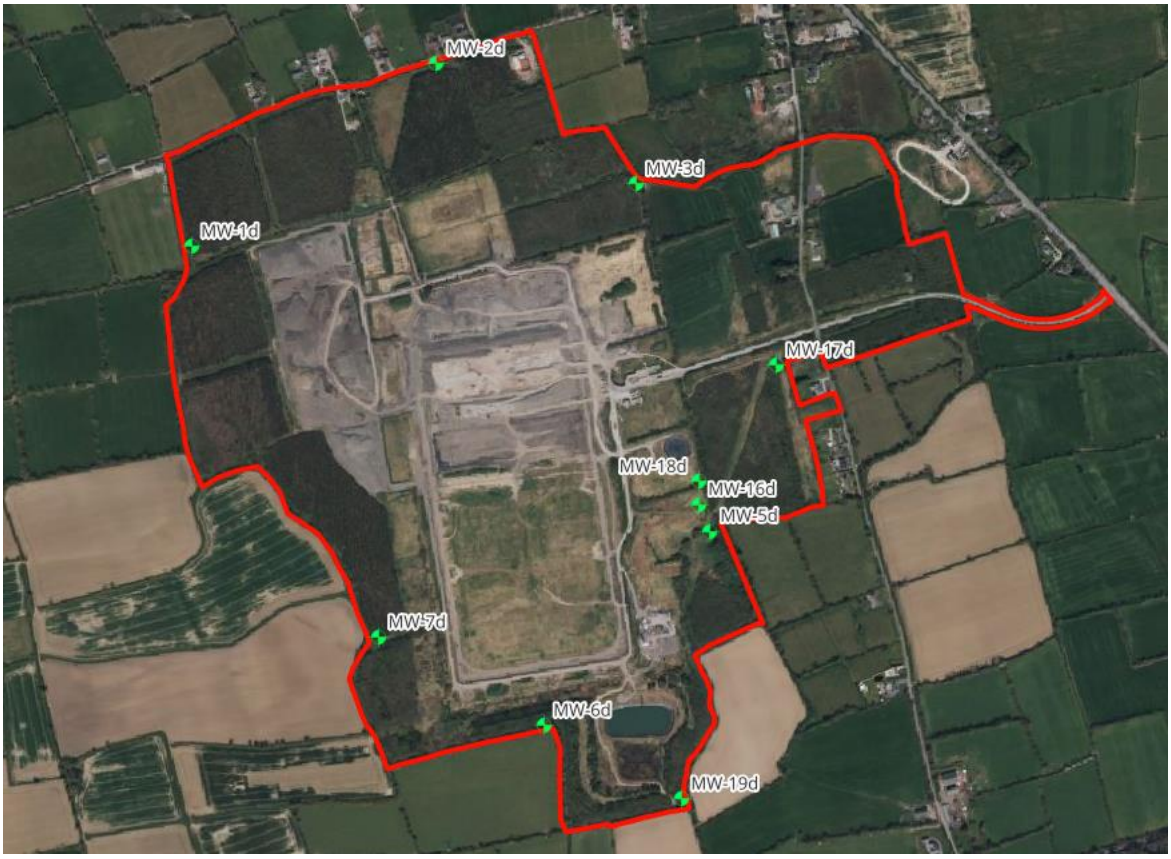


Table 6-6. Groundwater Levels in existing Monitoring Wells (OCM, 2025)

Well Reference	Top of Well Head	Q1 2025		Q2 2025	
	(mOD)	(mBTOC)	(mOD)	(mBTOC)	(mOD)
MW-1d	66.88	0.27	66.61	0.27	66.61
MW-2d	64.62	6.95	57.67	9.27	55.35
MW-3d	60.01	2.75	57.26	2.88	57.13
MW-5d	55.13	1.08	54.05	0.75	54.38
MW-6d	55.08	1	54.08	1.46	53.62
MW-7d	64.07	0.93	63.14	1.39	62.68
MW-16d	59.13	2.92	56.21	2.93	56.2
MW-17d	61.18	5.12	56.06	5.17	56.01
MW-18d	59.87	3.81	56.06	3.08	56.79
MW-19d	59.37	0.62	58.75	1.11	58.26

As part of the proposed landfill extension, an additional ground investigation was carried out by GII between May and July of 2025.

The scope of works included the following and presented in figure 6-15.

- 8 No. rotary core Geobore S boreholes to a maximum depth of 29.50m BGL
- 4 No. rotary core *DTH Symmetrix* boreholes to a maximum depth of 14.00m BGL
- Installation and development of twelve (12 No.) groundwater monitoring wells
- Completion of six (6 No.) falling head permeability tests
- Installation of eleven (11 No.) water level data loggers

The groundwater levels recorded across the boreholes within the newly installed wells are presented in Table 6-5. However, based on onsite observations carried out during the site investigation and falling head test, it was noted that these levels were still in recovery and groundwater levels have not completely stabilised.

Figure 6-15. Ground Investigation Location Plan (GII, 2025)

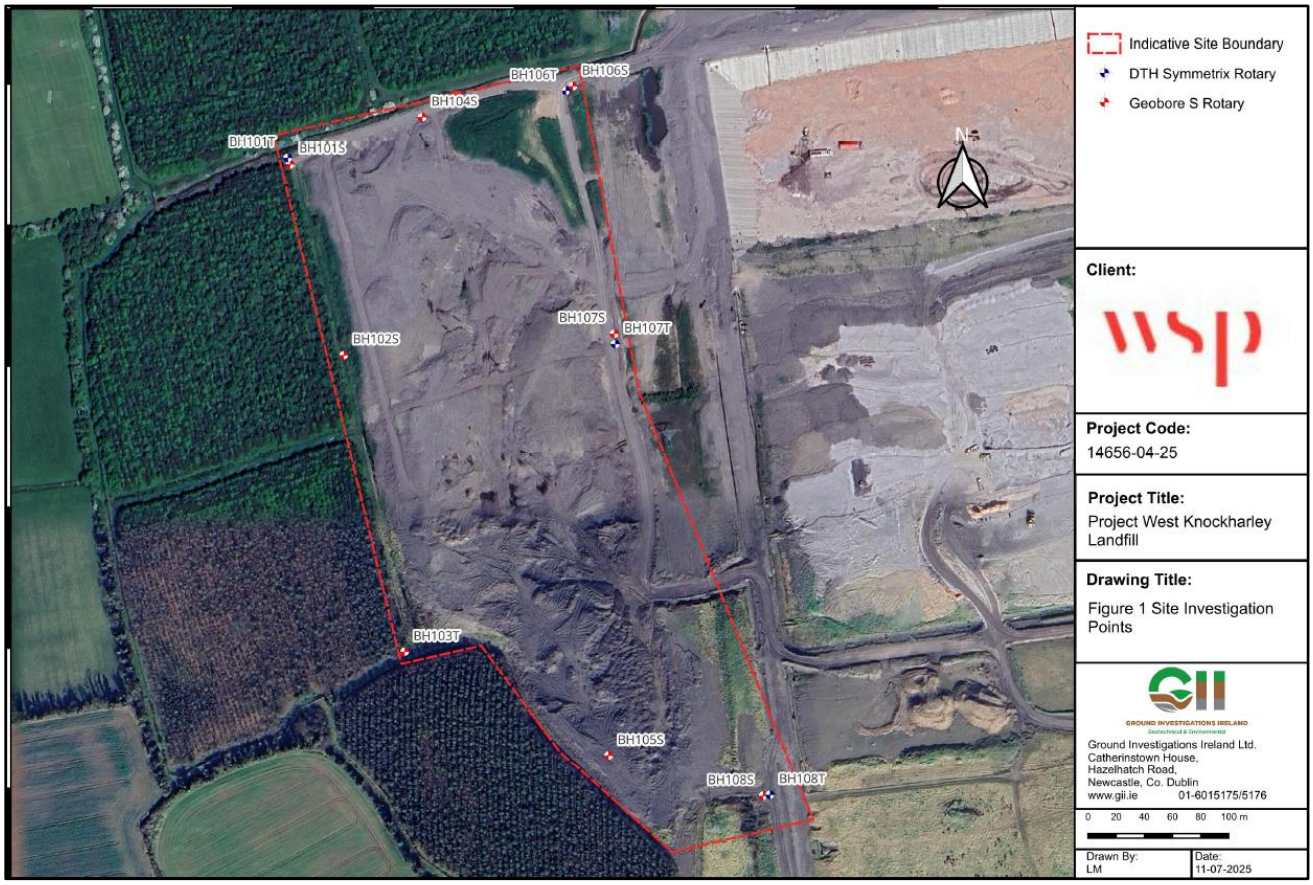


Table 6-7. Ground Levels Recorded in Bedrock and Overburden (GII, 2025)

Borehole ID	Date	Depth (m)	Depth (mOD)	Water Level (mBSTP)	Water Level (mOD)	Comments
Bedrock						
BH101S	23/06/2025	23.5	40.09	1.65	62.1	
BH102S	23/06/2025	28	36.91	0	65.1	Artesian
BH104S	23/06/2025	20.5	42.14	> -1.00	>63.835	Artesian
BH105S	23/06/2025	29.5	42.13	6.92	64.91	
BH106S	23/06/2025	16	45.72	0	61.83	Artesian
BH107S	23/06/2025	19	44.54	0.87	62.8	
BH108S	23/06/2025	20.5	42.6	1.52	61.68	

Borehole ID	Date	Depth (m)	Depth (mOD)	Water Level (mBSTP)	Water Level (mOD)	Comments
Overburden						
BH101T	20/06/2025	14	49.71	5.1	58.8	FHT
BH103T	20/06/2025	19	49.72	0.89	68.09	FHT
BH106T	20/06/2025	11	50.73	9.4	52.62	FHT
BH107T	20/06/2025	14	49.83	13.56	50.45	FHT
BH108T	20/06/2025	13.5	49.61	9.6	53.61	FHT

The current inferred overall ground water flow is presented in Figure 6-16 below. Local variations are present however, it should be noted that the groundwater levels recorded during the current site investigation have not fully recovered since the development of the wells and falling head tests. The presence of the liner has a local impact on the groundwater flow directions but there is no impact outside of the local area due to existing fracture system and preferential flow paths. The overall groundwater flow direction will remain the same, flowing from northwest to southeast.

Figure 6-16. Current Inferred Groundwater Flow Direction



6.3.9.6 Groundwater Quality

6.3.9.6.1 Regional Groundwater Quality

Presently, the groundwater body in the region of the site (Realtage GWB - European Code: IE_EA_G_020) for which the site is located entirely within, has a WFD status of "*Good*" (WFD Period: 2016-2021) as shown in Figure 6-12 and a WFD risk score (3rd Cycle) of "*Not at Risk*" of not achieving good status, meaning it has achieved its objectives end the overall status is considered good.

This" Good'" status is related to the overall groundwater status i.e. quantitative groundwater status and chemical groundwater status.

6.3.9.7 Local Groundwater Quality

6.3.9.7.1 EPA IED Licence Quarterly Monitoring

As part of the license for the landfill, groundwater monitoring is required to be carried out on a quarterly basis since the landfill became operational. Based on the latest monitoring round, there were ten (10 No.) groundwater monitoring wells specified in the Licence as presented in Figure 6-14 (MW-1d, MW- 2d, MW-3d, MW-5d, MW-6d. MW-7d, MW-16d, MW-17d, MW-18d and MW-19d) were sampled on the 5th of February (Q1) and on the 27th May (Q2) 2025.

MW-1d, MW-2d, MW-3d and MW-7d are located up-gradient of the existing landfill, while MW-5d, MW-6d, MW-16d, MW-17d, MW-18d and MW-19d are located down-gradient.

There are no ELV's for groundwater as no there is no discharge to ground. However, in 2011, the EPA approved revised trigger levels for groundwater monitoring for the site. The trigger levels are set based on the baseline groundwater condition upgradient and downgradient of the site. Any exceedance of trigger levels may lead to a site investigation to determine the cause of the deviation, which could be an unintended pollution event or a naturally occurring variation. The trigger levels were set for the following parameters to include pH, ammonia, chloride, sodium, potassium, TOC and phenols. The trigger levels are presented in Table 6.6.

Table 6-8 Groundwater Trigger Levels set by EPA for Knockharley Landfill

Parameter	pH	NH3 (N)	Cl	Na	K	Total Organic Carbon	Phenols
Units	pH Units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
All wells	>8.28	>1.98	>31.28	>112.3	>6.25	>12.99	>0.02

Groundwater results were also assessed relative to available Irish guideline and legislative standards as follows:

The groundwater results are also screened against and interpreted with reference to the relevant Interim Guideline Values (IGVs) and Threshold Values for groundwater quality (TVs).

The IGV levels represent typical background or unpolluted conditions; however, levels higher than an IGV can occur naturally, depending on the local geological and hydrogeological conditions.

The Threshold Values for groundwater quality (TVs) were introduced by the European Communities Environmental Objectives (Groundwater) Regulations 2010 S.I. No 9 of 2010 and amendments. While the TVs are more appropriate for large scale abstraction wells used for potable supply, they can be used to assess the significance of contamination where present in groundwater.

A summary of the analytical results are presented below.

6.3.9.7.2 Data Trend analysis – licence data (period 2021-2025)

Trend graphs of groundwater quality for the period 2021 to 2025 are presented in Appendix 6.6 and overall demonstrate that there is no impact on receiving groundwater quality beneath the site area. A summary of the data is provided below:

The pH levels in all wells were below the trigger levels, IGV's and TV's during the monitoring period. There is a downward trend in all wells which is steady.

The ammonia concentrations in all upgradient and downgradient wells are below the trigger levels, IGV's and TV's. The trends in MW-3d, MW-5d, MW-6d, MW-7d, MW-16d, MW-18d and MW-19d are decreasing while the trends in MW-1d, MW-2d and MW-17d are steady.

The chloride concentrations in all upgradient and downgradient wells are below the trigger levels, IGV's and TV's except for the chloride concentration in MW-16d in Q4 2024. The trends in MW-1d, MW-2d, MW-5d, MW-6d and MW-19d are decreasing and the trends in MW-3d, MW-7d, MW-16d and MW-18d are increasing while the trend in MW-17d is steady. No likely cause was identified for the elevated levels of chloride during the investigation of the incidence reported to EPA.

The sodium concentrations in all upgradient and downgradient wells are below the trigger levels, IGV's and TV's. The trends in MW-1d, MW-2d, MW-5d, MW-7d, MW-16d, MW-17d and MW-18d are increasing, the trends in MW-19d are decreasing and the trend in MW-3d and MW-6d in is steady.

TOC is only encountered occasionally at concentrations above the laboratory detection limit and did not exceed the levels, IGV's and TV's in any location during the monitoring period with the exception of the concentration in MW-17d in Q4 2021 when the trigger level was exceeded by 0.01mg/l. the incident was reported to the EPA and the investigation concluded that the elevated levels were most likely associated with the high levels of suspended solids in the sample.

In the upgradient wells, TOC was detected in MW-1d on one occasion (Q2 2021), MW- 2d on three occasions (Q2 2021, Q4 2022 and Q3 2024), MW-3d on one occasion (Q32024) and in MW-7d on two occasions (Q2 2021 and Q3 2024). In the downgradient wells, TOC was detected in MW-5d on two occasions (Q4 2022 and Q3 2024), MW-6d on four occasions (Q2 2021, Q2 2022, Q4 2022 and Q3 2024), MW-16d on one occasion(Q3 2024), MW-17d on two occasions (Q4 2021 and Q4 2022), MW-18d on one occasion (Q3 2024) and MW-19d on two occasion (Q3 2024 and Q2 2025). Due to the nature of the sporadic detections, it is not appropriate to create trends to this parameter. However, it should be noted that no other exceedances were recorded for TOC except for the isolated incidence in Q4 of 2021.

Phenols were not detected in any location at concentrations above the laboratory detection limits which are below the trigger level as such no trends can be determined for this parameter.

All heavy metals concentrations were recorded below the IGV's and TV's with the exception of manganese concentrations which has been elevated at every monitoring round between 2021 and 2025. However, the elevated levels were recorded in both upgradient and downgradient wells of the facility. The likely cause has been identified as naturally occurring manganese along with high levels of total suspended solids in the sample when the incidence was investigated by the EPA.

Total coliforms have been identified in all monitoring rounds between 2021 and 2025. Since total coliforms are not part of the licence requirement for monitoring, they are not reported to the EPA. However, the elevated concentrations have been identified in upgradient and downgradient wells, they are likely caused by agricultural activities and cattle rearing in the area. Total coliforms are also naturally occurring within the environment.

6.3.9.7.3 Review of Q1 and Q2 licence data (2025)

Monitoring Wells Upgradient of the existing Landfill Footprint

In Q1 there were no exceedances of the trigger levels, IGVs or TVs apart from Total Coliforms that exceeded the IGV in MW-1d.

In Q2 there were no exceedances of the Trigger Levels, IGVs or TVs except for total coliforms that exceeded the IGV in MW-1, MW-2d and MW-7d and E.Coli that exceeded the IGV in MW-2d.

Monitoring Wells downgradient of the existing Landfill Footprint

In Q1 there were no exceedances of the trigger levels, IGVs or TVs in the downgradient monitoring wells apart from total coliforms which exceeded the IGV in all MW-6d and MW-16d.

In Q2 there were no exceedances of the trigger levels, IGVs or TVs in the downgradient monitoring wells except for the Total coliforms that exceeded the IGV in all monitoring wells except MW-18d.

6.3.9.7.4 Discussion and Conclusion

Groundwater flow beneath the site is from the north-west to the south-east. There was no exceedance of the trigger levels in R1 2025.

In Q1 total coliforms were detected in the upgradient well MW-1d, and in the downgradient wells MW-6d and MW-19d.

In Q2, total coliforms were detected in MW-1, MW-2d and MW-7d (upgradient wells) and in all downgradient wells except MW-18d. E.coli was detected in MW-2d (upgradient well) and was not detected in any downgradient wells. Total coliforms can be naturally occurring. The levels of E.Coli identified are likely to be the result of localised agricultural activities such as land spreading.

6.3.9.7.5 Groundwater Monitoring 2025

During the site investigation undertaken in 2025, groundwater sampling and laboratory analysis was carried out to determine the groundwater quality. Groundwater quality was assessed by comparing analytical results to the European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2016 (Statutory Instrument No. 366 of 2016 and amendments) and 2010 (Statutory Instrument No. 9 of 2010 and amendments), i.e. GTV, and the Environmental Protection Agency (EPA) Draft Interim Guidelines Values (IGVs) for the Protection of Groundwater, 2003 and the preapproved EPA trigger values under the existing licence conditions. The results are presented in Appendix 6.7.

It should be noted that all boreholes drilling carried out during the current site investigation are upgradient of the existing operational landfill. No exceedances were recorded in relation to the EPA approved trigger values for the parameters which were allotted a trigger value.

Summary of the analytical results are presented below.

No exceedances were identified in PAH's, TPH's, SVOC's, VOC's and Total phenols when compared to IGV's and GTV's.

All heavy metals concentrations were recorded below the IGV's and TV's with the exception of manganese and Barium which exceeded the IGV's and no TV's are available for these parameters. However, the levels were marginally above the screening criteria. The likely cause for elevated levels of manganese is naturally occurring manganese within the soil and bedrock.

6.3.10 Rating of Site Importance of the Hydrogeological Features

The review of the receiving environment undertaken (Section 6.3.9) and based on the TII methodology (2009) (Appendix 6.1), the importance of the hydrogeological features at this site can be rated as ` Low to *Medium'* importance with medium importance or value on a local scale, due to the aquifer beneath the site being classified as a "*Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones*" and contributes to the baseflow of local streams and rivers (i.e. Knockharley Stream, Kentstown Stream and the River Nanny [Meath]).

6.3.10.1 Conceptual Site Model

AWN have developed a conceptual site model (CSM) in order to identify any likely Source-Pathway-Receptor linkages relating to the proposed development. Refer to Figure 6-17 and 6-18 for schematic cross sections.

- The bedrock aquifer is classified as a "*Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones*" The main groundwater movement in this category of aquifer occurs in the upper 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep-water strikes in more isolated disconnected faults/ fractures can be encountered at 30-50 mbgl. As a result, flow paths are short between 100 and 500m minimising the potential a source pathway linkage in the bedrock aquifer.
- The aquifer underlying the proposed development has a 'Low' vulnerability following GSI classification for aquifer vulnerability (Figure 6-11). The GSI vulnerability classification is consistent with data obtained from the site investigations carried out by Ground Investigation Ireland (GII, 2025), at the proposed development site, where soft to stiff sandy gravelly glacial Clays with sand lenses were encountered. Bedrock was encountered at the site at depths ranging from 14.3m BGL at BH106S in the northeastern section of the proposed landfill extension, to 28m BGL at BH105S in the southern section of the proposed landfill extension.
- Regional groundwater flow direction is northwest to southeast. Local groundwater flow direction is east to southeast with some local variation based on the presence of the landfill liner and site drainage but no overall change in groundwater flow pattern off site.
- The proposed development is outside the zone of contribution for any public or group groundwater supplies or groundwater dependent wetlands.
- The proposed development site has a hydrological connection/pathway with Balrath Woods pNHA (Site Code: 001519) and located c. 550m south (linear distance) and c.800m downstream from the site. The pNHA has a direct hydrological connection through Knockharley Stream which transverses with the pNHA before flowing in a south early direction and discharging to River Nanny.
- The proposed development also has a hydrological connection with The River Nanny Estuary and Shore SPA and North-west Irish Sea SPA lie approximately 22km and 27.8km downstream from the Proposed Development, respectively. However, the connection is a long hydrological pathway allowing significant time for settlement and dilution and as such there is no potential for change in water quality of this receiving habitat.
- An existing lined landfill is in operation on part of the site since 2004 and operates in accordance with an EPA licence. As the landfill is lined, there are no discharges to the underlying soil or groundwater and only stormwater discharges to the receiving streams.
- Groundwater and surface water monitoring is carried out in accordance with licence conditions. The monitoring has confirmed that there is no evidence of groundwater or surface water contamination as a result of existing landfill activity. Some parameters such as E.coli and Total coliforms were slightly elevated above background and indicate some evidence of local impacts from surrounding agricultural activity
- There is no evidence of historical soil contamination as discussed in section 5.3 of chapter 5 of this EIAR.

Overall, there is no likely source pathway linkage to any receptor through the underlying aquifer or off site through groundwater. There is a pathway off site through the adjacent streams (Knockharley and Kentstown) and there is a source pathway linkage to Balrath Woods pNHA through the Knockharley should an unlicenced discharge occur to stormwater discharging form the proposed development area. A temporary unmitigated discharge during construction will not impact the habitat requirements for Balrath Woods pNHA.

Figure 6-17. A-A' Cross Section Along Existing Landfill and Inferred Groundwater Flow

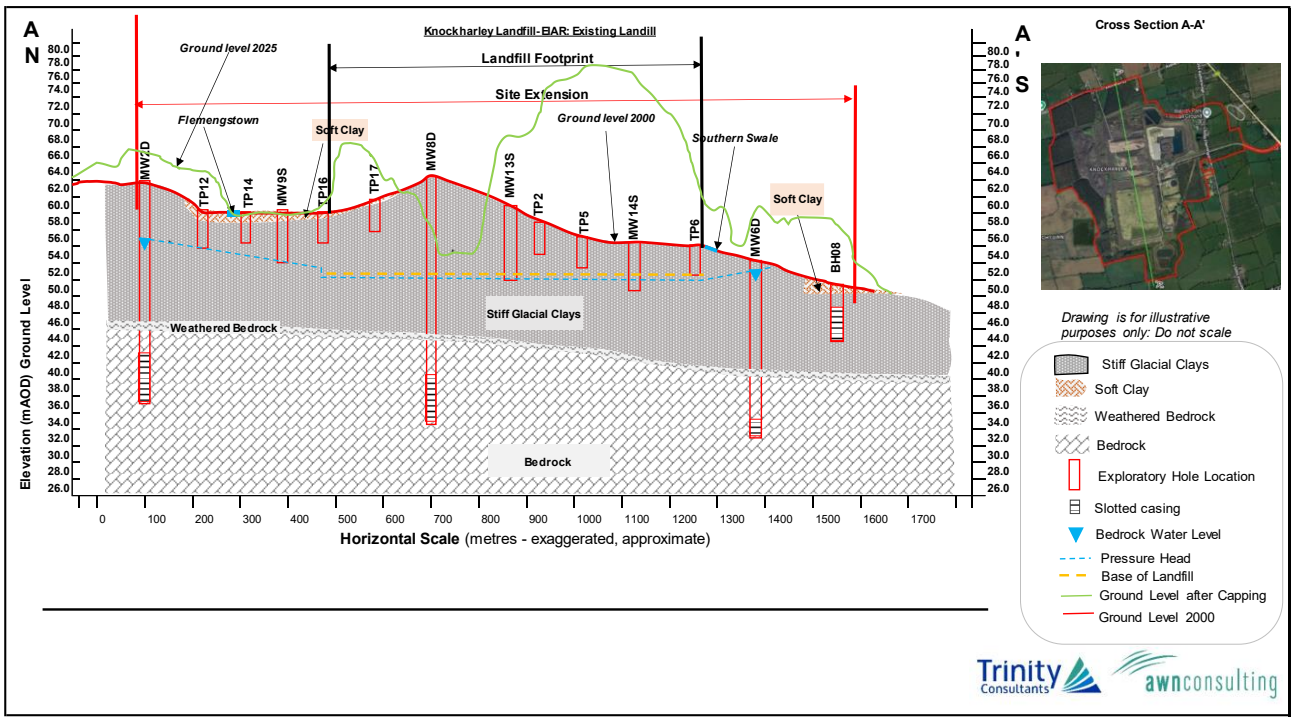
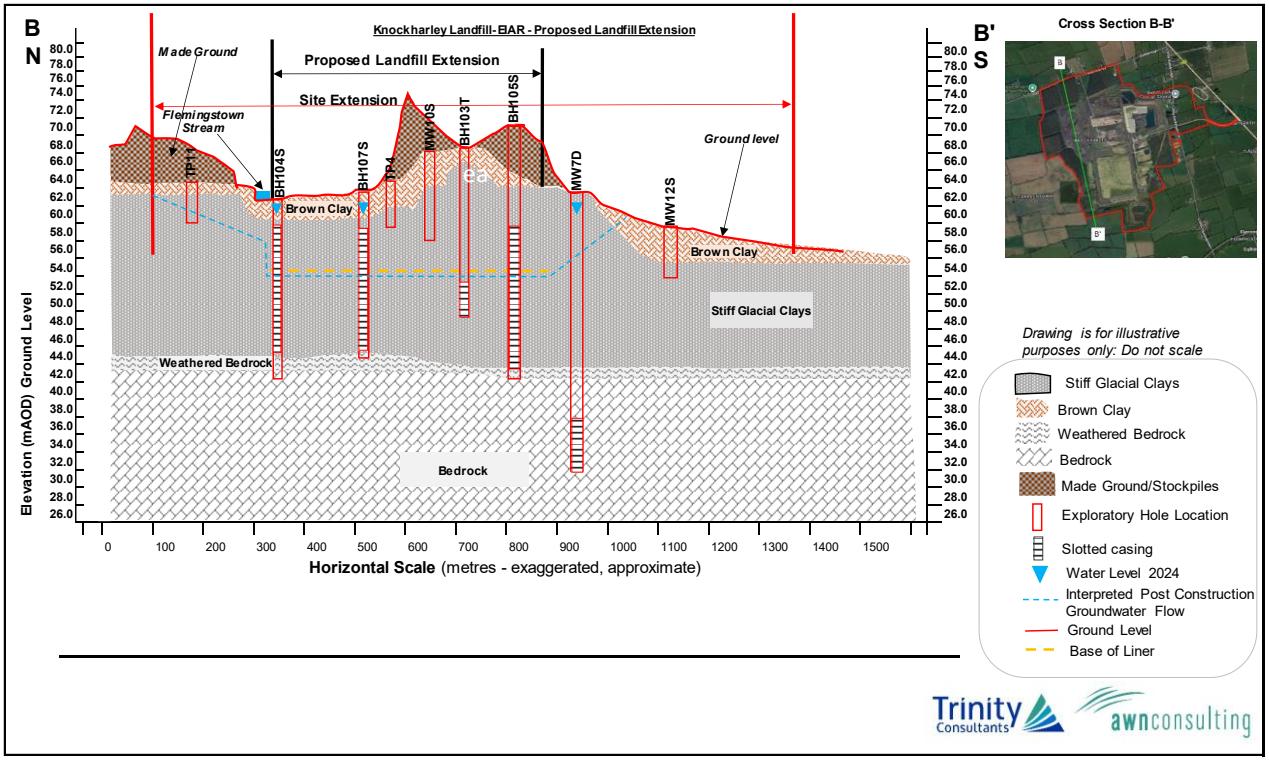


Figure 6-18. B-B' Cross Section Along Proposed Landfill Expansion with Interpreted Post Construction Groundwater Flow

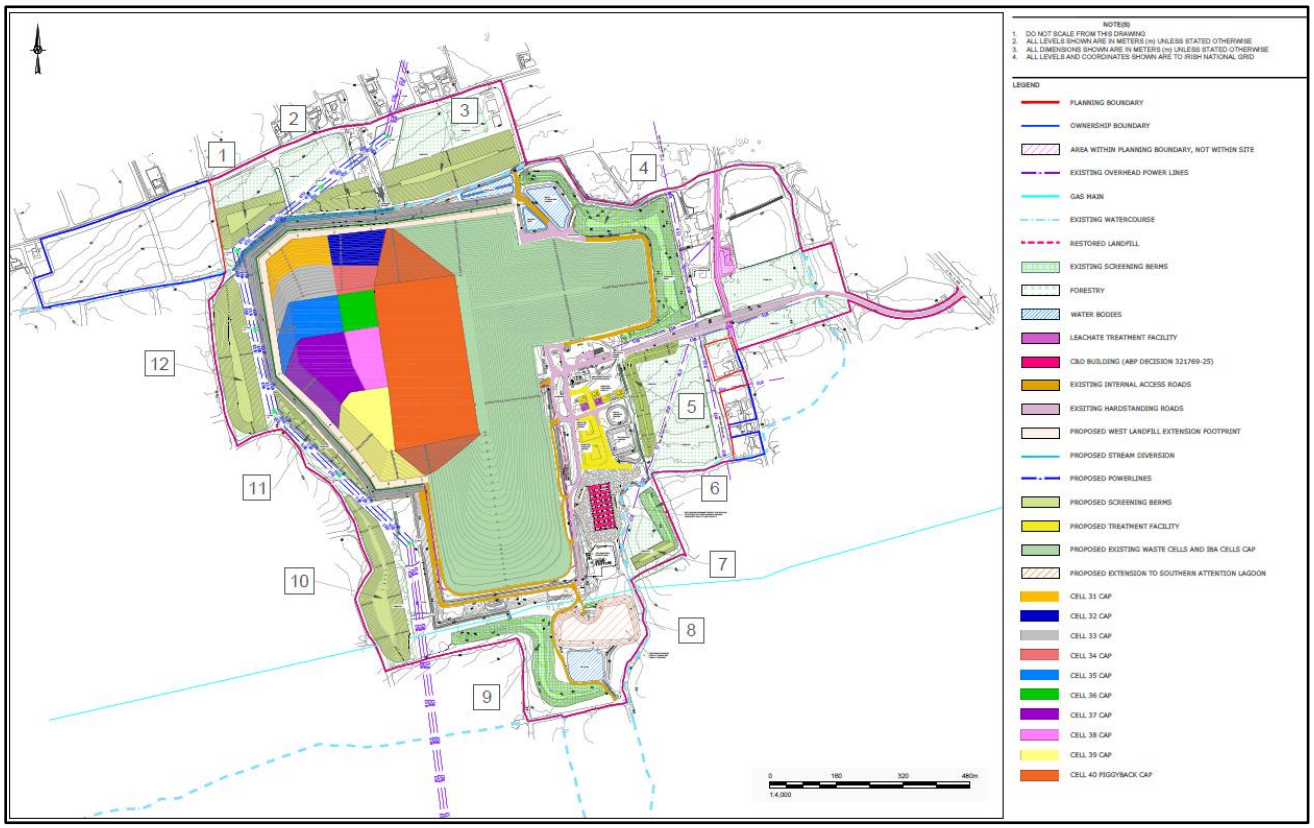


6.4 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction phase operational and decommissioning phase of the proposed development. The information presented in this section is informed by the project design, but it is not a complete description of the proposed development. Therefore, it should be read in conjunction with Chapter 2 (Description of the Proposed Development) of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the proposed development.

The proposed development is anticipated to be completed (from construction to capping of final cells) with in c. a 21-year period and will be constructed over seven phases. Each phase will overlap with waste cell filling taking place in tandem as the construction of cells are complete. As such construction, operation and decommissioning overlap during the course of the landfill life. Please refer to section 2.4.9 Construction Phasing and Duration of Chapter 2.

Figure 6-19. Proposed Masterplan Layout - (WSP, 2025)



6.4.1 Construction Phase

The activities required for the construction phase of the proposed development represents the greatest risk of potential impact on the hydrological and hydrogeological environment. These activities primarily pertain to the site preparation, excavation and infilling activities required to facilitate construction of the proposed development.

- Excavations and levelling of the site to the necessary foundation base levels for the proposed landfill extension will require the excavation of an estimated c. 1.773,581 m3 of material. The estimated volumes for fill, clay liner, landscaping and berms is 1,353,448 m3 with approximately 420,133 m3 of material needing to be removed and transported off site. The construction will require excavations

down to approximately 55 mOD at the high internal corners and approximately 54.0 mOD at the low external corner where the sump is located.

- Clay liner will be placed at the base of the landfill cells which will prevent of any leachate migration to the underlying geology as well as leachate collection system comprising of HDPE liner above the clay liner.

- Pipework will be placed in the drainage stone layer above the HDPE barrier which has been designed to collect any leachate runoff from the landfill cells. Leachate will be pumped from the base of cells via a rising main and stored in leachate lagoons/tanks, prior to removal off-site for disposal at an authorised wastewater treatment plant. In the event leachate will be pretreated on-site, treatment and subsequent storage will be carried out in bunded units and tanks. Leachate management during the operational phase of the proposed development will be carried out in accordance with the current IED Licence (W146-04).

- As part of the extension of the landfill footprint, the minor diversion of a short section of the Knockharley Stream and the establishment of a new culvert along this diversion is required to facilitate a new access road crossing over the stream. The proposed culvert will be a concrete box culvert which will be installed over an 8m section of the Knockharley Stream as illustrated in Figure 2.8 in Chapter 2 section 2.3.2. Consultation has taken place with Inland Fisheries Ireland (IFI) regarding the design of the stream diversion and culvert. IFI conducted a site visit on 8th May 2025 as part of the consultation and following the visit issued correspondence to note they were satisfied with what was being proposed. Requirements for the culvert construction were agreed on and incorporated into the design. Specifically, that the culvert will be buried to a minimum depth of 0.5 m below the stream bed and that the gradient in the culvert should not exceed 3%. The material used to embed the culvert will be similar to that of the existing stream bed.

- A Culvert Hydrologic and Hydraulic Assessment has been prepared by WSP (2025) and submitted with the planning application documentation. The design of the diversion aims to preserve the existing hydrological function of the stream and will not result in any significant changes to flow regime, connectivity, or water quality. The open channel sections will be designed to mimic natural conditions and will incorporate geomorphological features such as, pools and riffles where feasible, along with appropriate bed and bank materials to promote aquatic and riparian habitat.

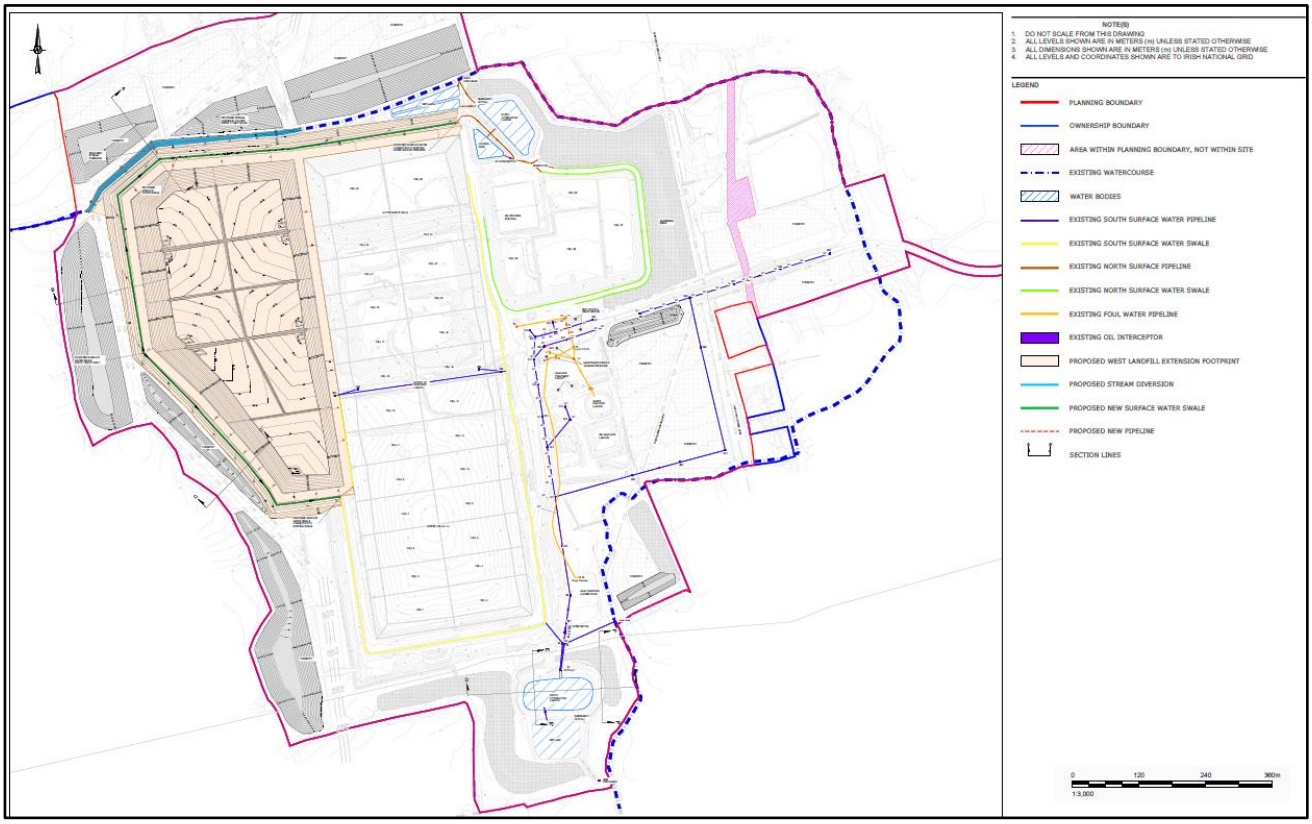
- The proposed surface water management infrastructure will connect to the existing infrastructure on site and continue to operate as current. The capacity of the southern attenuation pond will be increased as part of the proposed development works for stormwater attenuation post closure, however this will not affect the operation of the onsite surface water system as presented in Figure 6-18.

- There are no surface water or groundwater abstractions proposed, therefore no long-term potential impacts on the quantity of surface water or groundwater discharging form the site. The flow regime outside of the site will operate as it currently does. Within the site, stormwater management for the existing landfill will continue to operate as current, with a stormwater discharge to the south and north of the site through an existing attenuation pond and wetland discharging to Knockharley Stream.

- The northern surface water holding pond, attenuation pond, constructed wetland, associated surface water management infrastructure, culvert and river diversion shall be constructed and operational prior to the commencement of other construction works and prior to the acceptance of IBA waste for storage and recovery on-site.

- Foul Water for the existing landfill will continue to be collected and treated in a bio treatment facility on site prior to its discharge to the waste leachate lagoon, which will be tankered off site. This is further described for the full proposed development in section 6.4.2 below.

Figure 6-20. Proposed Surface water Strategy



6.4.2 Operational Phase

The proposed development characteristics which relate to the hydrological and hydrogeological environment during operation are summarised below. The proposed activities to be undertaken as a result of the expanded landfill void can broadly be described as:

- placement of waste within lined cells
- management of leachate
- storage of surface water for attenuation prior to discharge
- storage of unsuitable waste in quarantine area prior to removal off-site
- Operation of the landfill will be undertaken in compliance with an amendment to the current EPA IED Licence.

The quantity of waste received at the facility will not change and will be as per the existing IED Licence (W0146-04), i.e. acceptance of up to 435,000 tonnes per annum of non-hazardous wastes and up to 5,000 tonnes per annum of stable non-reactive hazardous waste. The non-hazardous waste accepted at the site comprises up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables.

Once a landfill cell is constructed, waste cell filling (operation) will be carried out in line with the IED Licence (W0146-04) and permitted planning applications, including any conditions stipulated by the planning authority. In total, the proposed development consists of 4.12 million m^3 active void space for landfilling (3.32 million m^3 of additional constructed void space with further void space of 807,000 m^3 for the 'Piggyback Cell').

Once a cell is at capacity, a permanent capping will be constructed over the cell.

As per the IED Licence, the following design and mitigation measures will be implemented:

- SuDS incorporate surface water management infrastructure shall be provided and maintained at the installation during construction works, operation, closure, restoration and aftercare at the installation. As a minimum, the infrastructure shall be capable of the following:
    - Collection/diversion of any contaminated run-off arising within the installation;
    - the prevention of contaminated water and leachate discharges into surface water drains and courses; and
    - the collection/diversion of run off arising from capped and restored areas, incorporating adequately sized swales.

- The surface water from all roads, hardstanding areas and all areas of the installation where surface water has the potential to become contaminated shall be directed to the northern holding pond and southern attenuation pond.

- The inlet to the northern surface water holding pond and southern attenuation pond includes Class I Full Oil Interceptor.

  The discharge from the northern and southern holding pond, attenuation pond and constructed wetland shall be controlled by an actuated penstock that will prevent surface water discharging into the next pond, constructed wetland or receiving water in the event that monitoring should indicate contamination of the surface water.

- There is no foul sewer service in the area. All foul effluent generated from administration welfare facilities is collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

6.4.3 Decommissioning and Remediation Phase

Key site-specific activities during the Decommissioning and Remediation Phase are consistent with those required for the existing landfill as set out in Chapter 2, Section 2.6 and include:

- Final landfill capping, undertaken in accordance with the CEMP;
- Ongoing post- landfilling site activities, carried out in accordance with the CRAMP.

As part of this phase, the following activities will be undertaken.

- On completion of the deposit of waste at the facility, final capping shall be restored over the waste mass. Following completion of the final capping and establishment of interim restoration of the site, all structures, plant and equipment that are not required for restoration purposes will be decontaminated in accordance with recognised standard procedures and regulatory requirements and removed from the site.

- There is potential for run-off water to become contaminated with pollutants released during decommissioning and remediation activities. During decommissioning, the contractor will be obliged to operate in compliance with a Construction & Environmental Management Plan (CEMP), Closure, Restoration and Aftercare Management Plan (CRAMP) and mitigation measures as outlined in the EIA provided with planning.

- Leachate extraction and management will continue in the aftercare phase, notwithstanding the fact that the landfill will be capped. Despite the low permeability cap over the waste, a small portion of the rainfall incident on the landfill will percolate into the waste mass, for example through penetrations (gas wells, etc.) through the cap.

- In addition, it is considered desirable to recirculate leachate back into the waste mass so as to accelerate the biodegradation of waste matter. Two benefits accrue:
- the aftercare phase is shortened because the waste stabilises, (i.e. approaches an inert state) more speedily
- the quantity and quality of landfill gas being produced can be managed and manipulated, thus making recovery options more attractive.
- The initiation of leachate recirculation would be by agreement with the EPA and subject to a specified engineering works report.
- Throughout the aftercare period, leachate within the landfill would be maintained at or below the levels required by the IED licence. To achieve this, leachate would continue to be pumped to the leachate lagoon before being disposed off-site by tankering which is the basis of the modelling for the CRAMP for the facility.
- It is planned that leachate would be treated on site to allow for use in the IBA Facility. This is expected to consume approximately 90% of the treated leachate. The remaining leachate will be tankered off site for disposal or recirculated.
- As leachate management infrastructure is decommissioned, all buried pipework and cables will be grubbed up and removed from site.
- Environmental monitoring will continue after the closure of the facility for surface and groundwater along with maintenance and inspection of drainage ditches to ensure that all discharges are adhering to the EPA License.

6.5 Potential Impacts of the Proposed Development

An analysis of the potential impacts of the proposed development on the hydrological and hydrogeological environment during the construction and operation is outlined below. Due to the inter-relationship between land, soils and geology with hydrogeology and hydrology the following impacts discussed will be considered applicable to both Chapter 5 and 6 of the EIA Report. Remediation and mitigation measures included in the design of this project to address these potential impacts are presented in Section 6.6 of this EIA.

6.5.1 Do Nothing Scenario

If the proposed development does not proceed, it is likely that the land will continue to be used for landfill with areas left as poorly drained pasture and forestry. In areas where conifer forestry plantations are present, deforestation and reforestation will continue to occur into the future. The impact on hydrology and surface water quality would remain largely unaltered as a result.

Modifying the existing landfill facility will avoid the need for a similar development elsewhere on alternative lands where the other constraints and limitations would have to be managed, as opposed to making modifications to the existing site/landfill, where the associated works to accommodate such will be minimal as much of the associated works are in place and functioning efficiently.

6.5.2 Construction Phase

6.5.2.1 Potential Impacts on Surface Water and Groundwater Quality

There is potential for run-off water to become contaminated with pollutants released during construction activity. During construction the contractor will be obliged to operate in compliance with a Construction &

Environmental Management Plan (CEMP) and mitigation measures as outlined in the EIA provided with planning. Contaminated water can pose a temporary risk to the Knockharley [Meath] and Kentstown based on the natural protection which includes more than 10m of low permeability soils underlying the proposed development, there is no impact on the underlying aquifer Realtage GWB (European Code: IE_SE_G_020).

During construction of the development, drainage form the existing landfill will be unchanged. There is the potential of contamination on the new area of development until the drainage is connected to the existing attenuation system, associated with the following sources:

- Suspended solids (muddy water with increased turbidity (measure of the degree to which the water loses its transparency due to the presence of suspended particulates)) – arising from excavation and ground disturbance;
- Excavations/ top and sub soil stripping- Increase sediment run off (erosion during rainfall periods), Pollutant mobilisation (heavy metal runoff), Loss of vegetation;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons and other construction chemicals (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms. Construction phase sewerage will be contained in a tank and taken by tanker off site for disposal at a licensed waste management facility.

There is a potential for temporary slight impact on Knockharley stream due to construction activities from the proposed diversion and construction of culvert.

This is a potential for temporary impact on aquifer vulnerability, since as part of the proposed development excavations will be required down to 54mOD for the construction of landfill cells. This will temporarily increase the aquifer vulnerability which is classified by the GSI as having 'Low' (L) to 'Moderate' (m) vulnerability in the northeastern of the proposed landfill extension. However, as part of the proposed extension the bottom of the cells will be lined with an impermeable Clay liner which increases aquifer protection. Also, bedrock was encountered between 14.3m BGL (BH106S) in the northeastern section to 28m BGL (BH105S) in the southwestern section of the proposed extension. Therefore, the impact would be not significant and temporary.

There is no potential impacts from foul water on the hydrological and hydrogeological environment as Foul Water will be collected and tankered off site during construction phase.

In the absence of mitigation measures the potential impacts during the construction phase on surface water quality and groundwater quality are ***negative***, ***slight*** and ***long term***.

6.5.2.2 Potential Impacts on Surface Water and Groundwater Flow and Quantity

6.5.2.2.1 Groundwater

The construction of landfill cells and installation of an impermeable clay liner, introduction of impermeable surfaces and the compaction of soils across the construction site as a result of the land clearing and earthworks will reduce the recharge to the underlying aquifer locally (noting recharge is already very low based on the low permeability of the clayey till present) and increase the rate and volume of direct surface run-off. However, there will be no change in the surface water regime off site.

Upon installation of the additional impermeable clay liner and drainage layer for the new landfill cells, there will be an ongoing change in the groundwater flow direction within the site area but no overall change in the groundwater flow and regime off site within the aquifer and the underlying Realtage GWB.

6.5.2.2.2 Surface water

As attenuation is already in place there will be no increase in the rate of run-off of site once flows are directed to the existing attenuation ponds. During construction of the drainage system there is a potential for local increase in surface water run-off rate which could increase sediment loading, scouring impacts on local drainage.

There will no surface water or groundwater abstractions proposed during construction, therefore no potential impacts on the existing surface water and groundwater regime.

As part of the extension of the landfill footprint, the diversion of the Knockharley Stream and the establishment of a new culvert along this diversion is required to facilitate a new access road crossing over the stream. The proposed culvert will be a concrete box culvert which will be installed over an 8m section of the Knockharley Stream. The impact would be not significant and temporary

In the absence of mitigation measures the potential impacts during the construction phase on surface water and groundwater quantity and flow are ***negative***, ***slight*** and ***short term***.

6.5.2.3 Potential Impacts on Human Health and Populations

As there are no recorded recreational waters, bathing waterbodies, no downgradient surface water abstraction points or Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas, there is no potential for impacts on human health and populations.

6.5.2.4 Potential Impacts on Water Framework Directive Status

There is a potential of accidental discharges during the construction phase (as set out in Section 6.5.1.1). However, these are temporary short-lived events due to the distance to the River Nanny Estuary and Shore SPA (Site Code: 004158), North-west Irish Sea SPA (Site Code: 004236) as stated in section 6.3.7 and due to the more than 10m thickness of low permeability soils and low vertical conductivity and migration to the Realtage GWB. This will not impact on the status of the Nanny [Meath]_SC_010 (European Code: IE_EA_08N010280), the Balrath Woods pNHA (Site Code: 001519), River Nanny Estuary and Shore SPA (Site Code: 004158), North-west Irish Sea SPA (Site Code: 004236) or the underlying Realtage GWB (European Code: IE_SE_G_020) and the adjacent Donore GWB (European Code: IE_SE_G_021) in the long-term. Therefore, the proposed development will not cause any deterioration or change in water quality status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland.

Therefore, there is no potential for impacts on Water Framework Directive status based on the current understanding of the proposed development during construction. A temporary unmitigated discharge during construction will not impact the habitat requirements in relation to the water quality for Balrath Woods pNHA.

Please refer to Appendix 6.3 for WFD Assessment.

6.5.3 Operational Phase

6.5.3.1 Potential Impacts on Surface Water and Groundwater Quality

There are no potential impacts to the Surface Water and Groundwater Quality during the operational phase due to the implementation of design measures discussed in section 6.4.2. The existing surface water management infrastructure will be extended and maintained in line with the licence requirements during Operation. The infrastructure is discussed as part of mitigation measures.

As current, there will be an engineered landfill liner and leachate collection system, an under cell drainage system and leachate recording and monitoring programme. The leachate collection rising main will discharge to the existing leachate lagoons or tanks on site. To manage the additional leachate generated by the proposed development, 2 no. containerised reverse osmosis plant units will be stationed on reinforced concrete bunded slabs (Plant Bund) and 12 no. additional storage tanks (6 no. per Reverse Osmosis plant unit) will be stationed on reinforced concrete bunded slabs.

A network of foul drainage collects foul waste from the existing buildings and is treated in the biotreatment plant on site prior to discharge into the waste leachate lagoon which is then Tankered offsite for further treatment.

In the absence of mitigation measures the potential impacts during the operational phase on surface water and groundwater quantity and flow are ***neutral***, ***not significant*** and ***long term***.

6.5.3.2 Potential Impacts on Surface Water and Groundwater Flow and Quantity

The construction of landfill cells and installation of an impermeable clay liner, introduction of impermeable surfaces will reduce locally the recharge to the aquifer. However, there will be no measurable change as the recharge is already very low due to the low permeability nature and thickness of the clayey till present. The overall regime of groundwater quantity within the aquifer and the underlying Realtage GWB will be unchanged considering the proportion of the site area in relation to the total aquifer area.

During the operational phase, there is a potential for a slight change in groundwater flow paths locally. However, there will be no impact or change in the overall regime of groundwater flows within the aquifer and the underlying Realtage GWB considering the proportion of the site area in relation to the total aquifer area.

There will be no change to on site or off site flooding. The design has incorporated adequate attenuation in the project design. The Northern Attenuation Pond has been already designed to provide storage for the 1:100 AEP event and any flow above the 1:100 AEP level is conveyed through an emergency spillway provided to safely pass any exceedance flows. The Southern Attenuation Pond has also been designed to provide long-term storage whose discharge has been designed to convey the 1:100 AEP event. An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows. As such, these works do not affect the extent of the existing Flood Zone A associated with the wetland where this attenuation pond discharges, as the storm 1:100 will be attenuated and managed by this existing system

As described in Section 6.3.6 above, the assessment has identified that the proposed layout is located primarily in Flood Zone C. However, Flood Zones A and B extents are present within the site, associated with the existing northern settlement pond and southern wetland, respectively. Following the required Justification Test as required under DECLG/OPW Guidelines, it is concluded that no residual risk is foreseen as the proposed development will not affect the existing hydrological, morphological and hydraulic conditions that define the aforementioned Flood Zones. The design of the proposed development and drainage infrastructure proposed will ensure that the run-off rate is restricted to greenfield run-off. The development includes the implementation of SUDS and an attenuation system. The design includes for a 30% climate change allowance post closure. The proposed drainage system has been designed to accommodate the 1% AEP plus 20% climate change allowance during operation and 30% allowance post closure. The proposed layout will also have capacity to control and attenuate the 0.1% AEP event without additional flooding risk.

In addition, the Proposed Development works includes the diversion of the existing Knockharley Stream to facilitate the extension of the existing landfill footprint. The diverted stream will be unculverted with the exception of existing access road crossing which will require a culvert to allow the road to passover. This culvert will have capacity to convey the design flood flow (1% AEP + 20% climate change) without

significantly changing the hydraulic characteristics of the watercourse) with sufficient freeboard. It is not anticipated that the flood risk in the catchment area for the 1% AEP + climate change will increase as a result of the presence of the proposed new culvert.

There are no surface water or groundwater abstractions proposed, therefore no potential impacts on the existing surface water or groundwater regime. However, all proposed discharges will be adequately treated through a combination of SuDs measures prior to discharge to waterbodies.

In the absence of mitigation measures the potential impacts during the operational phase on surface water and groundwater flow and quantity are ***neutral, not significant,*** and ***long-term***.

6.5.3.3 Potential Impacts on Human Health and Populations

There is no potential for flooding off-site as a result of the increased run off due to the existing and proposed design and drainage infrastructure.

There are no recorded recreational waters, bathing waterbodies, surface water abstraction points (refer to Section 6.3.5) located downstream of the proposed development site.

In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the proposed development site (refer to Section 6.3.10.3 above).

Therefore, there is no potential for impacts on human health and populations in the absence of source-pathway-receptor linkages.

In the absence of mitigation measures the potential impacts during the operational phase on surface water and groundwater flow and quantity are ***neutral, imperceptible,*** and ***long-term***.

6.5.3.4 Potential Impacts on Water Framework Directive Status

There are discharges of surface water during the operational phase to the Knockharley Stream located in the northern and southern section of the site. However, the landfill is required to operate in compliance with the existing licence and future licence conditions for discharge to receiving waters. This will ensure protection of receiving water status. These discharges will be adequately attenuated via SuDS measures i.e. grassed swales, attenuation ponds and wetland treatment in northern and southern catchment. All surface water flows from the proposed development will be directed to the existing attenuation ponds which have the storage capacity for the increased run off and flows. The flow control devices are already installed downstream of the ponds outlet pipes to ensure the surface water runoff is stored maximising storage potential and the discharged rate agreed in the licence is not exceeded, prior to entering the network downstream i.e. Knockharley Stream.

As current, there will be an engineered landfill liner and leachate collection system, an under cell drainage system and leachate recording and monitoring programme. The leachate collection rising main will discharge to the existing leachate lagoons or tanks on site. To manage the additional leachate generated by the proposed development, 2 no. containerised reverse osmosis plant units will be stationed on reinforced concrete bunded slabs (Plant Bund) and 12 no. additional storage tanks (6 no. per Reverse Osmosis plant unit) will be stationed on reinforced concrete bunded slabs. This ensures that there is no potential for discharge to surface water or groundwater.

There are no abstraction or discharges (other that stormwater) to the groundwater or surface water during operation.

These proposed design measures ensure there is no long-term negative impact to the WFD water quality status of the the Knockharley Stream, Kentstown Stream and Veldonstown Stream, Nanny [Meath]_SC_010 (European Code: IE_EA_08N010280), the Balrath Woods pNHA (Site Code: 001519), River Nanny Estuary and Shore SPA (Site Code: 004158), North-west Irish Sea SPA (Site Code: 004236) or the underlying Realtage GWB (European Code: IE_SE_G_020) and the adjacent Donore GWB (European Code: IE_SE_G_021).

Therefore, there is no potential for impact on Water Framework Directive status as a result of the proposed development during operation (Refer to appendix 6.3 for WFD assessment).

In the absence of mitigation measures the potential impacts during the operational phase on WFD status are ***neutral, imperceptible,*** and ***long-term***.

6.5.4 Decommissioning and Remediation Phase

Decommissioning and Remediation Phase refers to the process of closing the landfill post completion of landfilling activities as set out in Section 2.6 of Chapter 2. The potential impacts arising during the final landfill capping will be similar in nature to those identified during the Construction Phase. The primary impact is the potential for a localised spill/leak during decommissioning and restoration works which will include capping of the landfill cells across the site. The activities involved during this phase are discussed in section 6.4.3.

In the absence of mitigation measures the potential impacts during the decommissioning phase due to the potential for contamination of receiving waters are ***negative***, ***slight*** and ***long term***.

6.6 Mitigation Measures

6.6.1 Construction Phase

The existing licence will continue to operate as per licence conditions during construction phase.

6.6.1.1 Construction & Environmental Management Plan

A Construction & Environmental Management Plan (CEMP) has been prepared in respect of the areas of construction for the Proposed Development. The CEMP outlines and explains the construction techniques and methodologies which will be implemented by the contractor during construction of the proposed development.

Construction works and the proposed mitigation measures are informed by best practice guidance on the prevention of pollution during development projects including but not limited to:

- Construction Industry Research and Information Association (CIRIA), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (C532);
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016);
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (4th edition), (C741);
- Enterprise Ireland Best Practice Guide, Oil Storage Guidelines (BPGCS005).
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board);
- Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers;
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors;
- CIRIA C648 Control of Water Pollution from Constructional Sites;
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA 2008); and

- Inland Fisheries Ireland (IFI) – A Guideline on Planning for Watercourses in the Urban Environment.
- Environmental Protection Agency (EPA)- Landfill Manuals: Landfill Site Design

The CEMP sets out the proposed procedures and operations to be utilised on the proposed construction site to protect soil quality. The CEMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

During the project planning phase, a comprehensive emergency response plan will be developed by the construction contractor. This plan will outline a well-defined procedure for effectively managing emergencies as they arise. Furthermore, it's imperative to disseminate this emergency protocol to all site personnel during the site induction process. This plan will include for events such as:

- Pollution incidents: These may involve spillages, the malfunction of temporary structures, embankment collapse, acts of vandalism, fires, and other related events.
- Extreme weather occurrences: Events such as heavy rainfall, flooding, are important factors to consider due to their potential impact on the construction process.

All mitigation measures outlined below are presented in the CEMP and will be implemented during the construction phase, as well as any additional measures required pursuant to planning conditions which may be imposed.

- Standing water present in excavations will be pumped into the site drainage system (including attenuation ponds and wetland);
- The site wheelwash will be used throughout the Proposed Project;
- A designated refuelling area equipped with appropriate spill containment measures will be established in accordance with the EPA Licence. All plant refuelling activities will be confined to this area.
- All fuels, including diesel and fuel oils will be stored in bunded areas. Bunds will have a capacity of at least 110% of the largest storage tank, in compliance with the EPA Licence.
- Only emergency breakdown maintenance will be permitted on site to minimise the risk of environmental contamination.
- A concrete wash-down area will be constructed within the temporary site compound. All concrete delivery trucks must use this facility before leaving the site.
- Construction personnel will receive training on pollution incident control procedures as required by the EPA Licence.
- Portable sanitation facilities, such as portaloos or containerised toilets, will be provided as needed to supplement existing welfare facilities. Waste from these units will be removed from site by a licensed waste disposal contractor.

6.6.1.2 Suspended solids

As there is potential for run-off to indirectly discharge to a watercourse Knockharley Stream and eventually to River Nanny, in order to manage the potential impact associated with sediment and sediment runoff the following mitigation measures will be implemented during the construction phase.

- During earthworks and excavation works care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.
- Silt reduction measures on site will include a combination of silt fencing and settlement measures.
- A riparian zone with 30m buffer will be maintained along the Knockharley Stream as per the Meath county council development plan 2021-2027.

- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate,
- The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection.
- Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination.
- Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.
- Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations.
- Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site.
- Any surface water run-off collecting in excavations will likely contain a high sediment load. This will not be allowed to directly discharge to any stormwater sewer, drainage ditch or watercourse.

6.6.1.3 Cement/concrete works

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil.

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within buffer zone. Wash-outs will only be allowed to take place in designated areas with an impervious surface where all wash water is contained and removed from site by road tanker or discharged to waste leachate lagoon

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. Relevant personnel working on the site will be suitably trained in the implementation of the procedures.

6.6.1.4 Hydrocarbons and other construction chemicals

The following mitigation measures will be implemented during the construction phase in order to prevent any spillages to ground of fuels and other construction chemicals and prevent any resulting to surface water (and groundwater) systems:

- Designation of bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used, the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers to carry a spill kit and relevant operatives must have spill response training;
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be stored within temporary bunded areas, doubled skinned tanks or bunded containers to a volume of 110% of the capacity of the largest tank/container. Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the Site, they will be secured and on spill pallets; and
- Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated bunded refuelling areas, which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained in the implementation of the procedures.

6.6.1.5 Wastewater Management

Foul wastewater arising from the site will be managed and controlled for the duration of the construction works.

Foul water from the offices and welfare facilities on the site will be collected in portable sanitary facilities and disposed of appropriately by licenced contractor.

The construction contractor will implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the site will be suitably trained in the implementation of the procedures.

6.6.1.6 Surface Water and Groundwater Flow and Quality

- During construction of cells, water will be added to the existing site infrastructure and drainage system. As per the IED Licence (W146-04), the following design and mitigation measures will be in place to ensure surface water quality discharge meet licence limits with no resulting impacts on receiving water quality:

- Surface water management infrastructure is in place and maintained during construction works. As a minimum, the infrastructure is capable of the following:
    - Collection/diversion of any contaminated run-off arising within the installation. An actuated penstock is in place to prevent surface water discharging into the next pond, constructed wetland or receiving water in the event that monitoring should indicate contamination of the surface water;
    - the prevention of contaminated water and leachate discharges into surface water drains and courses; and
    - the collection/diversion of run off arising from capped and restored areas, incorporating adequately sized swales.
    - Discharge from attenuation ponds is further treated by microbiological treatment, chemical treatment and physical treatment through constructed wetlands before discharge to streams.
    - The inlet to the northern surface water holding pond and southern attenuation pond includes Class I Full Oil Interceptor.

- The culvert and river diversion shall be constructed and operational prior to the commencement of construction works for the Proposed Landfill.

- The proposed development works include a small diversion of the existing Knockharley Stream. The diverted stream will be open stream with the exception of existing access road crossing which will require a culvert to allow the road to pass over. The design of the diversion aims to preserve the existing hydrological function of the stream and will not result in any significant changes to flow regime, connectivity, or water quality. The open channel sections will be designed to mimic natural conditions and will incorporate geomorphological features such as, pools and riffles where feasible, along with appropriate bed and bank materials to promote aquatic and riparian habitat.

- The contractor will be obliged to operate in compliance with a Construction Environmental Management Plan which includes measures for management of runoff water quality, avoidance controls (e.g keeping machinery out of water courses, management of water from cement works areas, working only in appropriate weather conditions and suspending works in heavy rainfall conditions to avoid silty runoff, and emergency response measures for any localised spills, managing of soil stockpiles).

- Sequencing of works will be undertaken to ensure that the proposed development is constructed in managed stages.

- The existing contractor compound, which is on hardstand, will be used for refuelling, storage of machinery and chemicals. This also included dedicated welfare facilities with offsite disposal.

- All foul effluent generated from administration welfare facilities is collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

6.6.1.7 Human Health and Populations

It has been established (refer to Section 6.5.1.3 above) that there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream in the Knockharley Stream and River Nanny. In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the proposed development site.

As there is no source pathway linkage, no mitigation is required.

6.6.1.8 Potential Impacts on Water Framework Directive Status

It has been established (refer to Section 6.5.1.4 above) that there is a potential of accidental discharges during the construction phase. However, these are temporary short-lived events that will not impact on the status of the FlemingstownStream, Kentstown Stream and Veldonstown Stream, Nanny [Meath]_SC_010 (European Code: IE_EA_08N010280), the Balrath Woods pNHA (Site Code: 001519), River Nanny Estuary and Shore SPA (Site Code: 004158), North-west Irish Sea SPA (Site Code: 004236) or the underlying Realtage GWB (European Code: IE_SE_G_020) and the adjacent Donore GWB (European Code: IE_SE_G_021) in the long-term. As such the proposed development will not cause any significant deterioration or change in water quality status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the third cycle river basin management plan (2022-2027) i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland.

The mitigation measures set out in Section 6.6.1 will be implemented during the construction works for the protection of surface water and groundwater quality.

6.6.2 Operational Phase

6.6.2.1 Surface Water and Groundwater Quality

The landfill will be required to operate in compliance with the existing licence and licence conditions for discharge to receiving waters. This will ensure protection of receiving water status.

- As current, there will be an engineered landfill liner and leachate collection system, an under cell drainage system and leachate recording and monitoring programme. The leachate collection rising main will discharge to the existing leachate lagoons or tanks on site. To manage the additional leachate generated by the proposed development, 2 no. containerised reverse osmosis plant units will be stationed on reinforced concrete bunded slabs (Plant Bund) and 12 no. additional storage tanks (6 no. per Reverse Osmosis plant unit) will be stationed on reinforced concrete bunded slabs.

- The existing surface water management infrastructure will be extended and maintained at the during Operation. The infrastructure is capable of the following:
    - Collection/diversion of any contaminated run-off arising within the installation. An actuated penstock is in place to prevent surface water discharging into the next pond, constructed wetland or receiving water in the event that monitoring should indicate contamination of the surface water;
    - the prevention of contaminated water and leachate discharges into surface water drains and courses; and
    - the collection/diversion of run off arising from capped and restored areas, incorporating adequately sized swales.
    - Discharge from attenuation ponds is further treated through constructed wetlands before discharge to streams.
    - The inlet to the northern surface water holding pond and southern attenuation pond includes Class I Full Oil Interceptor.
    - The northern and southern attenuation ponds discharge to wetlands for secondary retention and treatment prior to discharge.

- An Environmental Management System currently operates at the facility as required by the licence and includes measures for maintenance, inspections of containment etc, management of monitoring, reporting and spill response training and reporting.

- The proposed surface water design was designed to provide the following, including a 30% climate change post closure;

- The Northern Attenuation Pond has been designed to provide long-term storage which will discharge at a maximum rate of 109 l/s for a 1:100 AEP event through a Hydro-brake device, or similar on the outlet pipe to regulate the discharge rate. The total storage volume required to attenuate the 1:100 AEP event is 7,901 m3. The current attenuation capacity provided by the Northern Attenuation Pond and the Holding Pond will be sufficient to accommodate the design storage volume. An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

- The Southern Attenuation Pond has been designed to provide long-term and short-term storage. The long-term storage will discharge at a maximum rate of 107 l/s during a 1:100 AEP event. It has been assumed that an orifice, or similar, will be installed on the outlet pipe to regulate the discharge rate. The total storage volume required to attenuate the 1:100 AEP event is 9,401m^3. Similarly, the minimum long-term storage volume required in the pond is 3,249 m^3 to attenuate the 1:1 AEP event. The current attenuation capacity provided by the Southern Attenuation Pond will be increased from c. 6,900m^3. to c. 12,700m^3 to meet this criterion. An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

Refer to the Knockharley Landfill Expansion Services Report produced by WSP in September 2025 submitted as part of the planning application for further information on the proposed storm water management and design.

6.6.2.2 Surface Water and Groundwater Flow and Quantity

The design of the development and its drainage infrastructure will ensure that runoff rates are restricted to those of greenfield conditions. The development will incorporate design mitigation measures such as SuDS and an attenuation system, with a design that includes flow rate of 1% AEP plus a 20 % allowance for climate change during operation and a 30% allowance for climate change post closure. The proposed surface water management strategy incorporates the minimum long-term storage volume required in the pond is 3,249 m^3 to attenuate the 1:1 AEP event.

6.6.2.3 Human Health and Populations

Since, there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream of the site. In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the proposed development site.

As there is no source pathway linkage, no mitigation is required.

6.6.2.4 Water Framework Directive Status

There are discharges of surface water during the operational phase to the Knockharley Stream located in the northern and southern section of the site. However, the landfill will be required to operate in compliance with the existing licence and licence conditions for discharge to receiving waters. This will ensure protection of receiving water status. These discharges will be adequately attenuated via SuDS measures i.e. grassed swales, attenuation ponds and wetland treatment in northern and southern catchment. All surface water flows from the proposed development will be directed to the exisiting attenuation ponds which have the storage capacity for the increased run off and flows. The flow control devices are already installed downstream of the ponds outlet pipes to ensure the surface water runoff is stored maximising storage potential and the discharged rate agreed in the licence is not exceeded, prior to entering the network downstream i.e. Knockharley Stream.

As current, there will be an engineered landfill liner and leachate collection system, an under cell drainage system and leachate recording and monitoring programme. The leachate collection rising main will discharge to the existing leachate lagoons or tanks on site. To manage the additional leachate generated by the proposed development, 2 no. containerised reverse osmosis plant units will be stationed on reinforced concrete bunded slabs (Plant Bund) and 12 no. additional storage tanks (6 no. per Reverse Osmosis plant unit) will be stationed on reinforced concrete bunded slabs. This ensures that there is no interaction with surface water or groundwater.

These proposed design measures ensure there is no impact to the WFD water quality status of the Knockharley Stream, Kentstown Stream and Veldonstown Stream, Nanny [Meath]_SC_010 (European Code: IE_EA_08N010280), the Balrath Woods pNHA (Site Code: 001519), River Nanny Estuary and Shore SPA (Site Code: 004158), North-west Irish Sea SPA (Site Code: 004236) or the underlying Realtage GWB (European Code: IE_SE_G_020) and the adjacent Donore GWB (European Code: IE_SE_G_021).

Therefore, the proposed development will not cause any deterioration or change in water body status or prevent attainment, or potential to achieve, future good status or to meet the requirements and/or objectives in the Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024). (Refer to Appendix 6.3 for WFD assessment).

No additional mitigation measured are required to ensure WFD compliance.

6.6.3 Decommissioning and Remediation Phase

The mitigation measures applied during the decommissioning and remediation phase will be same as outlined in the construction phase apart from:

- Final remediation of leachate collection system will be designed and undertaken in accordance with EPA licence requirements
- Hardstand areas will be rehabilitated and revegetation in line with the agreed restoration plan.

In terms of ongoing site activities post completion of landfilling following completion of decommissioning, mitigation impacts are expected to be in line with the implementation of the Closure, Restoration and Aftercare Management Plan (CRAMP) in line with EPA requirements and respond to the potential impacts identified.

- Water management and leachate treatment systems maintained and operated for as long as required to protect surface water and groundwater quality.
- Landfill gas management measures, including collection, treatment and/or utilisation, to continue until monitoring demonstrates that emissions are stable and no longer pose a risk.
- Landscaping and aftercare management to ensure the long-term stability and environmental integration of the capped landfill.

These mitigation measures will need to remain in place for the duration of the decommissioning and remediation phase as required by the EPA. The site cannot be surrendered and formally closed until the EPA is satisfied that all closure, restoration and aftercare requirements have been met, in accordance with Condition 10 of the facility's licence.

6.7 Monitoring or Reinstatement Measures

6.7.1 Construction Phase

During construction phase the following monitoring measures will be implemented.

Monitoring of the existing landfill groundwater and surface water will continue in line with licence requirements.

- Monitoring will be undertaken by the contractor in compliance with the project CEMP.
- Contractors will carry out regular inspections to confirm compliance with the CEMP. Daily inspections by contractors will address potential environmental impacts including dust, litter, waste management and general housekeeping.
- Buffers along existing ponds, drainage ditches and streams will be fenced off and maintained in grass cover in accordance with objective 38 of the Meath County Council Development plan 2021-2027.
- Regular inspection of surface water run-off and sediments controls (e.g., silt traps). Inspection and maintenance of the silt control measures during construction phase is crucial to ensuring that they work as intended.
- Regular inspection of construction / mitigation measures (e.g., concrete pouring, refuelling, etc).

6.7.2 Operational Phase

Monitoring as per licence conditions and maintenance of the surface water drainage system, including interceptors, and leachate collection system to minimise any accidental discharges to the underlying soils. An Environmental Management System currently operates at the facility as required by the licence and includes measures for maintenance, inspections of containment etc, management of monitoring, reporting and spill response training and reporting.

No additional monitoring for the purpose of the EIAR is deemed necessary.

6.7.3 Decommissioning and Remediation Phase

Monitoring Monitoring and reporting to verify the effectiveness of closure measures identified in CRAMP and demonstrate compliance with licence conditions.

6.8 Residual Effects of the Proposed Development

6.8.1 Construction Phase

6.8.1.1 Surface Water and Groundwater Quality

The implementation of the mitigation and monitoring measures detailed in Section 6.6.1 and 6.7.1, will ensure that the potential impacts on surface water and groundwater quality during the construction phase are adequately mitigated. There will be no change to overall flow and quality within the hydrological and hydrogeological regime as a result of construction.

The residual effect on surface water and groundwater quality during the construction phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.1.2 Surface Water and Groundwater Flow and Quantity

The implementation of the mitigation and monitoring measures detailed in Section 6.6.1 and 6.7.1, will ensure that the potential impacts on surface water and groundwater flow and quantity during the construction phase are adequately mitigated. There will be no change to overall flow and quality within the hydrological and hydrogeological regime as a result of construction.

The residual effect on surface water and groundwater flow and quantity during the construction phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.1.3 Human Health and Populations

Since, that there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream in the Knockharley Stream or River Nanny. In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the proposed development site.

As there is no source pathway linkage, no residual impacts are anticipated on human health and populations i.e. ***neutral, imperceptible*** and ***long-term***.

6.8.1.4 Water Framework Directive Status

Even in the absence of the mitigation and monitoring measures detailed in Section 6.6.1 and 6.7.1.

The residual effect on Water Framework Directive status of any waterbody or habitat during the construction phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.2 Operational Phase

6.8.2.1 Surface Water and Groundwater Quality

The implementation of the mitigation and monitoring measures detailed in Section 6.6.2 and 6.7.2, will ensure that the potential impacts on surface water and groundwater quality once the proposed development is constructed and operational are adequately mitigated.

The residual effect on surface water quality during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.2.2 Surface Water and Groundwater Flow and Quantity

The implementation of the mitigation and monitoring measures detailed in Section 6.6.2 and 6.7.2, will ensure that the potential impacts on surface water and groundwater flow and quantity once the proposed development is constructed and operational are adequately mitigated.

The residual effect on surface water and groundwater flow and quantity during the operational phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.2.3 Human Health and Populations

Since, that there are no recorded Recreational Waters, Bathing Waterbodies or Surface Water Drinking RPA located downstream in the Knockharley Stream or River Nanny. In addition, there are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution located in the vicinity of the proposed development site.

As there is no source pathway linkage, no residual impacts are anticipated on human health and populations.

6.8.2.4 Water Framework Directive Status

No residual impacts are anticipated on the Water Framework Directive status of any receiving waterbody or habitat. The residual effect on Water Framework Directive status during the operation phase is considered to be ***neutral, imperceptible*** and ***long-term***.

6.8.3 Decommissioning and Remediation Phase

The implementation of the mitigation and monitoring measures detailed in Section 5.6.3 and 5.7.3, will ensure that the potential impacts on land, soils and geology once the proposed development is constructed and operational are adequately mitigated. The residual effect on soils and geology during the Decommissioning and remediation phase is considered to be ***neutral, imperceptible*** and ***long-term.***

6.9 Cumulative Impacts of the Proposed Development

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below. For details on the developments considered refer to Chapter 2, Section 2.9 and Appendix 2.1.

Two projects of note in the proximity to the development are the proposed 180 Megawatt gas fired peaking power plant proposed to be located to the immediate southwest of the Proposed Development site, and a planned 165 ha solar farm in the vicinity of the Proposed Development site, however this has not yet within the planning system. The project is at non-statutory pre-planning community consultation stage.

Existing developments that are already built and in operation contribute to the characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational developments has been assessed in the preceding sections of this chapter.

Any future application on these lands will be subject to planning approval and environmental assessment as required. Any new development proposed on the lands after the submission of the proposed development would be accompanied by an EIAR, or EIA Screening as required and take into consideration the development of this site.

The developments in Table 6-9 below are considered to be the project which could most likely result in cumulative effects with the Proposed Development. This table summarises the potential for combined residual cumulative effects of each of these developments during the construction, operational and decommissioning and remediation phases of the Proposed Development

6.9.1 Construction Phase

In relation to the potential cumulative impact on hydrology and hydrogeology during the construction phase, the construction works which would have potential cumulative impacts are as follows:

- Surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses.
- Stockpiled material will be stored on hardstand away from surface water drains, and gullies will be protected during works to ensure there is no discharge of silt-laden water into the surrounding surface water drainage or to ground.
- Contamination of surface water and groundwater from accidental spillage and leakage from construction traffic and construction materials is possible unless project-specific measures are put in place for each development and complied with.

The works contractors for other planned or permitted developments will be obliged to ensure that measures are in place to protect surface water and groundwater quality in compliance with legislative standards for receiving groundwater quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016) and surface water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019).

The implementation of mitigation and monitoring measures previously detailed above in section 6.6.1 and 6.7.1 as well as the compliance of other developments with their respective planning conditions, will ensure there will be no significant cumulative potential for change to the hydrological and hydrogeological environment during the construction phase of the proposed development.

The residual cumulative impact of the proposed development in combination with other planned or permitted developments can therefore be considered to be ***neutral, imperceptible*** and ***long-term***.

6.9.2 Operational Phase

In relation to the potential cumulative impact on hydrology and hydrogeology during the operational phase, the operational activities which would have potential cumulative impacts are as follows:

Increased impermeable areas will reduce local recharge to ground and increase surface water run-off potential if not limited to the green field run-off rate from the site. Cumulatively this development and others in the area will result in localised reduced recharge to ground and increase in surface run-off. However, the existing drainage system on site aims to store any excess run off without impacting the current discharge rates to the surrounding water bodies.

Each specialist has considered the list of relevant planning permissions from the surrounding areas of the proposed development as presented in Chapter 2 – Description of Proposed Development - Appendix 2.1. The proposed development and other permitted developments will result in an increase in hard standing which will result in localised reduced recharge to ground.

The proposed development site is underlain by a "*Poor Aquifer*". There is no potential for change in groundwater levels as a result of local changes in the groundwater regime at the site due to the natural recharge capacity of the underlying aquifer which allows for the maintenance of groundwater levels.

The implementation of SuDS measures on site will mitigate against and reduce the recharge rate to ground.

All developments are required to ensure they do not have an impact on the receiving water environment in accordance with the relevant legislative standards for receiving groundwater quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016 and amendments) and surface water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019 and amendments).

The implementation of mitigation and monitoring measures previously detailed above in section 6.6.2 and 6.7.2 as well as the compliance of other developments with their respective planning conditions, will ensure there will be no significant cumulative potential for change to the hydrological and hydrogeological environment during the operational phase of the proposed development.

The residual cumulative impact of the proposed development in combination with other planned or permitted developments can therefore be considered to be ***neutral, imperceptible*** and ***long-term***.

6.9.3 Decommissioning and Remediation Phase

The potential for cumulative impacts during the Decommissioning and Remediation Phase has been considered; however, there are no known projects or developments that could interact with the site given the long-term time horizon for this phase. The existing landfill forms part of the baseline environment, and the proposed development represents an extension to that activity. Key site-specific activities during the Decommissioning and Remediation Phase are consistent with those required for the existing landfill and include:

- Final landfill capping, undertaken in accordance with the CEMP;
- Ongoing post- landfilling site activities, carried out in accordance with the CRAMP.

Through implementation of the CEMP and CRAMP, adherence to EPA guidance, and regulatory oversight, decommissioning and remediation will be managed to ensure that no significant environmental effects arise. Given the long-term time horizon, any future proposed developments will be required to ensure that cumulative impacts in combination with this development remain at an acceptable level.

In relation to the potential cumulative impacts on hydrology and hydrogeology during the decommissioning and remediation phase, the risk of accidental spills, leaks, and discharges into the underlying aquifer and surrounding hydrological environment. However, the mitigation measures outlined in Section 5.6.3 will be implemented to prevent and control these risks, ensuring the protection of the underlying bedrock aquifer and surrounding waterbodies.

The implementation of mitigation and monitoring measures detailed in Section 6.6.3; as well as the compliance of permitted developments listed in Appendix 2.1 of Chapter 2 and any future permitted developments with their respective planning conditions, will ensure there will be minimal cumulative potential for change to the hydrology and hydrogeology environment during the decommissioning and remediation phase of the proposed development.

The residual cumulative impact of the Proposed Development in combination with other planned or permitted developments can therefore be considered to be ***neutral, imperceptible*** and ***long-term.***

Table 6-9. Cumulative Potential Impact and Rationale

Project	Distance from Project Site	Potential Cumulative Impacts	Rationale	Construction Schedule
Curraghtown Gas-fired power plant (Planning ref: Meath County Council - 2460842)	Adjoining the site	The residual cumulative impact of the proposed development in relation to hydrology and hydrogeology for Construction, operation and decommissioning and remediation phase in combination are therefore considered to be neutral, imperceptible and long-term.	The proposed project will have to adhere and implement their own CEMP and will be obliged to ensure that measures are in place to protect surface water and groundwater quality in compliance with legislative standards for receiving groundwater quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016) and surface water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019).	Overall, the construction period is assessed to be 36 months. Noting also that the proposed works on the north side of the river up to the N51 is assessed to be 27 months duration and works on the south side of the river to be 33 months. No details on commencement
165 ha. Solar farm (not yet submitted for planning)	Adjoining the site	The residual cumulative impact of the proposed development in realtion to hydrology and hydrogeology for Construction, operation and decommissioning and remediation phase in combination are therefore considered to be neutral, imperceptible and long-term.	The proposed project will have to adhere and implement their own CEMP and will be obliged to ensure that measures are in place to protect surface water and groundwater quality in compliance with legislative standards for receiving groundwater quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016) and surface water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019).	N/A

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- Site Investigation Report (Priority Geotechnical, 2017)
- Geophysical Survey (Priority Geotechnical, 2016)
- Site Investigation Report (GII, 2025)
- Geophysical Investigation Report (Apex Geophysics, 2025)
- Knockharley Landfill Expansion Services Report (WSP, 2025)
- Construction Environmental Management Plan (WSP, 2025)
- Engineering Design and Drawings (WSP, 2025)

Chapter 7 – Biodiversity

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7. BIODIVERSITY

7.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the output of the biodiversity assessment and contains information regarding, inter alia, the biodiversity baseline scenario, the potential impacts on biodiversity, the mitigation measures, and the predicted residual effects of Project West, hereafter referred to as the Proposed Development.

In accordance with the requirements of *Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment* (i.e. the EIA Directive), this chapter of the EIAR identifies, describes and assesses the likely direct and indirect significant effects of the Proposed Development on biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC (i.e. the Habitats and Birds Directives). In addition, this chapter of the EIAR also identifies, describes and assesses the likely direct and indirect significant effects of the Proposed Development on species protected pursuant to the Wildlife Acts 1976 (as amended).

The EIA Directive does not provide a definition of biodiversity. The Convention on Biological Diversity, however, gives a formal definition of biodiversity in its article 2: "*biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*". Alongside the term "biodiversity" the terms "ecology" and "ecological" are also used throughout this chapter as a broader term to consider the relationships of biodiversity receptors to one another and to their environment.

The aims of this assessment were to:

- Establish and evaluate baseline ecological environment, as relevant to the Proposed Development;
- Identify, describe and assess all potentially significant ecological effects associated with the Proposed Development;
- Set out the mitigation measures required to address any potentially significant ecological effects and ensure compliance with relevant nature conservation legislation;
- Provide an assessment of the significance of any residual impacts after mitigation; and,
- Identify any appropriate compensation, enhancement or post-construction monitoring requirements.

A separate stand-alone Appropriate Assessment (AA) Screening Report and follow on Stage Two Natura Impact Statement (NIS) (Scott Cawley Ltd., 2025a,b) have been prepared and are submitted as part of the planning application documentation. These reports contain information to inform the competent authority's assessment of potential impacts on European sites as a result of the Proposed Development either alone or in combination with other plans/projects.

7.2 Legislation, Policy and Guidance

7.2.1 Legislation

The collation of ecological baseline data and the preparation of this assessment has had regard to the following legislation and policy documents. This is not an exhaustive list but the most relevant legislative and policy basis for the purposes of preparing this Biodiversity chapter.

The following international legislation is relevant to the Proposed Development:

- Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 ('the EIA Directive').
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter, referred to as the 'Habitats Directive'. The Habitats Directive is the legislation under which the Natura 2000 network[1] was established and special areas of conservation (SACs) are designated for the protection of natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of that directive.
- Directive 2009/147/EEC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds; hereafter, referred to as the 'Birds Directive'. The Birds Directive is the legislation under which special protection areas (SPAs) are designated for the protection of endangered species of wild birds listed in Annex I of that directive.
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy hereafter, referred to as the 'Water Framework Directive'. The Water Framework Directive' is the legislation requiring the protection and improvement of water quality in all waters (rivers, lakes, groundwater, and transitional coastal waters) with the aim of achieving good ecological status by 2015 or, at the latest, by 2027.

The following national legislation is relevant to the Proposed Development:

- Wildlife Act 1976 (as amended); hereafter collectively referred to as the 'Wildlife Acts'. The Wildlife Acts are the principal pieces of legislation at national level for the protection of wildlife and for the control of activities that may harm wildlife. All bird species, 22 other animal species or groups of species, and 86 species of flora are protected under this legislation.
- Planning and Development Acts 2000 (as amended); hereafter collectively referred to as the 'Planning and Development Acts'. This piece of legislation is the basis for Irish planning. Under the legislation, development plans (usually implemented at local authority level) must include mandatory objectives for the conservation of natural heritage and for the conservation of European Sites. It also sets out the requirements in relation to environmental assessment with respect to planning matters, including transposition of the Habitats and Birds Directive into Irish law.
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 (as amended) (S.I. 477 of 2011 (as Amended); hereafter the 'Birds and Habitats Regulations'. This legislation transposes the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the regulations).
- European Communities (Water Policy) Regulations 2003 (as amended) (S.I. No. 722 of 2003). This legislation transposes the Water Framework Directive into Irish Law.

[1] The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special Areas of Conservation are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special Protection Areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats. In Ireland these sites are designed as European sites - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

- Flora (Protection) Order, 2022. This lists species of plant protected under Section 21 of the Wildlife Acts.

7.2.2 Policy

The following plans and policies are relevant to the Proposed Development:

- Ireland's 4th National Biodiversity Action Plan 2023-2030 (Department of Housing, Local Government and Heritage, 2023)
- All-Ireland Pollinator Plan 2021-2025 (National Biodiversity Data Centre, 2021)
- National Development Plan Ireland 2021-2030
- National Energy & Climate Plan 2021-2030
- Project Ireland 2040 – National Planning Framework
- Climate Action Plan 2025
- Regional Spatial & Economic Strategy- Eastern and Midland Region 2019-2031
- The River Basin Management Plan for Ireland 2022-2027
- Meath County Development Plan 2021-2027
- County Meath Biodiversity Action Plan 2015 – 2020[2]
- Climate Action Plan 2024-2029
- County Meath Heritage Plan 2015-2020

7.2.3 Guidance

The process of identifying, quantifying and evaluating potential impacts of the Proposed Development on habitats, species and ecosystems was undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland Version 1.3 (CIEEM, 2024). In addition, reference to the following recognised guidance defined the scope and evaluation process:

- Collins (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Edition) The Bat Conservation Trust;
- European Commission (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report;
- Environmental Protection Agency (EPA) (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports; and
- Marnell, F., Kelleher, C., & Mullen, E. (2022). Bat Mitigation Guidelines for Ireland V2. Irish Wildlife manuals, No. 134. National Parks & Wildlife Service, Department of Housing, Local Government and Heritage, Ireland
- Department of Housing, Planning and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. August 2018.
- European Union (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment
- CIEEM (2024) Guidelines for Ecological Impact Assessment in the UK and Ireland version 1.3
- National Roads Authority (NRA) (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes
- Transport Infrastructure Ireland (TII) (2020a) The Management of Invasive Alien Plant Species on National Roads – Technical Guidance
- TII, (2020b) The Management of Invasive Alien Plant Species on National Roads – Standard
- NRA (2005-2009) Environmental Guidelines Series for Planning and Construction of National Roads

[2] Whilst it is recognised that the Meath Biodiversity Action Plan is now out of date, the recommendations are still valid, and the consultation in respect of the pre-draft discussion paper for the Meath Biodiversity Action Plan 2025-2030 has been launched by Meath County Council.

- National Parks & Wildlife Service (NPWS) (2007a) Circular Letter NPWS 2/07 Guidance on compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/applications for derogation licences
- NPWS (2007b) Circular Letter PD 2/07 and NPWS 1/07 Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites
- NPWS (2011) Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland
- NPWS (2021) The strict protection of animal species of Community interest under the Habitats Directive

7.3 Methodology

7.3.1 Scope of Assessment

7.3.1.1 Forecasting Methods and Difficulties Encountered

No forecasting methods were employed. Limitations to surveys included part of the Proposed Development being inaccessible on instruction of the Site Manager, due to an unauthorised encampment onsite, affecting 13ha of the site during the breeding bird and bat surveys in April 2025. Access was denied to farmland north of the site, outside of the Proposed Development. This limited access to a 350m section of the Knockharley Stream (EPA Name: Flemingstown 08, EPA Code: 08F05) at the border of the Proposed Development for kingfisher Surveys.

7.3.1.2 Study Area

The site is a 135.2 hectare land holding with the existing landfill footprint positioned near its centre. The Proposed Development is being developed in 7 no. phases (see Section 7.5.1) and the current authorised landfill, when fully developed, will comprise 40 landfill cells. The planned expansion of the existing landfill will provide an additional active void space of 4.12 million m^3 for landfilling.

The study area is defined by the Zone of Influence (ZoI) (See Figure 7.1) of the Proposed Development with respect to the ecological receptors that could potentially be affected on and beyond the Proposed Development site. The study area was defined by the findings of the desk study (presence/absence of protected habitats, flora or fauna within the ZoI) and best practice methodology referenced above for assessing effects on those ecological features. In general, the study area includes the site of the Proposed Development and consideration is also given to species and habitats outside this area on a case-by-case basis.

7.3.1.3 Establishing a Zone of Influence

The ZoI, or distance over which potentially significant effects may occur, will differ across the Key Ecological Receptors (KERs), depending on the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken have established the habitats and species present within, and in the vicinity of, the Proposed Development site. The ZoI was informed and defined by the sensitivities of each of the likely KERs present, in conjunction with the nature and potential impacts associated with the Proposed Development. In some instances, the ZoI extends beyond the study area (e.g., surface water quality effects of a sufficient magnitude can extend, and affect, receptors at significant distances downstream).

The ZoI of the Proposed Development in relation to terrestrial habitats is generally limited to the footprint of the Proposed Development, and the immediate environs (to take account of shading or other indirect impacts, such as air quality). Hydrogeological / hydrological linkages (e.g., rivers

or groundwater flows) between impact sources and wetland / aquatic habitats can often result in impacts occurring at significant distances.

With regards to hydrological impacts, the distances over which water-borne pollutants are likely to remain in sufficient concentrations to have a likely significant effect on receiving waters and associated wetland / terrestrial habitat and species are highly site-specific and related to the predicted magnitude of any potential pollution event. Evidently, it will depend on volumes of discharged waters, concentrations, and types of pollutants (in this case leachate, chemicals, plastic leading to eutrophication), volumes of receiving waters, and the ecological sensitivity of the receiving waters. In the case of the Proposed Development, the ZoI of potential impacts on surface water quality in the receiving environment could potentially extend downstream as far as the River Nanny Estuary and the Irish Sea, 21.5km and 27.8km downstream from the Proposed Development, respectively.

The unmitigated ZoI of air quality effects is generally local to the Proposed Development and not greater than a distance of 50m from the Proposed Development boundary (refer to Chapter 8 (Air Quality) for more detail).

The ZoI in relation to direct impacts to wintering birds could extend up to approximately 300m from the Proposed Development for general construction activities, as many species (such as waterbirds) are highly susceptible to disturbance from loud and unpredictable noise during construction[3]. Additionally, as many estuarine bird species use inland habitat areas at distances from the coast, the effect of *ex-situ*[4] impacts could extend a considerable distance from the Proposed Development. In the case of the Proposed Development, impacts to wintering birds within this 300m band could affect the use of potential *ex-situ* sites for bird species listed as Special Conservation Interests (SCI) of the nearby European sites, River Nanny Estuary and Shore SPA and North-west Irish Sea SPA.

The ZoI of the Proposed Development in relation to likely significant effects on most breeding bird species is generally limited to habitat loss within the footprint of the Proposed Development, and disturbance/displacement during construction and disruption in territorial singing due to noise during operation. Disturbance effects may extend for several hundred metres from the Proposed Development.

The ZoI for impacts to aquatic species, such as Atlantic salmon and lamprey species, is limited to those watercourses crossed by the Proposed Development or waterbodies to which runoff from the Proposed Development could drain to during construction. However, impacts could occur at significant distances downstream depending on the magnitude and duration of any pollution event; potentially even affecting species in the receiving estuarine and marine environment.

The ZoI for small mammal species, such as the pygmy shrew, would be expected to be limited to no more than approximately 100m from the Proposed Development due to their small territory sizes and sedentary lifecycle. The disturbance ZoI in relation to otters, badgers, stoat, and

[3] Current understanding of construction related noise disturbance to wintering waterbirds is based on the research presented in Cutts *et al.* (2009) and Wright *et al.* (2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging or roosting birds. Noise levels between 50dB and 70dB would provoke a moderate effect/level of response from birds, i.e. birds becoming alert and some behavioural changes (e.g. reduced feeding activity), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At *c.* 300m, typical noise levels associated with construction activity (BS 5228) are generally below 60dB or, in most cases, are approaching the 50dB threshold.

[4] In respect of this report, the term ex-situ refers to inland feeding sites which are utilised by SCI wintering bird species, but that are outside the boundaries of the SPA to which the species are designated for.

hedgehogs may extend over greater distances[5] than smaller mammal species due to their ability to disperse many kilometres from their natal site; however, the ZoI of significant disturbance impacts to badger and otter breeding/resting places (including impacts associated with elevated noise levels) is likely to be no more than approximately 150m from the Proposed Development boundary[6].

The ZoI of potential impacts to bat roosts are dependent on many factors (such as species, roost type, surrounding habitat and commuting routes), this is assessed on a case-by-case basis and the ZoI may increase/decrease from this distance accordingly. Given the large foraging ranges for some species[7], the effect of potential landscape scale impacts, such as habitat loss and severance, could extend for several kilometres from the Proposed Development but the most significant effects are likely to occur within a 3km core sustenance zone (BCT, 2020) associated with roosts of the following bat species which are known to occur in the area; Leisler's bat, Common pipistrelle, Soprano pipistrelle, and *Myotis* species[8]. As per the Bat Conservation Trusts' Guidelines (Collins *et al.,* 2023), core sustenance zones are defined as the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost.

The ZoI in relation to amphibian species is likely to be limited to direct habitat loss and severance with the Proposed Development and/or indirect impacts to water quality in any wetland habitats hydrologically connected to the Proposed Development.

The ZoI in relation to the common lizard is likely to be limited to direct habitat loss and severance with the Proposed Development and disturbance/displacement effects in the immediate vicinity during construction.

The ZoI of general construction and operational activities (i.e. risk of spreading/introducing non-native invasive species, dust deposition and disturbance due to increased noise, vibration, human presence and lighting) is considered unlikely to extend more than several hundred metres from the site of the Proposed Development.

The overall biodiversity ZoI of the Proposed Development is shown in Figure 7-1.

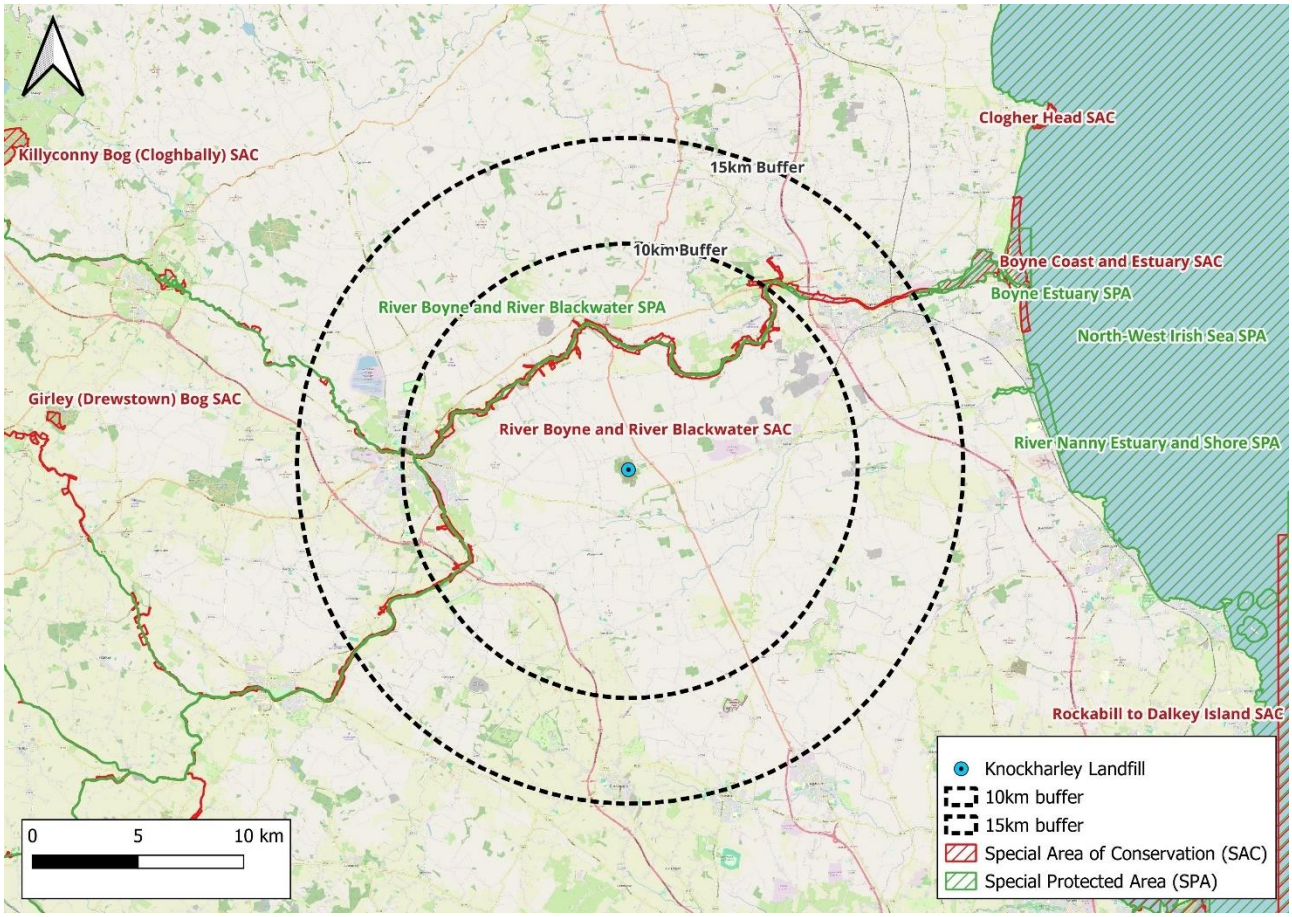
[5] Otter territory size from Ó Néill L. (2008) Population dynamics of the Eurasian otter in Ireland. Integrating density and demography into conservation planning. PhD thesis. Trinity College, Dublin; Badger territory size from NRA (2005) Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes ; Irish stoat territory size from Sleeman, P.D (2016) Irish Stoat (*Mustela erminea hibernica*) Pp 102-103 In Lysaght, L. and Marnell, F. (Eds) (2016) Atlas of Mammals in Ireland 2010-2015, National Biodiversity Data Centre, Waterford; Pine marten territory size from O'Mahony, D. (2016) Pine marten (*Martes martes*) Pp. 100-101 In Lysaght, L. and Marnell, F. (Eds) (2016) Atlas of Mammals in Ireland 2010-2015, National Biodiversity Data Centre, Waterford and Hedgehog territory size from Haigh, A. (2011). The Ecology of the European hedgehog (*Erinaceus europaeus*) in rural Ireland. PhD Thesis, UCC.

[6] This ZoI (i.e. approximately 150m from the Proposed Development boundary) for badgers and otters has been defined in accordance with NRA/TII guidelines i.e. Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA, 2005), and Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA, 2006), and is considered to be of a precautionary distance. During construction-related disturbance, the screening effect provided by surrounding vegetation and buildings would likely reduce the actual distance of the ZoI for badgers and otters.

[7] Leisler's bats have been recorded foraging up to 13km from maternity roost sites (Shiel *et al.*, 1999)

[8] The three *Myotis* species present in Ireland cannot be distinguished by acoustic analysis, therefore they are presented collectively as *Myotis* genus.

Figure 7-1 Zone of Influence (ZoI) of the Proposed Development



7.3.2 Desk Study

A desktop study was carried out to inform the initial scope of the ecological surveys required to inform the environmental impact assessment. The desktop study involved collection and review of relevant published and unpublished sources of data, collation of existing information on the ecological environment and consultation with relevant statutory bodies.

Aquatic surveys were not undertaken in respect of the Proposed Development. Fish stock surveys were not conducted given that significant impacts on fisheries are not anticipated, owing to the nature of the Proposed Development. This follows best practice guidelines (NRA, 2008) which states that "*It will only be appropriate to undertake detailed surveys where significant impacts are anticipated on potentially valuable assemblages of fish, or important populations of a particular species*".

The desk study was undertaken in May 2025, to collate available information on the local ecological environment. The following resources were used to inform the assessment presented in this report:

- Data on European sites, Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the National Parks and Wildlife Service (NPWS) from https://www.npws.ie/protected-sites and https://www.npws.ie/maps-and-data - refer to Figure 7-1 and Section 7.4.2 for locations of protected sites in the vicinity of the Proposed Development[9];

[9] The following SAC, SPA, NHA and pNHA GIS boundary datasets are the most recently available at the time of writing: SAC_ITM_2024_12, SPA_ITM_2024_01, NHA_ITM-2019_06 and pNHA_ITM_2015_11.

- Records of rare and protected species for the 10km grid square(s) [N96], as held by the National Biodiversity Data Centre www.biodiversityireland.ie
- Ordnance Survey Ireland mapping and aerial photography from https://www.geohive.ie/
- Data on waterbodies, available for download from the EPA web map service. Available from https://gis.epa.ie/EPAMaps/
- Information on soils, geology and hydrogeology in the area available from the Geological Survey Ireland (GSI) online Spatial Resources service. Available from https://www.gsi.ie/en-ie/data-and-maps/Pages/Groundwater.aspx
- Information on the conservation status of birds in Ireland from Birds of Conservation Concern in Ireland (Gilbert *et al.,* 2021)
- Information on the location, nature and design of the Proposed Development supplied by the Applicant's design team; and
- IFI consultation regarding the Proposed Development and the realignment of Knockharley Stream.

7.3.3 Overview of Ecological Surveys

The Field surveys for the Proposed Development were undertaken by suitably qualified ecologists from Scott Cawley Ltd., between September 2024 and May 2025 (see Table 7-1). The surveys aimed to detect the presence, or likely presence, of rare/threatened, protected or invasive species, and to record the habitats present in the study area. The surveys provided baseline information regarding the existing ecology of the study area. Incidental records of plants, bird species and protected species were collected throughout the surveys. Specific ecological surveys were carried out with respect to the following:

- Habitats;
- Bats;
- Terrestrial mammals;
- Biological water quality;
- Birds (wintering and breeding); and,
- Invasive Species.

Section 7.3.4 describes the various ecological survey methodologies used to collate baseline ecological information in the preparation of this Chapter. Results of these surveys are presented in Section 7.4. The ecological surveys carried out and dates are summarised in Table 7-1 below.

Table 7-1 Ecological Survey Dates

Survey	Survey Dates
Habitat Surveys	24 September 2024, May 14 2025
Invasive Plant Species Surveys	24 September 2024, May 14 2025
Terrestrial Fauna (excluding bats)	24 September 2024, May 14 2025
Small Stream Risk Score (SSRS)	3,4 and 11 December 2024
Bat Activity Surveys	18 September 2024, 24 September 2024, 4 October 2024, 9 October 2024, 22 April 2025, 13 May 2025
Ground-level Tree Assessment	25 March 2025
Breeding Bird Surveys	20 March 2025, 17 April 2025, 21 May 2025

Wintering Bird Surveys	24 September 2024, 23 October 2024, 20 November 2024, 20 December 2024, 20 January 2025, 20 February 2025, 19 March 2025
Kingfisher Surveys	19 March 2025, 16 April 2025, 13 May 2025

7.3.4 Survey Methodology

7.3.4.1 Habitats and Flora Survey

A habitat survey of the Proposed Development site was undertaken on the 24th September following the methodology described in Best Practice Guidance for Habitat Survey and Mapping (Smith *et al*., 2011). A verification survey was performed on 14 May 2025 to confirm results, as the initial survey was performed late in September 2024 which was suboptimal for identifying habitats and flora species. All habitat types were classified using the *Guide to Habitats in Ireland* (Fossit, 2000) and recording any species of conservation interest. Vascular and bryophyte plant nomenclature generally follow that of *The National Vegetation Database* (Weekes & Fitzpatrick, 2010) having regard to more recent taxonomic changes to species names after the *New Flora of the British Isles* (Stace, 2019) and the *British Bryological Society's Mosses and Liverworts of Britain and Ireland: A Field Guide* (Atherton *et al*., 2010). Non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) and Habitats Regulations and the European Union (Invasive alien species) Regulations 2024 (S.I. 374/2024) were also recorded. The habitat's extent was mapped onto a field tablet using proprietary QField software. Vascular plant nomenclature follows that of the *New Flora of the British Isles Fourth Edition* (Stace 2019).

7.3.4.2 Small Stream Risk Score Survey

A Small Stream Risk Score (SSRS) survey was undertaken on 3, 4, and 11 December 2024 following the methodology described *SSRS Training Manual – a Pollution Investigation Tool for Use in the Field*[10]*.* Small Streams Risk Score (SSRS) is a biological risk assessment system for identifying rivers that are 'at risk' of failing to achieve the 'good' water quality status goals of the Water Framework Directive (WFD) (2000/60/EC). As per EPA the guidance on the SSRS method[10], it is a rapid field methodology for risk assessment that is based on macroinvertebrate indicators of water quality and their well-understood response to pollution. The method produces a continuous score and threshold values are used to decide on the degree of risk at a site. It is possible to compare 'before' and 'after' scores, which may be useful in assessing the potential impact of a development. The SSRS method focuses on first and second order streams and assists in identifying point source pollution which may otherwise be unidentified in a larger river downstream. The sampling site locations are illustrated in Figure 7-2 below. The SSRS rapid technique involved a two-minute kick sample using the 'Travelling Kick Method', a one minute stone wash, and a weed sweep (where possible)[11]. Macroinvertebrate types were identified from each of the samples and the SSRS score was calculated based on the presence/absence of indicator macroinvertebrate taxa. The SSRS scores are classified as per Table 7-2 below.

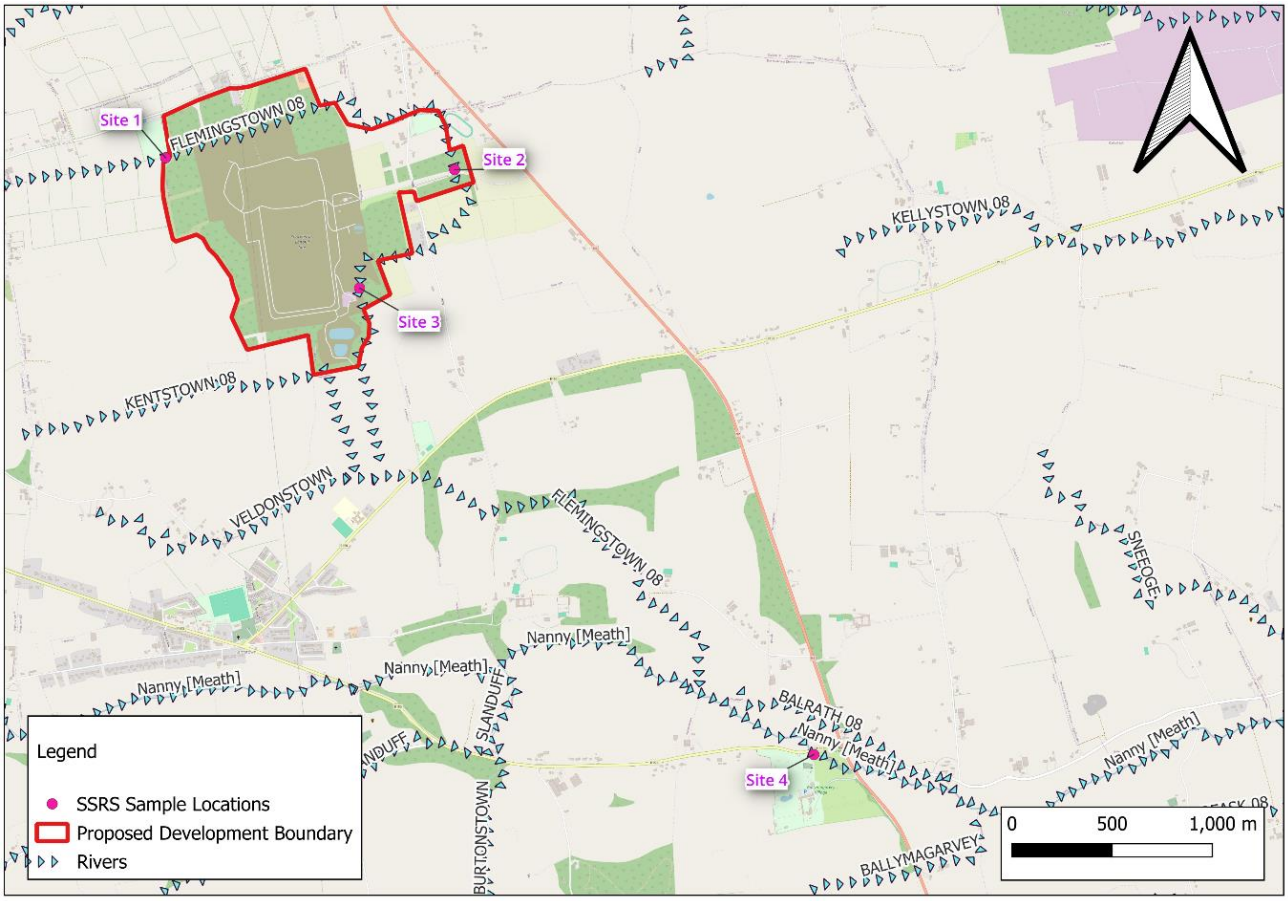
Table 7-2 Small Stream Risk Scores as defined by the EPA

Score	Status
>7.25	Stream 'probably not at risk'
>6.5 to 7.25	Stream 'probably at risk'
<6.5	Stream 'at risk'

[10] Anonymous (2009). Small Streams Risk Score (SSRS) Training Manual. A pollution investigation tool for use in the field. White Young Green, Apex Business Centre, Blackthorn Road, Sandyford, Dublin.

[11] Small Stream Risk Score Method Manual. Western River Basin District Project (2005) Unpublished

Figure 7-2 Small Stream Risk Score (SSRS) sampling locations



7.3.4.3 Fauna Surveys

7.3.4.3.1 Terrestrial Fauna (Excluding Bats)

A dedicated terrestrial fauna survey was undertaken on 24 September 2024. Signs of terrestrial fauna observed during other surveys was also recorded. The presence/absence of terrestrial fauna species were surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. The habitats on site were assessed for signs of usage by protected/red-listed fauna species, and their potential to support these species. Surveys included checks for the presence of badger setts and otter holts within the subject lands, and to record any evidence of use.

7.3.4.3.2 Bats

A ground-level assessment of buildings and vegetation within the subject lands, was undertaken on 25 March 2025. Buildings and vegetation were assessed to determine their suitability to support roosting bats and potential to act as important features for commuting/foraging bats, based on guidelines (see Table 7-3) in *Bat Surveys for Professional Ecologists: Good Practice Guidance* (Collins 4th ed., 2023) and included inspections of buildings or potential roost features (PRFs), and for signs of bats (staining at roost entrances, droppings, carcasses, insect remains).

Four activity surveys were performed, concurrent with the placement of automated detectors, in September 2024, October 2024, April 2025 and May 2025. Bat activity surveys followed a transect which covered the Proposed Development site. Two automated detectors where placed in the north-west (Location 1) and south-east (Location 2) of the site to record activity in forested areas.

Once the detectors had been deployed for a minimum of 7 nights, they were collected, and the data was analysed using proprietary BatExplorer analysis software.

Table 7-3 Guidelines for assessing the potential suitability of subject lands for bats, based on the presence of habitat features within the landscape, applied according to professional judgement. (Taken from Collins (2023))[12]

Suitability	Description of Roosting Habitats	Commuting and Foraging Habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e. a complete absence of crevices/suitable shelter at all ground/underground levels	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e. no habitats that provide continuous lines of shade/protection for flight-lines, or generate/shelter insect populations available to foraging bats).
Negligible[a]	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flight-paths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[b] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity and not a classic cool/stable hibernation site, but could be used by individual hibernating bats[c]).	Habitat that could be used by small numbers of bats as flight-paths such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[b] and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for flight-paths such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.

[12] Collins, J. (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines 4th Edition*.

High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[b] and surrounding habitat. These structures have the potential to support high conservation status roosts, e.g. maternity or classic cool/stable hibernation site.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by bats for flight-paths such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Proposed Development is close to and connected to known roosts.
a) Negligible is defined as 'so small or unimportant as to be not worth considering, insignificant'. This category may be used where there are places that a bat could roost or forage (due to one attribute) but it is unlikely that they actually would (due to another attribute). b) For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance. c) Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2016 and Jansen *et al.*, 2022). Common pipistrelle swarming has been observed in the UK (Bell, 2022 and Tomlinson, 2020) and winter hibernation of numbers of this species has been detected at Seaton Delaval Hall in Northumberland (National Trust, 2018). This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in prominent buildings in the landscape, urban or otherwise.		

7.3.4.3.3 Breeding Birds

Breeding bird surveys were undertaken on 20 March 2025, 2 May 2025, and 21 May 2025 using a methodology adapted from the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species* (Gilbert *et al.*, 2011). The study area covered the Proposed Development site. Lands within the study area were slowly walked in a manner allowing the surveyor to come within 50m of all habitat features. Birds were identified by sight and song, and general location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes.

7.3.4.3.4 Wintering Birds

A full season of wintering bird surveys were undertaken on 24 September 2024, 23 October 2024, 20 November 2024, 20 December 2024, 20 January 2025, 20 February 2025, and 19 March 2025, using a methodology adapted from the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species* (Gilbert *et al.*, 2011). The study area covered the lands within the Proposed Development site. Lands were surveyed visually using binoculars from a vantage point(s) at the edge of the study area followed by a walkover of the area to identify birds which may not be visible from a distance (e.g. waders) and evidence of usage by wildfowl such as swans or geese (e.g. droppings). Birds were identified by sight and general location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes.

7.3.4.3.5 Kingfisher Surveys

Dedicated kingfisher surveys were undertaken on 19 March 2025, 16 April 2025, and 13 May 2025. Kingfisher surveys focusing on the Knockharley Stream, were undertaken as kingfisher are a Birds Directive Annex I species. The nearest SPA for which kingfisher are an SCI is River Boyne and River Blackwater SPA, however there is no hydrological connection between this SPA and the Proposed Development. The survey methodology comprised of walked transects along the accessible riverbank(s) and vantage point watches of potentially suitable kingfisher nesting habitat shortly after dawn. Sightings of nest holes, perches, resting places and individual birds were

recorded and mapped. Nest holes were categorised as active when kingfisher activity was reported near the hole and/or fresh droppings were present at the entrance(s).

7.3.5 Assessment of Methodology

7.3.5.1 Ecological Evaluation

Ecological receptors (including identified sites of ecological importance) are valued with regard to the ecological valuation examples set out in *Guidelines for Assessment of Ecological Impacts of National Roads Schemes: Revision 2* (National Roads Authority, 2009) and the guidance provided in *Guidelines for Ecological Impact Assessment in the UK and Ireland* Version 1.3 (CIEEM, 2024) – refer to Appendix 7.1 for examples of how ecological importance is assigned. In accordance with these guidelines, important ecological features within what is referred to as the ZoI of the Proposed Development which are "both of sufficient value to be material in decision making and likely to be affected significantly" are deemed to be 'Key Ecological Receptors' (KERs). These are the ecological receptors which may be subject to significant effects from the Proposed Development, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of local importance (higher value) or greater.

7.3.5.2 Impact Assessment

Ecological impact assessment is conducted following a standard source-pathway-receptor model, where all three elements of this mechanism must be in place in order for an impact to be established. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potentially significant effect would not occur.

- Source(s) – e.g. pollutant run-off from proposed works;
- Pathway(s) – e.g. groundwater connecting to nearby groundwater dependant wetland habitats; and,
- Receptor(s) – e.g. wetland habitats and the fauna and flora species they support.

7.3.5.3 Characterising and describing impacts

The parameters considered in characterising and describing the potential impacts of the Proposed Development are per the EPA's *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*[13] and CIEEM's *Guidelines for Ecological Impact Assessment in the UK and Ireland*: whether the effect is positive, neutral or negative; the significance of the effects; the extent and context of the effect; the probability, duration and frequency of effects; and, cumulative effects.

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. The following development types are included in considering cumulative effects:

- Existing projects (under construction or operational);
- Projects which have been granted consent but not yet started;
- Projects for which consent has been applied for which are awaiting a decision, including those under appeal; and,
- Projects identified at a plan level, if relevant (e.g. future strategic infrastructure such as roads or greenways, and for which geographic specificity/design criteria may or may not be available).

[13] Environmental Protection Agency (2022) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. May 2022 (refer to Table 3.4)

The likelihood of an impact occurring, and the predicted effects, can also be an important consideration in characterising impacts. In some cases it may not be possible to definitively conclude that an impact will not occur. In these cases, the evaluation of significant effects is based on the best available scientific evidence but where reasonable doubt remains then the precautionary principle is applied, and it may need to be assumed that significant effects may occur. Professional judgement is used in considering the contribution of all relevant criteria in determining the overall magnitude of an impact.

Significant Effects

In determining whether potential impacts will result in significant effects, the CIEEM (2018) guidelines were followed. The approach considers that significant effects will occur when there are impacts on either:

- the structure and function (or integrity) of defined sites, habitats or ecosystems; or
- the conservation status of habitats and species (including extent, abundance and distribution).

Integrity

The term '*integrity*' may be regarded as the coherence of ecological structure and function, across the entirety of a site that enables it to sustain all of the biodiversity or ecological resources for which it has been valued (National Roads Authority, 2009).

The term '*integrity*' is most often used when determining impact significance in relation to designated areas for nature conservation (e.g. SACs, SPAs or pNHA/NHAs) but can also be the most appropriate method to use for non-designated areas of biodiversity value where the component habitats and/or species exist with a defined ecosystem at a given geographic scale.

An impact on the integrity of an ecological site or ecosystem is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites' habitats and/or species; affect the nature, extent, structure and functioning of component habitats; and/or, affect the population size and viability of component species.

Conservation Status

Similar definitions for conservation status given in the EU Habitats Directive 92/43/EEC, in relation to habitats and species, are also used in the CIEEM (2018) and NRA (2009) guidance which are summarised as follows:

- For natural habitats, conservation status means the sum of the influences acting on the natural habitat and its typical species, that may affect its extent, structure and functions as well as its distribution, or the long-term survival of its typical species, at the appropriate geographical scale
- For species, conservation status means the sum of influences acting on the species concerned that may affect the abundance of its populations, as well as its distribution, at the appropriate geographical scale

An impact on the conservation status of a habitat or species is significant if it will result in a change in conservation status, having regard to the definitions of favourable conservation status provided in the EU Habitats Directive 92/43/EEC – i.e. into the future, the range, area and quality of habitats are likely to be maintained/increased and species populations are likely to be maintained/increased.

According to the CIEEM methodology, if it is determined that the integrity and/or conservation status of an ecological receptor will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e. local, county, national, international). In some cases an impact may not be significant at the geographic scale at which the ecological feature has been valued but may be significant at a lower geographical level. For example, a particular impact may not be considered likely to have a negative effect on the overall conservation status of a species which is internationally important. However, an impact may occur at a local level on this internationally important species. In this case, the impact on an internationally important species is assessed as significant at only a local, rather than an international level.

7.3.6 Consultation

The following organisations with relevance to biodiversity were consulted:

- Inland Fisheries Ireland (IFI)

Correspondence in the form of email was received from IFI on the 15 May 2025, indicating that IFI were satisfied in principle with the proposed stream diversion plans and had no further queries.

7.4 Receiving Environment

7.4.1 Local Biodiversity Areas

The Meath Biodiversity Action Plan 2015 – 2020[14] highlights a number of areas considered to be of biodiversity value present within the boundaries of MCC. These areas that are located within the ZoI of the Proposed Development are provided below;

- European and national sites designated for conservation (i.e. SAC, SPA and pNHA) and the lands surrounding these sites that are of key importance as stepping stones in particular for birds as feeding or roosting grounds;
- The variety of landscape character areas in Co. Meath, some of which are downstream or in close proximity to the Proposed Development, consisting of River Corridors and Estuaries (i.e. Boyne Valley and Nanny Valley), and coastal areas/plains; and
- Habitats considered to be of importance due to intense deforestation and strong agricultural ties in the county, such as woodlands, hedgerows, watercourses, wetlands and coastal habitats, bogs and peatlands, canals, eskers, and urban habitats, all of which support a range of protected and/or rare species and act as important ecological links/corridors/refuges across the wider landscape.

7.4.2 European Designated Sites

The Proposed Development does not traverse any European site. The nearest European sites to the Proposed Development are the River Boyne and River Blackwater SPA and the River Boyne and River Blackwater SAC, approximately 5km north of the Proposed Development. There is no direct surface water hydrological link between the Proposed Development site and the River Boyne and River Blackwater SPA and the River Boyne and River Blackwater SA., However surface water drains from the Proposed Development flow site into the River Nanny (IE_EA_08N010280) via Knockharley Stream (IE_EA_08F050930), which intersects the Proposed Development site and joins the River Nanny approximately 6.7km downstream. The River Nanny Estuary and Shore SPA and North-west Irish Sea SPA lie approximately 22km and 27.8km downstream from the Proposed Development, respectively. All other marine SPAs and SACs are not included in this assessment as

[14] This plan is still valid and there is no published update as checked in August 2025

the perceptible impacts from construction are negative at a local geographic scale (refer to Chapter 6 (Hydrology and Hydrogeology)) and would not impact European sites beyond North-west Irish Sea SPA. No other European sites are hydrologically connected to the Proposed Development.

There are 6 European sites (SACs and SPAs) located within the vicinity of the Proposed Development, listed in Table 7-4 and illustrated in Figure 7-3 below. The QIs/SCIs of the European sites in the vicinity of the Proposed Development are provided in Table 7-4 European sites (SACs and SPAs) located within the ZoI of the Proposed Development boundary. Table 7-4. It is confirmed that, for the purposes of the EIAR, these European sites are valued as being of International Importance.

Table 7-4 European sites (SACs and SPAs) located within the ZoI of the Proposed Development boundary.

European Site Name [Code]	Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
Special Area of Conservation (SAC)		
River Boyne and River Blackwater SAC [002299)	1099 River Lamprey *Lampetra fluviatilis* 1106 Salmon *Salmo salar* 1355 Otter *Lutra lutra* 7230 Alkaline fens 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)* NPWS (2021a) Conservation Objectives: River Boyne and River Blackwater SAC 002299. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. S.I. No. 451/2024 - European Union Habitats (River Boyne and River Blackwater Special Area of Conservation 002299) Regulations 2024	Approximately 4.2km north of the Proposed Development site.
Boyne Coast and Estuary SAC [001957]	1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1310 *Salicornia* and other annuals colonizing mud and sand 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1410 Mediterranean salt meadows (*Juncetalia maritimi*)[15] 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') 2130 Fixed coastal dunes with herbaceous vegetation ('grey dunes')* NPWS (2012) Conservation Objectives: Boyne Coast and Estuary SAC 001957. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. S.I. No. 433/2021 - European Union Habitats (Boyne Coast and Estuary Special Area of Conservation 001957) Regulations 2021	Approximately 15.9km east of the Proposed Development site.
Special Protection Area (SPA)		

[15]The status of Mediterranean salt meadows (*Juncetalia maritimi*) as a qualifying Annex I habitat for Boyne Coast and Estuary S AC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this habitat".

European Site Name [Code]	Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
River Boyne and River Blackwater SPA [004232]	A229 Kingfisher *Alcedo atthis* NPWS (2024) Conservation Objectives: River Boyne and River Blackwater SPA 004232. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. S.I. No. 462/2012 - European Communities (Conservation of Wild Birds (River Boyne and River Blackwater Special Protection Area 004232)) Regulations 2012	Approximately 4.4km north of the Proposed Development site.
Boyne Estuary SPA [004080]	A048 Shelduck *Tadorna tadorna* A130 Oystercatcher *Haematopus ostralegus* A140 Golden Plover *Pluvialis apricaria* A141 Grey Plover *Pluvialis squatarola* A142 Lapwing *Vanellus vanellus* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba* A156 Black-tailed Godwit *Limosa limosa* A162 Redshank *Tringa totanus* A169 Turnstone *Arenaria interpres* A195 Little Tern *Sterna albifrons* A999 Wetlands NPWS (2013) Conservation Objectives: Boyne Estuary SPA 004080. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. S.I. No. 626/2011 - European Communities (Conservation of Wild Birds (Boyne Estuary Special Protection Area 004080)) Regulations 2011.	Approximately 14.7km east of the Proposed Development site.
River Nanny Estuary and Shore SPA [004158]	A130 Oystercatcher *Haematopus ostralegus* A137 Ringed Plover *Charadrius hiaticula* A140 Golden Plover *Pluvialis apricaria* A143 Knot *Calidris canutus* A144 Sanderling *Calidris alba* A184 Herring Gull *Larus argentatus* A999 Wetlands NPWS (2012) Conservation Objectives: River Nanny Estuary and Shore SPA 004158. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. S.I. No. 140/2012 - European Communities (Conservation of Wild Birds (River Nanny Estuary and Shore SPA 004158)) Regulations 2012.	Approximately 16.7km east and 21.5km downstream of the Proposed Development site.
North-West Irish Sea SPA [004236]	A001 Red-throated Diver *Gavia stellata* A003 Great Northern Diver *Gavia immer* A009 Fulmar *Fulmarus glacialis* A013 Manx Shearwater *Puffinus puffinus* A017 Cormorant *Phalacrocorax carbo* A018 Shag *Phalacrocorax aristotelis* A065 Common Scoter *Melanitta nigra* A179 Black-headed Gull *Chroicocephalus ridibundus*	Approximately 18.7km east and 27.8km downstream of the Proposed Development site.

European Site Name [Code]	Qualifying interest(s) / Special Conservation Interest(s) (*Priority Annex I Habitats)	Location Relative to the Proposed Development Site
	A182 Common Gull *Larus canus* A183 Lesser Black-backed Gull *Larus fuscus* A184 Herring Gull *Larus argentatus* A187 Great Black-backed Gull *Larus marinus* A188 Kittiwake *Rissa tridactyla* A192 Roseate Tern *Sterna dougallii* A193 Common Tern *Sterna hirundo* A194 Arctic Tern *Sterna paradisaea* A195 Little Tern *Sterna albifrons* A199 Guillemot *Uria aalge* A200 Razorbill *Alca torda* A204 Puffin *Fratercula arctica* A862 Little Gull *Hydrocoloeus minutus* NPWS (2023) Conservation Objectives: North-west Irish Sea SPA 004236. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. *No S.I Documents*	

Figure 7-3 European sites in the vicinity of the Proposed Development

7.4.3 Nationally Designated Sites

National Heritage Areas (NHAs) are designations under Section 16 of the Wildlife Acts to protect habitats, species or geology of national importance. In addition to NHAs there are proposed NHAs (referred to as pNHAs), which are also sites of significance for wildlife and habitats and were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. Proposed NHAs are offered protection in the interim period under the county or city development plans which requires that planning authorities give due regard to their protection in planning policies and decisions[16]. Many of the pNHA sites, and some of the NHAs, in Ireland overlap with the boundaries of European sites.

There are no NHAs within the 15km of the Proposed Development boundary, nor hydrologically connected to the Proposed Development. There are 13 pNHAs which are located within 15km of the Proposed Development boundary or hydrologically connected to the Proposed Development. The closest National site is Balrath Woods pNHA, located approximately 560m south and 770m downstream of the Proposed Development. Laytown Dunes/Nanny Estuary pNHA also hydrologically connected to the Proposed Development via the River Nanny, located approximately 20km downstream of the Proposed Development. No Nationally designated sites are hydrogeologically connected to the Proposed Development site.

The proposed nationally designated sites in the vicinity of the Proposed Development, their distance from the Proposed Development and their biodiversity features[17] are presented in Table 7-5. The locations of those sites relative to the Proposed Development are illustrated in Figure 7-4.

It is confirmed that for the purpose of this EIAR, National sites within the ZoI of the Proposed Development are of National Importance.

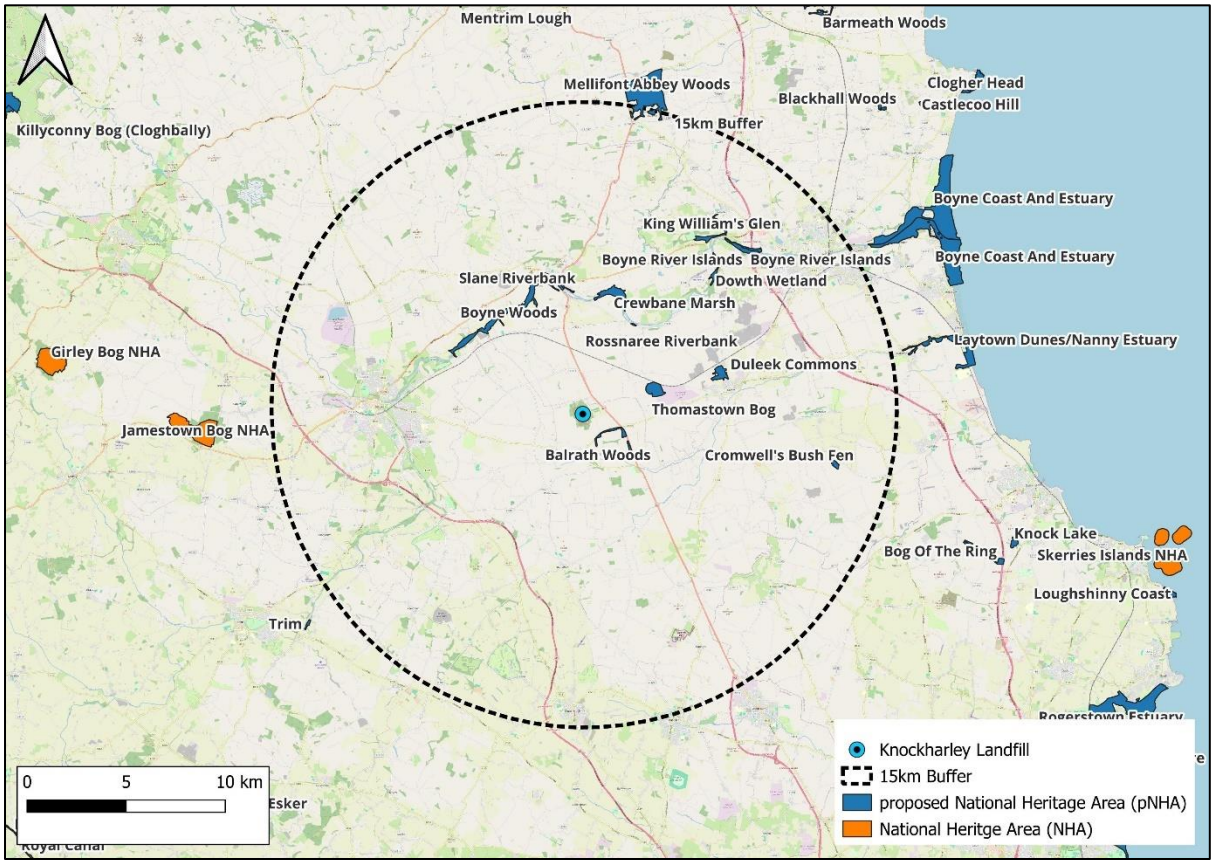
[17] As noted by NPWS online documentation https://www.npws.ie/sites/default/files/general/pNHA_Site_Synopsis_Portfolio.pdf

Table 7-5 National designated sites (pNHAs) located within the ZoI of the Proposed Development boundary.

Site Name	Distance	Reasons for Designation[17]
Proposed Natural Heritage Areas (pNHAs)		
Balrath Woods [001579]	Located *c.* 560m south and 770m downstream of the Proposed Development	Site is composed of three main areas of mature woodland, with oak and non-native beech dominant. The rare common wintergreen (*Pyrola minor*) has been recorded here.
Thomastown Bog [001593]	Located *c.* 2.5km east of the Proposed Development	Raised bog surrounded by wet woodland and wet grassland, with wet woodland being the most prominent habitat. Wet woodland exhibits a rich ground flora. Reed beds also recorded within this site.
Rossnaree Riverbank [001589]	Located *c.* 4.4km north-east of the Proposed Development	Of scientific interest for the presence of round-fruited rush (*Juncus compressus*), a rare plant found in three counties in Ireland.
Crewbane Marsh [000553]	Located *c.* 4.8km north of the Proposed Development	Freshwater marsh habitat on very wet alluvial flood plain. One of the last remaining examples of flood plain marsh on the banks of the Boyne. Also, important habitat for a number of protected species.
Boyne Woods [001592]	Located *c.* 5 km north-east of the Proposed Development	Variety of wetland habitats along the banks of the Boyne including broad-leaved woodland, freshwater marsh and canal. Swamp meadow-grass (*Poa palustris*), a red data listed species also occurs here.
Slane Riverbank [001591]	Located *c.* 5.6km north of the Proposed Development	This small area of wet grassland along the banks of the Boyne is home to the rare round-fruited rush (*Juncus compressus*), known from only two other counties in Ireland.
Duleek Commons [001578]	Located *c.* 5.8km east of the Proposed Development	Drained marsh area supporting a good variety of wetland plants in relatively good condition. The rare slender spikerush (*Eleocharis uniglumis*) has been recorded here.
Dowth Wetland [001861]	Located *c.* 8.3km north-east of the Proposed Development	An area of flood plain marsh with associated deciduous woodland.
King William's Glen [001804]	Located *c.* 9.6km north-east of the Proposed Development	Deep meltwater channel, exposed limestone
Boyne River Islands [001862]	Located *c.* 10.5km north-east of the Proposed Development	Small chain of three islands formed by a build-up of alluvial sediment, covered with dense wet woodland. Other habitats include grassland, freshwater marsh and reed swamp
Cromwell's Bush Fen [001576]	Located *c.* 11.9km south-east of the Proposed Development	Small wetland lying in a pastoral/arable setting over poorly draining glacial drift. Numerous fen habitats represented; from open water to relatively dry coarse grassland. This site supports a number of wetland waders and the rare floating plant frogbit (*Hydrocharis morsus-ranae*) has been recorded here.
Mellifont Abbey Woods [001464]	Located *c.* 14.3km north of the Proposed Development	Mixed woodland, wet woodland, conifer plantations, grassland and lake habitats. The Red Data Book plant wintergreen (*Pyrola* spp.) and the notable invertebrate species Pyrenean snail (*Semilimax pyrenaicus*) have been recorded at the site.

Site Name	Distance	Reasons for Designation[17]
Laytown Dunes/Nanny Estuary pNHA [000554]	Located *c.* 15.6km east and *c.* 20km downstream of the Proposed Development	A diversity of habitats make this site of particular value to wildlife, these include a muddy estuary, salt-marsh, sandy beach, woodland, freshwater marsh, wet and dry grasslands and sand dunes. It is an important area for wintering birds such as brent geese and oystercatcher.

Figure 7-4 National designated sites in the vicinity of the Proposed Development



7.4.4 Habitats and Flora

7.4.4.1 Habitats Overview

The results of the habitat surveys within the site are described below by habitat type after Fossitt (2000). The habitats described below relate to habitat areas within or adjacent to the Proposed Development, as shown on Figure 7-5 and Figure 7-6 below.

Each habitat identified within the Proposed Development was classified according to Fossitt (2000) and their corresponding level of ecological importance was determined in accordance with CIEEM (2018) and NRA (2009) guidelines. A detailed description of each habitat is provided in Section 7.4.4.2 along with an overall summary. The habitats identified include;

- Buildings and artificial surfaces (BL3)
- Exposed sand, gravel or till (ED1)
- Spoil and bare ground (ED2)
- Recolonising bare ground (ED3)
- Other artificial lakes and ponds (FL8)
- Reed and large sedge swamps (FS1)
- Depositing/Lowland Rivers (FW2)

- Drainage ditches (FW4)
- Improved Agricultural grassland (GA1)
- Amenity grassland (Improved) (GA2)
- Dry meadows and grassy verges (GS2)
- Wet grassland (GS4)
- (Mixed) broadleaved woodland (WD1)
- Mixed broadleaved/conifer woodland (WD2)
- (Mixed) conifer woodland (WD3)
- Hedgerows (WL1)
- Treelines (WL2)
- Scrub (WS1)
- Immature woodland (WS2)
- Ornamental/non-native shrub (WS3)

None of the recorded habitats on site correspond with Annex I habitats as per the *Interpretation manual of European Union Habitats* (European Commission, 2013), and they are of low ecological value.

Figure 7-5 Area habitats recorded within the Proposed Development

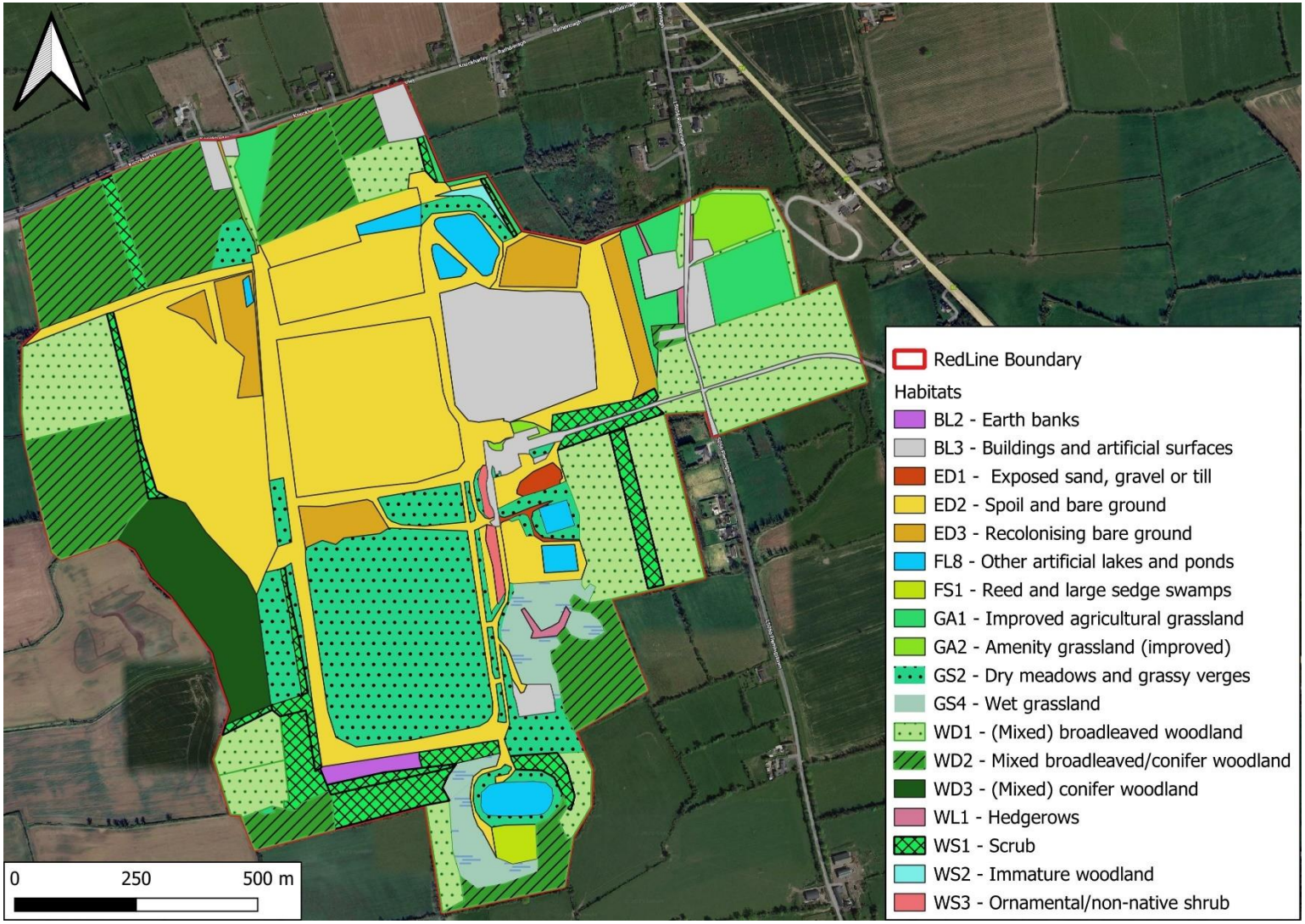
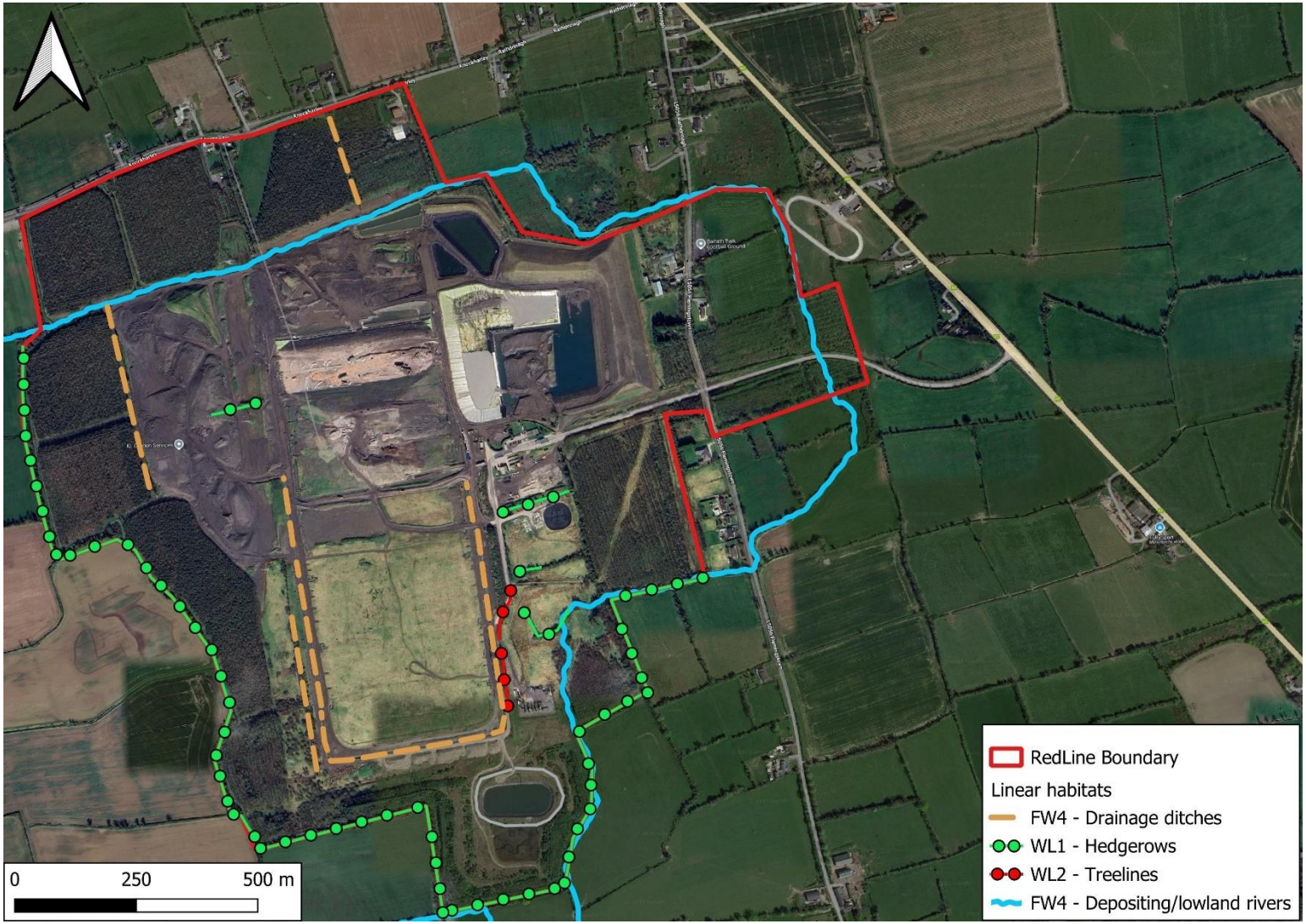


Figure 7-6 Linear habitats recorded within the Proposed Development



7.4.4.2 Habitats Recorded Within the Proposed Development Lands Boundary

Buildings and artificial surfaces (BL3)

The Proposed Development contains office buildings and the concrete foundation of an Incinerator Bottom Ash (IBA) facility, as well as a leachate gas treatment plant and roads. Buildings and artificial surfaces are considered to be of Local Importance (Lower Value) due to their built structure.

Exposed sand, gravel or till (ED1)

The site contains mounds of gravel, as well as gravel tracks made recently. This habitat type is associated with a low species diversity and is closely associated with development and therefore is valued as being of Local Importance (Lower Value).

Spoil and bare ground (ED2)

The site contains large areas of ED2, particularly the tracks around the site and the operational landfill itself. At the western side of the site trees have been removed from the original screen planting resulting in a large area of bare ground. This habitat type is of Local Importance (Lower Value) due to lack of species diversity and high disturbance.

Recolonising bare ground (ED3)

This habitat type refers to are areas which feature ruderal pioneers and perennial species. Those recorded included common Nettle *Urtica dioica*, common Ragwort *Jacobaea vulgaris*, docks *Rumex* spp., willow-herbs *Epilobium* spp., greater plantain *Plantago major*, ribwort plantain *Plantago lanceolata*, cat's-ear *Hypochaeris radicata* and butterfly bush *Buddleja davidii* (See also Section 7.4.4.4). This habitat type is of Local Importance (Lower Value) due to lack of species diversity and high disturbance.

Other artificial lakes and ponds (FL8)

This habitat includes standing water which can either have small amounts of vegetation or is typically cleared of vegetation. This habitat types was identified at five locations within the site, and they are attenuation ponds used for the collection of water from drainage ditches. This habitat type is of Local Importance (Lower Value).

Reed and large sedge swamps (FS1)

At the southern boundary of the site is a FS1 swamp of primarily composed of common reed *Phragmites australis*. This habitat type is of Local Importance (Lower Value), as it is species poor.

Depositing/Lowland Rivers (FW2)

This habitat type refers to the Knockharley Stream (EPA name: Flemingstown 08) which passes through the landfill and flows along the eastern and south-eastern border the operational Knockharley site. It is proposed to part of the stream as part of the Proposed Development. In addition the northern section of the watercourse which passes through the landfill has previously been canalised and is heavily modified. While this stream had riparian vegetation, this has since been removed as part of the stream diversion. This habitat type is of Local Importance (Higher Value) due to its connectivity to the River Nanny which is of National Ecological Importance due to their conservation value as key habitats for SCI species within designated areas.

Drainage ditches (FW4)

This habitat type refers to several drainage ditches which border the landfill cells and drain into attenuation ponds. This habitat type is of Local Importance (Lower Value) due to lack of species diversity.

Improved Agricultural grassland (GA1)

This habitat was present at the north-west section of the site where there are portions of GA1 agricultural grassland associated with residential properties. Agricultural grassland is evaluated as Local Importance (Lower Value) due to it being a monoculture with limited ecological value.

Amenity grassland (Improved) (GA2)

This habitat type was comprised of managed grassland as part of the office building grounds. This habitat type is of Local Importance (Lower Value) due to lack of species diversity and high maintenance.

Dry Meadows and grassy verges (GS2)

Sections of GS2 are found around the leachate plant and near the western woodlands. A large 11ha section of GS2 habitat is located where the previous landfill cells 1-16 have been remediated. This species-poor habitat sward typically contains common vetch *Vicia sativa*, red clover *Trifolium pratense*, creeping bent grass *Agrostis stolonifera*, perennial ryegrass *Lolium perenne*, and creeping buttercup *Ranuculus repens*.

Species-rich variants of this habitat managed for hay production can correspond with the Annex I lowland hay meadow (*Alopecurus pratensis, Sanguisorba officinalis*) [6510] habitat. That was not the case in respect of the GS2 habitat within the Proposed Development, as it did not contain sufficient positive indicator species, and due to the management regime of the grassland.

The habitat type is of Local Importance (Lower Value) due to low species diversity.

Wet grassland (GS4)

This habitat type was comprised of unmanaged grassland which is influenced by the wet conditions of this area. The location of this habitat was primarily near the leachate gas plant and bordering the reed swamp.

The typical wet grassland habitat does not correspond with the Annex I habitat "*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]" due to the lack of positive indicator species.

The habitat type is of Local Importance (Lower Value) due to low species diversity.

(Mixed) broadleaved woodland (WD1)

This habitat type is located in distinct compartments of woodland established for screening and is planted in rows. The species of this habitat type is comprised of ash *Fraxinus excelsior,* sessile oak *Quercus petraea* or sycamore *Acer psuedoplatanus*, or combinations of these three species in a single row. This planted habitat type is of Local Importance (Higher Value) due to being recognised as a habitat of biodiversity importance within the Meath Biodiversity Action Plan 2015-2021.

Mixed broadleaved/conifer woodland (WD2)

This habitat type is located in distinct compartments of woodland established for screening and is planted in rows. The species of this habitat type is comprised of sikta spruce *Picea sitchensis*, Monterey pine *Pinus radiata*, ash *Fraxinus excelsior,* sessile oak *Quercus petraea,* and silver birch *Betula pendula.* These forests are planted with species alternating within the rows. This habitat type is of Local Importance (Higher Value) due to being recognised as a habitat of biodiversity importance in the Meath Biodiversity Action Plan.

(Mixed) conifer woodland (WD3)

This habitat type is located in distinct compartments of woodland established for screening and is planted in rows. The species of this habitat type is comprised of strands of Monterey pine *Pinus radiata*, with occasional sessile oak *Quercus petraea* planted around the edge of the woodland. This habitat type is of Local Importance (Lower Value) due to being composed entirely of non-native conifer species.

Hedgerows (WL1)

Hedgerows are present throughout the Proposed Development but several are degraded due to sections being removed for construction activities. Hedgerows within the Proposed Development were typically floristically poor and degraded, with species including: hawthorn *Crataegus monogyna*, sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior*, and grey willow *Salix cinerea*. Longer sections of hedgerow bound the screening forest plantations around the site, and typically in better condition than those on site. This habitat type is of Local Importance (Higher Value) due to being recognised as a habitat of biodiversity importance in the Meath Biodiversity Action Plan.

Treelines (WL2)

A single planted treeline was located at the top of embankments which bounds the road towards the Leachate plant. The species of this habitat type was composed of either non-native Cypress species or ash *Fraxinus excelsior* with no understorey. This habitat type is of Local Importance (Lower Value) due to its extent and low species diversity.

Scrub (WS1)

This habitat type was located on the slopes of embankments around the landfill cells and between woodland compartments, or areas not managed that is encroached by shrub vegetation. The species of this habitat type were dominated by low shrub species such as bramble *Rubus fruticosus* agg*.,* gorse *Ulex europaeus,* and willow *Salix* spp. Other species present would be mosaic of other habitats such as GS2 grassland.

This habitat type is of Local Importance (Lower Value) due to low encroaching height and paucity of other typical hedge ground flora.

Immature woodland (WS2)

This planted habitat is located in distinct compartments of woodland established for screening and is planted in rows. The species of this habitat type were composed of immature ash *Fraxinus excelsior* and alder *Alnus glutinosa*.

This habitat type is of Local Importance (Lower Value) due to the lack of mature trees species.

Ornamental/non-native shrub (WS3)

This habitat type is very localised in distribution, forming part of the office landscaping or located along some field margins. The species of this habitat type were dominated by ornamental shrubs.

This habitat type is of Local Importance (Lower Value) due to lack of species diversity and high maintenance.

7.4.4.3 Rare and protected plant species

A search of the NBDC database returned two records of a red-list species as occurring within 10km of the Proposed Development; common wintergreen *Pyrola minor* and sender pocket-moss *Fissidens exilis*.

Surveys undertaken on 24 September 2024 and 14 May 2025 did not find any protected or rare species within the Proposed Development lands.

7.4.4.4 Non-native invasive plant species

A search of the NBDC database returned records for four non-native invasive plant species, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, (as amended), and Habitats Regulations and the European Union (Invasive alien species) Regulations 2024 (S.I. 374/2024). These were Indian balsam *Impatiens glandulifera,* Japanese knotweed *Reynoutria japonica,* Spanish bluebell *Hyacinthoides hispanica,* and three-cornered garlic *Allium triquetrum,* all within approximately 10km of the Proposed Development. None of these species were recorded within the vicinity of the Proposed Development.

A medium impact invasive species, based on the 2013 Invasive Species in Ireland risk assessment[18], but not listed as on the Third Schedule, butterfly bush *Buddleja davidii*, was recorded at the Proposed Development. As only one instance of this species was recorded there is no valuation, however mitigation for invasive species will be provided.

7.4.5 Biological Water Quality

The Proposed Development site is located within the Nanny-Delvin catchment and is drained by the Knockharley Stream (River Waterbody Code: IE_EA_08F050930) which initially flows from west to east along the northern portion of the site, then flows from north to south along the western boundary, and then across the southern boundary of the site. The Knockharley Stream flows into the River Nanny *c.* 3km southeast of the Proposed Development site. The River Nanny Estuary and Shore SPA and North-west Irish Sea SPA lie *c*. 22km and *c*. 27km downstream from the Proposed Development, respectively. No other European sites are hydrologically connected to the Proposed Development.

The nearest EPA monitoring station to the Proposed Development site is the 'East Br Kentstown' which lies *c.* 1.56km upstream of the site along the River Nanny at the Danestown Bridge (station code number RS08N010110). According to the latest EPA report for hydrometric area 08[19], the most recent EPA surveys were conducted in 2024 and assessed the River Nanny as 'poor' condition with low invertebrate diversity and abundance. The nearest downstream EPA monitoring station to the Proposed Development site is the 'NANNY (MEATH) - Br S of Balrath X-Rds' (station code RS08N010200) at the confluence of the Knockharley Stream and River Nanny at the Balrath crossroads. The most recent EPA surveys conducted at this EPA station were in 1991 and assessed the River Nanny as 'poor' condition.

The WFD 3rd cycle river waterbodies risk assessment for the Flemingston Stream is currently under "Review", and the downstream River Nanny is currently assessed as 'at risk'. There are no urban discharge points upstream of the Proposed Development site however, it should be noted that there is an urban effluent discharge point upstream of the River Nanny at the Danestown Bridge before the river joins up with the Knockharley Stream. This could have implications on the ecological assessment of the River Nanny downstream of the Proposed Development site. The River Nanny is likely impacted by urban and wastewater run-off.

The NBDC returned one record of Yellow hawk mayfly, *Ephemerella notata* in 2010 recorded within the vicinity of the Proposed Development site. The Yellow hawk mayfly classified as 'Endangered' under Ireland Red List No. 7: Mayflies (Ephemeroptera)[20].

The River Nanny holds a small stock of wild trout and is stocked annually with brown trout. The Knockharley Stream appears to have limited habitat for fish and previous surveys have shown that there

[18] Kelly, J., O'Flynn, C., and Maguire, C. 2013. Risk analysis and prioritisation for invasive and non-native species in Ireland and Northern Ireland.

[19] EPA (2025) EPA River Quality Surveys: Biological for Hydrometric Area 08. Report generated on the 7th April 2025.

[20] Kelly-Quinn, M. & Regan, E.C. (2012) Ireland Red List No. 7: Mayflies (Ephemeroptera). National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland

are no salmonid fish in the stream, although some Three-Spined Stickleback and eels have been recorded (Celtic Waste Ltd, 2000). Fish are discussed further in Section 7.4.6.7.1 below.

A brief description of each of the sampling sites that were surveyed are detailed below in Table 7-6. Upstream and downstream photos of each of the four sampling sites can be found in Appendix 7.2. The relative abundance of the macroinvertebrate groups and corresponding SSRS calculations for each of the four sampling locations can be found in the data sheets in Appendix 7.2. The results of the SSRS scores for each of the four sampling locations can be found in Table 7-6 below. The SSRS surveys for Site 1 (located a short distance upstream of the Proposed Development site), Site 2 and Site 3 (located within the Proposed Development site), were all assessed as being 'at risk' (see Table 7-6 and Figure 7-7). Site 4 was assessed as 'probably not at risk' and is located the furthest downstream (*c.* 2.96km) (see Table 7-6 and Figure 7-7). This baseline SSRS survey data suggests that the Knockharley Stream is likely impacted upstream and immediately downstream of the Proposed Development. The significance of Site 4 being assessed as 'probably not at risk' suggests that potential hydrological negative impacts of the Knockharley Stream are likely to be once the stream joins the River Nanny (*c.* 2.96km). Considerations should be made to reduce any potential negative hydrological impacts on the Knockharley Stream from the Proposed Development.

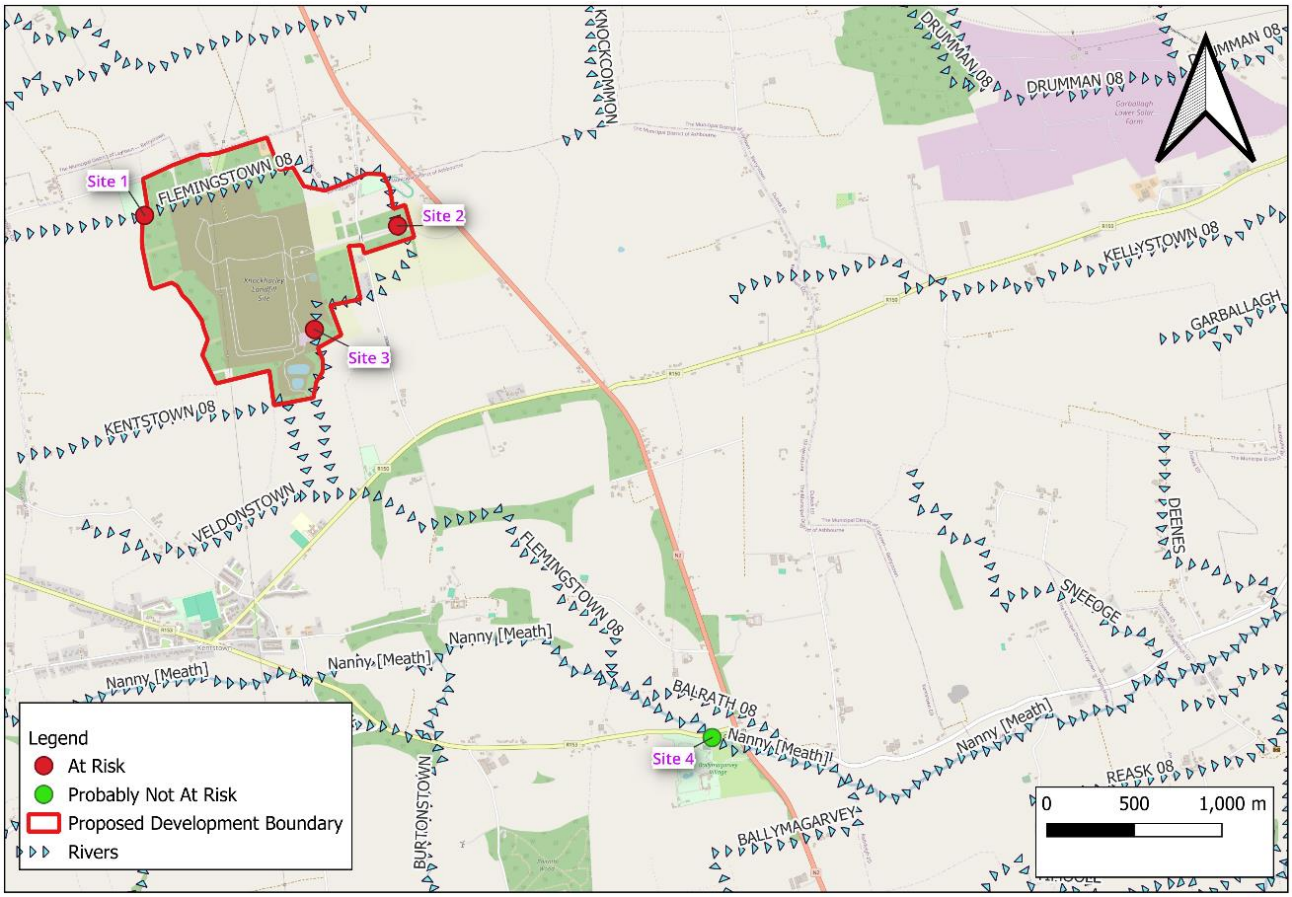
The Flemingston Stream is of some ecological value and is evaluated as being of Local Importance (Higher Value). The potential impacts of the Proposed Development on the Knockharley Stream are assessed and discussed in Section 7.5 below.

Table 7-6 Small Stream Risk Score (SSRS) Survey Results

Site	Location	Small Stream Risk Score	Status	Brief Site Description[21]
1.	Upstream of site (*c.*24 m)	<6.5	Stream 'at risk'	Directly adjacent to a football field, hedgerows and tree lines. There were notable agricultural practices ongoing in the proximal fields.
2.	Downstream of the landfill (within the Proposed Development boundary)	<6.5	Stream 'at risk'	This site was surrounding by mixed broadleaved woodland. It was very silty and had a strong smell. A large culvert was located downstream of sample site.
3.	Upstream of the pond (within the Proposed Development boundary)	<6.5	Stream 'at risk'	This site was surrounding by mixed broadleaved woodland. There was no verge of vegetation at this sample site. There is potential agricultural activities ongoing in the proximal fields.
4.	Downstream Ballymagarvey site (*c.* 2.96 km)	>7.25	Stream 'probably not at risk'	This site is directly adjacent to a rural roadbridge. Storm Darragh occurred the week before and may have influenced the flow and benthic composition of this sampling location.

[21] Note full details and results of each of the sampling sites can be found in the SSRS survey data sheets in Appendix 7.2.

Figure 7-7 Small Stream Risk Score Results



7.4.6 Fauna

7.4.6.1 Terrestrial Mammals (Excluding Bats)

7.4.6.1.1 Badger

Badger *Meles meles*, and their breeding and resting places, are protected under the Wildlife Acts. The NBDC database holds records for badger *Meles meles* within approximately 10km of the Proposed Development lands. The nearest record for badger is from approximately 200m north of the lands in 2009.

Badger activity was recorded, with footprints identified on a dirt road at the southern border of the Proposed Development during surveys. No badger setts were found during surveys, however there is suitable habitat for badger in the forests around the site. Given the evidence of activity and suitability of the wider environs for badgers, the local badger population is valued to be of Local Importance (Higher Value).

7.4.6.1.2 Otter

Otter *Lutra lutra*, and their breeding and resting places, are protected under the Wildlife Acts. Otter are also listed on Annex II and Annex IV of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).

The NBDC database holds records for otter within approximately 10km of Proposed Development, with the nearest record being from 1980, approximately 2.1km northwest of the Proposed Development site along the Seneschalstown Stream.

No signs of otter activity were recorded within the Proposed Development during field surveys along or adjacent to the Knockharley Stream. Where it bounds the Proposed Development site, it is largely dominated by riparian vegetation which is potentially suitable habitat for otter, however no suitable habitat features for otter were observed during surveys. Otter populations may utilise the watercourse, hydrologically connected to the Proposed Development, as Knockharley Stream is a tributary of the River Nanny, however these would not be SAC populations.

Given the suitability of the wider environs for otter, a precautionary approach has been taken and the local otter population is valued to be of County Importance.

7.4.6.1.3 Other Mammals

Hedgehog *Erinaceus europaeus,* pine marten *Martes martes* and red deer *Cervus elaphus* are protected under the Wildlife Acts, and pine marten are also listed on Annex V of the EU Habitats Directive. The NBDC database holds records for hedgehog (approximately 1.2km southeast), pine marten (approximately 600m southeast), and red deer (*c.* 500m northwest) in the vicinity of the Proposed Development.

Irish Hare *Lepus timidicum* ssp. *hibernicus* (no records returned for this Annex V mammal from desktop study) and Red deer were observed during surveys. The lands within the Proposed Development offer suitable habitat for hedgehog which typically commute and forage within habitats such as dry meadows and grassy verges (GS2) and scrub (WS1), and pine marten which commute and forage within coniferous (WD3) and deciduous woodland (WD1, WD2), and there are records of other mammal species in the wider environment. As such, the local mammal populations are assessed as being of a Local Importance (Higher Value).

7.4.6.2 Bats

Bats, and their breeding and resting places, are protected under the Wildlife Acts. All bat species are also listed on Annex IV of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). The Lesser horseshoe bat *Rhinolophus hipposideros*, is also listed in Annex II of the Habitat Directive, necessitating the establishment of SACs for their protection. This species is not, however, known from the Proposed Development area, as it distribution is confined to six western counties, occurring in clusters, with large areas that contain few or no colonies, which does not include Meath[22]. It was not recorded during surveys. This Annex II bat species is not considered further in this assessment.

The NBDC database holds records for four bat species, Brown Long-eared Bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, Leisler's bat *Nyctalus leisleri,* and soprano pipistrelle *Pipistrellus pygmaeus* within approximately 10km of the subject lands. Common pipistrelle, soprano pipistrelle, and Leisler's bat are common throughout Ireland, whereas Brown Long-eared Bat is less frequently observed. These species are found in similar habitats as those found within and adjacent to the Proposed Development.

Common pipistrelle, soprano pipistrelle, *Myotis* species, and Leislers' bat were recorded during the transect activity surveys. The automated detectors recorded calls from common pipistrelle, soprano pipistrelle, Leislers' bat, and *Myotis* species. Common pipistrelle and Soprano pipistrelle were primarily observed along the screening forest in the north-western section of the site, commuting along the edge of the screening forest.

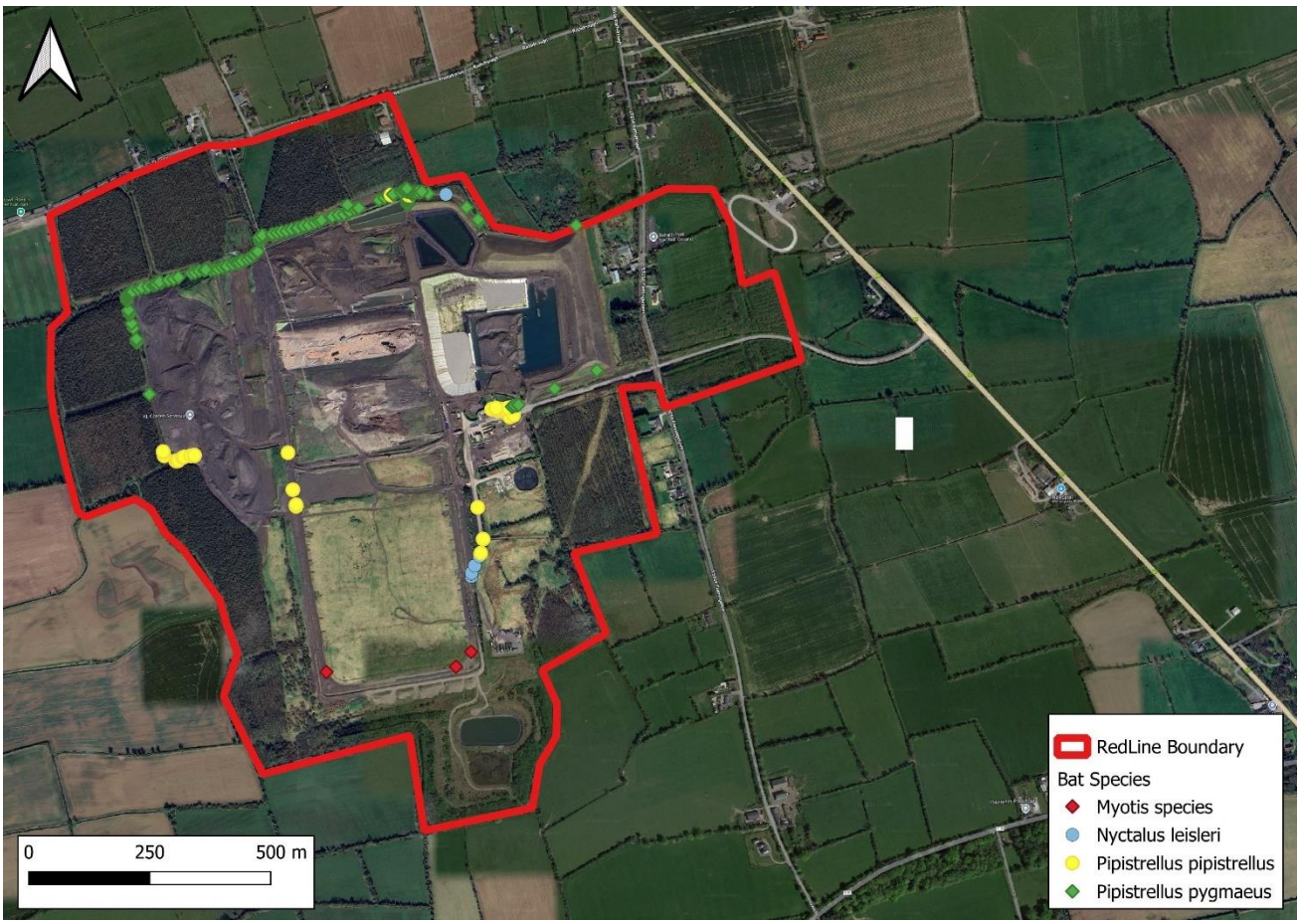
It was noted that for all species, that activity was lowest in autumn. The placement of automated detectors in late September and early October 2024 was sub-optimal, and low numbers recorded is likely to due to the fact that bats would be entering into hibernation for winter. The highest activity was recorded in April

[22] NPWS & VWT (2022) Lesser Horseshoe Bat Species Action Plan 20222026. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

and May 2025. Full details of the species recorded by the automated detectors during the autumn and spring seasons is presented in Appendix 7.4.

Myotis species were recorded in higher numbers at the southern portion of the Proposed Development compared to the north. This may be due to the presence of wetland features and a large retention pond, as *Myotis daubentonii*, is a water-habitat specialist.

Figure 7-8 Bat species recorded during bat activity surveys



There were no structures on site which were identified as being suitable for roosting bats.

An ground level assessment of trees within the Proposed Development site identified ten mature trees (Table 7-7), which based on guidance[12] are noted as having low suitability for roosting bats, including; three ash *Fraxinus excelsior*, an alder *Alnus glutinosa,* and a hazel *Corylus avellana* bordering the conifer forest plantations at the east and south of the site; a dead ash *Fraxinus excelsior* near the proposed new void excavation site; two ash *Fraxinus excelsior* and a grey willow *Salix cinerea* within the conifer and broadleaf plantations bordering the west and north of the site, and an alder *Alnus glutinosa* within a treeline bordering the northeast boundary. There are no buildings within the Proposed Development site which have potential for roosting bats.

Table 7-7 Trees with Potential Roost Features

Tree No	Tree Species	Alive-Dead	PRF Type	PRF Suitability[12]	To be removed	X	Y

1	ash *Fraxinus excelsior*	Dead	Knot-holes	Low	Yes	697035	767477
2	hazel *Corylus avellana*	Alive (Moribund)	Knot-holes	Low	No	697581	766967
3	alder *Alnus glutinosa*	Alive	Tear-outs	Low	No	697585	766988
4	ash *Fraxinus excelsior*	Alive	Knot-holes	Low	No	697624	767205
5	ash *Fraxinus excelsior*	Alive	Transverse-snaps	Moderate	No	697618	767217
6	ash *Fraxinus excelsior*	Alive	Transverse-snaps	Low	No	697592	767342
7	alder *Alnus glutinosa*	Alive	Tear-outs	Low	No	697502	767783
8	ash *Fraxinus excelsior*	Alive	Knot-holes	Low	Yes	697011	767810
9	*grey willow Salix cinerea*	Alive	Tear-outs	Low	Yes	696779	767804
10	ash *Fraxinus excelsior*	Alive (Moribund)	Transverse-snaps	Low	Yes	696831	767327

The Proposed Development has suitable foraging or commuting habitat (i.e. treelines, hedgerows and waterways) for bats. Bats as an Ecological Receptor have been assigned Local Importance (Higher Value) on the basis that the habitats within and adjacent to the Proposed Development which are utilised by a regularly occurring bat population.

7.4.6.3 Breeding Birds

Desk Study
All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the EU Birds Directive, and / or as SCIs within designated European sites.

The full results of the desk study, including records of breeding bird species of conservation concern, are presented in Appendix 7.3 of this EIAR. These species are considered to be KERs of the Proposed Development and include the following:

- SCIs for a breeding population of SPAs;
- Species listed under Annex I of the Birds Directive; and
- Red and Amber Birds of Conservation Concern in Ireland (BoCCI[23]) species listed for their breeding populations (Gilbert, Stanbury and Lewis, 2021).

The results of the breeding bird desk study carried out to inform this assessment are summarised below.

The NBDC desk study returned records of a total of 38 breeding bird species within approximately 10km of the Proposed Development site. Records included 6 species listed under Annex I of the Birds Directive, 19 Amber-listed and 12 Red-listed species. This includes 31 species with breeding and wintering populations. Bird species are grouped into habitat preferences and are discussed below in relation to their presence within the Proposed Development boundary.

Several bird species for which desk study records were returned, are those typically found in coastal, estuarine and intertidal habitats, such as Nanny Estuary. Gulls favour nesting along coasts on shingle and

[23]Gilbert, Gillian, Andrew Stanbury, and Lesley Lewis. *Birds of conservation concern in Ireland* 4: 2020–2026 ."Irish Birds 43 (2021): 1-22.

cliffs but may utilise inland public areas for scavenging and buildings for roof nesting as per habitat preferences associated with the species as listed on BirdWatch Ireland (BirdWatch Ireland, 2021). As such, some gull species may utilise the buildings adjacent to or within the Proposed Development for nesting. However, other species associated with estuarine and coastal habitats are not deemed likely to breed within the Proposed Development.

Breeding species which are associated with buildings were returned from the desk study including house martins, barn swallow, and swifts (BirdWatch Ireland, 2023). Several species of warblers and raptors which favour woodlands, agricultural lands and upland heathland areas were identified during the desk study. Agricultural lands and open areas are located directly adjacent to the Proposed Development. As such, these areas are suitable for use by breeding raptors and warblers such as kestrel, peregrine Falcon, and common grasshopper warbler.

Species that are known to utilise freshwater lakes, ponds, canals, and rivers in rural habitats include wagtails, swans, water rail, and ducks. Suitable habitats located within and adjacent to the Proposed Development include along the Knockharley Stream and associated internal wetland features.

Survey Results

The following birds, presented in Figure 7-9, were observed within or in the vicinity of the Proposed Development site during Breeding bird and kingfisher surveys undertaken between March and May 2025:

- SCI species: grey heron *Ardea cinerea*, herring gull *Larus argentatus*, and mallard *Anas platyrhynchos*
- Red listed species (i.e. of high conservation concern): meadow pipit *Anthus pratensis.*
- Amber listed species (i.e. of moderate conservation concern): goldcrest *Regulus regulus*, herring gull *Larus argentatus*, house martin *Delichon urbicum*, house sparrow *Passer domesticus*, linnet *Linaria cannabina*, mallard *Anas platyrhynchos*, mute swan *Cygnus olor*, skylark *Alauda arvensis*, spotted flycatcher *Muscicapa striata*, starling *Sturnus vulgaris*, swallow *Hirundo rustica*, tree pipit *Anthus trivialis*, and willow warbler *Phylloscopus trochilus*.
- Green listed species (i.e. of low conservation concern): blackbird *Turdus merula*, blackcap *Sylvia atricapilla*, blue tit *Cyanistes caeruleus*, bullfinch *Pyrrhula pyrrhula*, chaffinch *Fringilla coelebs*, chiffchaff *Phylloscopus collybita*, coal tit *Periparus ater*, dunnock *Prunella modularis*, goldfinch *Carduelis carduelis*, great tit *Parus major*, grey heron *Ardea cinerea*, hooded crow *Corvus corone*, jackdaw *Corvus monedula*, jay *Garrulus glandarius*, long-tailed tit *Aegithalos caudatus*, magpie *Pica pica*, mistle thrush *Turdus viscivorus*, pheasant *Phasianus colchicus*, pied wagtail *Motacilla alba yarrellii*, raven *Corvus corax*, reed bunting *Emberiza schoeniclus*, robin *Erithacus rubecula*, rook *Corvus frugilegus*, song thrush *Turdus philomelos*, stonechat *Saxicola torquatus*, treecreeper *Certhia familiaris*, whitethroat *Sylvia communis*, woodpigeon *Columba palumbus*, and wren *Troglodytes troglodytes.*

No Birds Directive Annex I species were observed during surveys.

There are habitats within the study area that are suitable for breeding birds to nest in, including trees, concrete structures, hedgerows and scrub. Breeding behaviour of the majority of species was observed within the Proposed Development, predominately along or close to hedgerows, scrub, or the screening forests. Ground nesting birds such as meadow pipit and skylark were identified in grasslands on top of the capped landfill, indicating this area as a potential breeding ground for these species.

Confirmed breeding birds were observed as providing material to nests and/or had nests nearby. Alarm calls from various species (blackbird, chaffinch, hooded crow, house Sparrow, meadow pipit, pheasant, skylark, and wren) indicated the presence of nests with young. A Blackbird was observed leaving a nest site, while meadow pipit and wren were observed visiting a probable nest site.

Kingfisher surveys were undertaken from March to May 2025, however no kingfisher were observed and Knockharley Stream was noted as having poor nesting potential.

Due to the presence of suitable breeding and / or foraging habitat within and directly adjacent to the Proposed Development, all other Red and Amber listed bird species (non-SCI breeding populations) are of County Importance. All other breeding bird populations are of Local Importance (Higher Value).

The Proposed Development has therefore been valued as being of Local Importance (Higher Value) for breeding birds. Despite the Proposed Development not containing any suitable habitat for SCI breeding bird populations, SCI and SPA breeding bird populations are valued as being of International Importance due to the hydrological connection between the Proposed Development and the River Nanny Estuary and Shore SPA and North-west Irish Sea SPA.

Figure 7-9 Breeding bird species recorded during surveys at the Proposed Development site[24]



[24] This figure only presents SCI, Red and Amber listed species. Refer to Appendix 7.5 for Green listed species.

7.4.6.4 Wintering Birds

Desk study
The full results of the desk study, including records of wintering bird species of conservation concern, are presented in Appendix 7.3 of this EIAR. These species are considered to be KERs of the Proposed Development and include the following:

- SCIs for a wintering population of SPAs;
- Species listed under Annex I of the Birds Directive; and,
- Red and Amber Birds of Conservation Concern in Ireland (BoCCI) species listed for their wintering populations.

The results of the wintering bird desk study carried out to inform this assessment are summarised below.

The desk study returned records of a total of 31 wintering bird species within approximately 10km of the Proposed Development site. Records included 5 species listed under Annex I of the Birds Directive, 14 SCI species, 15 Amber-listed, and 10 red-listed species.

The majority of wintering bird species identified in the desk study are typically found in coastal, estuarine, wetlands, and agricultural lands. There is suitable habitat for these species within the Proposed Development, as it contains areas of woodland and scrub.

Survey Results

The following birds, presented in , were observed within or in the vicinity of the Proposed Development site during Wintering bird surveys undertaken between September 2024 and March 2025:

- SCI species: great black-backed gull *Larus marinus*, grey heron *Ardea cinerea*, herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus*, and mallard *Anas platyrhynchos*.

- Red listed species (i.e. of high conservation concern): meadow pipit *Anthus pratensis*.

- Amber listed species (i.e. of moderate conservation concern): goldcrest *Regulus regulus*, greenfinch *Chloris chloris*, herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus,* mallard *Anas platyrhynchos*, mute swan *Cygnus olor*, and skylark *Alauda arvensis*.

- Green listed species (i.e. of low conservation concern): buzzard *Buteo buteo*, chaffinch *Fringilla coelebs*, goldfinch *Carduelis carduelis*, great black-backed gull *Larus marinus*, grey heron *Ardea cinerea*, hooded crow *Corvus corone*, jackdaw *Corvus monedula*, magpie *Pica pica*, pied wagtail *Motacilla alba yarrellii*, raven *Corvus corax*, robin *Erithacus rubecula*, rook *Corvus frugilegus*, song thrush *Turdus philomelos*, woodpigeon *Columba palumbus*.

No Annex I species were observed during surveys.

Six wintering bird species were observed foraging within the Proposed Development site during wintering bird surveys; herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus*, great black-backed gull *Larus marinus*, mallard *Anas platyrhynchos*, mute swan *Cygnus olor*, and skylark *Alauda arvensis*.

Two SCI species were observed flying over the site: herring gull *Larus argentatus* and mallard *Anas platyrhynchos.* Herring gull was disturbed from the waste deposition area into the current operational landfill cells. Mallard *Anas platyrhynchos* were observed flying south from the swamp site at the southern border of the Proposed Development. Herring gull, lesser black-backed gull and great black-backed gull were all observed foraging within the operational landfill site. Herring gull was observed in high frequency, while lesser black-backed gull and great black-backed gull were rarely observed.

The nearest site designated for herring gull is River Nanny Estuary and Shore SPA, approximately 16.7km east of the Proposed Development. The nearest site designated for lesser black-backed gull, great black-backed gull is North-west Irish Sea SPA, approximately 18.7km east of the Proposed Development site. The nearest site designated for mallard is Lough Ree SPA, located approximately 74km east of the Proposed Development.

The Proposed Development has therefore been valued as Local Importance (Higher Value) for non-SCI wintering birds. Despite the poor habitat suitability for SCI wintering bird populations within the Proposed Development, SCI wintering bird populations are valued as being of International Importance due to the hydrological connection between the Proposed Development and the River Nanny Estuary and Shore and North-west Irish Sea SPAs.

Figure 7-10 Wintering bird species recorded during surveys at the Proposed Development site



7.4.6.5 Amphibians

Common frog *Rana temporaria* and the smooth newt *Lissotriton vulgaris* are protected under the Wildlife Acts. Common frog is also listed under Annex V of the Habitats Directive.

The NBDC database returned records common frog *Rana temporaria* (approximately 2.9km southeast) of the Proposed Development.

Common frog tadpoles were identified within the during the surveys for the Proposed Development. Smooth newt were not observed during surveys. Amphibians require access to aquatic habitats (including ephemeral ponds) to breed. Suitable habitats for amphibians exists within the Proposed Development, including streams, drainage ditches, and artificial ponds. Local common frog populations are of Local

Importance (Higher Value) due to the presence of wet grassland, swamp, and stream habitat within the Proposed Development site.

7.4.6.6 Common lizard

Common lizard *Zootoca vivipara* were not recorded during any surveys and have not been recorded within the vicinity of the Proposed Development site, based on a review of the NBDC database.

This species is strongly associated with heathland and coastal dune habitats (Marnell, 2002; Farren *et al.*, 2010); neither habitat types were identified within the Proposed Development. Therefore, common lizard is not considered likely to be present within the Proposed Development. As such, common lizard populations are considered to be of Local Importance (Higher Value) on a precautionary basis.

7.4.6.7 Aquatic Species

7.4.6.7.1 Fish

Fish species are protected under the Fisheries Acts and by fishing by-laws. Atlantic salmon *Salmo salar*, sea lamprey *Petromyzon marinus* and the brook lamprey *Lampetra planeri*, are listed on Annex II of the Habitats Directive. Electro-fishing surveys and aquatic surveys were not carried out as part of the Proposed Development, as the stream which intersects the Proposed Development does not have a sufficient volume of water.

There are no NBDC records of fish species within approximately 10km of the Proposed Development. It is noted that the Knockharley Stream itself has no suitable habitat for trout, it is however hydrologically connected to the River Nanny, which has significant stocks of brown trout *Salmo trutta*[25]. European eel *Anguilla anguilla* was reported in a previous EIAR (Celtic Waster, 2000), however the original copy of this report could not be located. Based on SSRS surveys (see Section 7.4.5), Knockharley Stream around the site has poor habitat suitability for fish. As no records were available for fish species from the NBDC desk study, and there was no issue with the stream diversion from IFI, all fish species are of Local Importance (Higher Value) and precautionary mitigation will be provided.

7.4.6.7.2 White-Clawed Crayfish

White-clawed crayfish *Austropotamobius pallipes* are legally protected under the Wildlife Acts and are also listed on Annex II of the Habitats Directive. Ireland remains the only part of the EU with no introduced species of crayfish, as such it is of key conservation concern (NPWS, 2021b).

The NBDC desk study did not return any records of white-clawed crayfish within approximately 10km of the Proposed Development. White-Clawed Crayfish require overhanging riparian vegetation, stone substrates for refugia, low siltation, and are sensitive to pollution. Based on the poor quality of Knockharley Stream, surveys were not performed for this species and therefore white-clawed crayfish are not considered further in this assessment.

7.4.6.8 Invertebrates

Invertebrate species were not assessed in this report due to the lack of quality habitats to support these species within the Proposed Development.

[25] Central Regional Fisheries Board (2009). Sampling Fish for the Water Framework Directive – Rivers 2009. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.fisheriesireland.ie/sites/default/files/2023-09/wfd_summary_report_2022.pdf [accessed 18/05/2025].

The NBDC returned one record of Yellow hawk mayfly, *Ephemerella notata* in 2010 recorded within the vicinity of the Proposed Development site. The Yellow hawk mayfly classified as 'Endangered' under Ireland Red List No. 7: Mayflies (Ephemeroptera). Invertebrates are not considered further in this assessment.

7.4.7 Key Ecological Receptors

Table 7-8 summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance, and identifies the Key Ecological Receptors (KERs). Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of assessing the impacts on what are determined to be important ecological or biodiversity features (CIEEM, 2024 and National Roads Authority, 2009).

All designated areas for nature conservation that lie within the ZoI of the Proposed Development are considered to be KERs given that they are sites selected specifically for biodiversity conservation and are potentially at risk of impacts from the Proposed Development. Those designated areas for nature conservation that lie beyond the ZoI of the Proposed Development are not considered to be at risk of impact and are therefore not considered to be KERs.

In all cases, habitat and species valued as being of Local Importance (Higher Value), or higher, are considered to be KERs as they are important contributors to the local biodiversity resource and are of conservation concern, at least locally.

Habitats valued as being of a Local Importance (Lower Value) are not considered to be KERs in this assessment. This is not to say that they are of no biodiversity value, but that impacts on these habitat types in their local context are not likely to result in a significant effect on biodiversity. It should be noted that this relates to the impact on the habitat itself as distinct from considering the role these habitat types play in supporting KER fauna species.

An ecological evaluation of all receptors, considering legal protection, conservation status and local abundance, and identification of the Key Ecological Receptors (KERs) is shown in Table 7-8.

Table 7-8 Ecological evaluation of all receptors, considering legal protection, conservation status and local abundance, and identification of the Key Ecological Receptors (KERs).

Ecological Receptor	Ecological Valuation	KER
Designated Sites		
River Boyne and River Blackwater SAC [002299)	International Importance	No
Boyne Coast and Estuary SAC [001957]	International Importance	No
River Boyne and River Blackwater SPA [004232]	International Importance	No
Boyne Estuary SPA [004080]	International Importance	No
River Nanny Estuary and Shore SPA [004158]	International Importance	Yes
North-West Irish Sea SPA [004236]	International Importance	Yes
Balrath Woods pNHA [001579]	National Importance	Yes
Thomastown Bog pNHA [001593]	National Importance	No
Rossnaree Riverbank pNHA [001589]	National Importance	No
Crewbane Marsh pNHA [000553]	National Importance	No
Boyne Woods pNHA [001592]	National Importance	No

Ecological Receptor	Ecological Valuation	KER
Slane Riverbank pNHA [001591]	National Importance	No
Duleek Commons pNHA [001578]	National Importance	No
Dowth Wetland pNHA [001861]	National Importance	No
King William's Glen pNHA [001804]	National Importance	No
Boyne River Islands pNHA [001862]	National Importance	No
Cromwell's Bush Fen pNHA [001576]	National Importance	No
Mellifont Abbey Woods pNHA [001464]	National Importance	No
Laytown Dunes/Nanny Estuary pNHA [000554]	National Importance	Yes
Habitats		
Buildings and artificial surfaces (BL3)	Local Importance (Lower Value)	No
Exposed sand, gravel or till (ED1)	Local Importance (Lower Value)	No
Spoil and bare ground (ED2)	Local Importance (Lower Value)	No
Recolonising bare ground (ED3)	Local Importance (Lower Value)	No
Other artificial lakes and ponds (FL8)	Local Importance (Lower Value)	No
Reed and large sedge swamps (FS1)	Local Importance (Lower Value)	No
Flemington Stream / Depositing/Lowland Rivers (FW2)	Local Importance (Higher Value)	Yes
Drainage ditches (FW4)	Local Importance (Lower Value)	No
Improved Agricultural grassland (GA1)	Local Importance (Lower Value)	No
Amenity grassland (Improved) (GA2)	Local Importance (Lower Value)	No
Dry meadows and grassy verges (GS2)	Local Importance (Lower Value)	No
Wet grassland (GS4)	Local Importance (Lower Value)	No
(Mixed) broadleaved woodland (WD1)	Local Importance (Higher Value)	Yes
Mixed broadleaved/conifer woodland (WD2)	Local Importance (Higher Value)	Yes
(Mixed) conifer woodland (WD3)	Local Importance (Lower Value)	No
Hedgerows (WL1)	Local Importance (Higher Value)	Yes
Treelines (WL2)	Local Importance (Lower Value)	No
Scrub (WS1)	Local Importance (Lower Value)	No

Ecological Receptor	Ecological Valuation	KER
Immature woodland (WS2)	Local Importance (Lower Value)	No
Ornamental/non-native shrub (WS3)	Local Importance (Lower Value)	No
Fauna Species		
Badgers	Local Importance (Higher Value)	Yes
Otter	Local Importance (Higher Value)	Yes
Bats	Local Importance (Higher Value)	Yes
Other mammals	Local Importance (Higher Value)	Yes
All Red and Amber listed breeding bird species (non-SCI breeding populations)	County Importance	Yes
All other breeding bird species (non-SCI)	Local Importance (Higher Value)	Yes
Wintering birds (SPA populations)	International Importance	Yes
Wintering birds (outside of SPA populations)	Local Importance (Higher Value)	Yes
Amphibians	Local Importance (Higher Value)	Yes
Common Lizard	Local Importance (Higher Value)	Yes
All fish species	Local Importance (Higher Value)	Yes
White-Clawed Crayfish	Local Importance (Lower Value)	No

7.5 Characteristics of the Proposed Development

A detailed description of the Proposed Development and construction activities are provided in Chapter 2 (Description of the Proposed Development) of this EIAR. The main characteristics of the Proposed Development of relevance to the ecological assessment are outlined under the Construction and Operational Phases in sections below.

7.5.1 Construction Phase

Chapter 2 of this EIAR includes a detailed description of the Proposed Development. The construction phase is divided into seven phases over 21 years.

- Phase 1 will develop the site for the future construction programme within the first two years of construction, and involves site clearance, berm construction, diversion of Knockharley Stream, installation of surface water infrastructure, and the development of landfill cells 31-32.
- Phase 2 will involve the development of landfill cells 33-34 over 2 years.
- Phase 3 will involve the development of landfill cells 35-36 over 2 years, and capping of cells 31-32.
- Phase 4 will involve the development of landfill cells 37-38 over 2 years, and capping of cells 33-34.
- Phase 5 will involve the development of landfill cell 39 over 2 years, and capping of cells 35-36.
- Phase 6 will involve the development of landfill cell 40 over 2 years, and capping of cells 37-38.
- Phase 7 will involve the capping of cells 39-40.

7.5.2 Operation Phase

As the Construction Phase will be phased over 21 years, the Operation Phase will continue for the duration of construction. After the landfill is remediated, the site will remain operational for the IBA facility and Biological treatment facility. The main characteristics of the Operational Phase of the Proposed Development that have potential for ecological impact are:

- The presence and operation (traffic) of the road.
- Water degradation.
- Routine maintenance, including road maintenance and landscaping.

7.5.3 Do Nothing Scenario

In this EIAR, the 'evolution of the baseline without the Proposed Development' is described as the 'Do Nothing' scenario. Under this 'Do Nothing' scenario, the lands within the ZoI of the Proposed Development would remain with no immediate significant changes to the terrestrial and aquatic biodiversity (flora and fauna) of the area, as there would be no construction impacts from the Proposed Development. This would therefore result in a neutral effect on biodiversity in the Proposed Development.

The baseline receiving environment (see Section 7.4) describes the existing land use within and surrounding the Proposed Development. Due to the absence of a robust historical baseline for fauna species in the study area, it is not possible to establish accurate existing and future trends for fauna species at a local level; however, it is considered likely that the changes in habitats will impact fauna biodiversity and distributions locally.

However, any such effects on biodiversity are likely to be moderated to some degree by the environmental protective policies and objectives contained in Meath County Development Plan 2021 – 2027 and overarching pollution control objectives in the River Basin Management Plan 2022 – 2027.

The interaction between the existing trends, future trends, and other plans or projects with the Proposed Development are considered and assessed further in Chapter 15 (Interactions).

7.6 Potential Impacts of the Proposed Development (Unmitigated)

The following Section presents the assessment of potential impacts on biodiversity within the ZoI of the Proposed Development. As outlined in Section 7.3.5, this is focused on the KERs identified in Section 7.4.

7.6.1 Construction Phase

7.6.1.1 Designated Areas of Nature Conservation

This Section describes and assesses the potential for the Proposed Development to result in likely significant effects on designated areas for nature conservation at SACs, SPAs, NHAs or pNHAs. In the context of European sites, this is focused on the habitats and species for which the sites are selected (i.e. QIs for SACs and SCI species for SPAs, and the conservation objectives supporting their conservation status in each site). This assessment is directly related to the assessment methodology for European sites required under the Habitats Directive, which is presented separately in the NIS prepared for the Proposed Development. In the case of NHAs and pNHAs the assessment considers whether the integrity of any such site would be affected. For the avoidance of doubt, it should be noted that, if the Proposed Development would adversely affect the integrity of a European site, then this would constitute a likely significant effect in the context of the EIA Directive.

7.6.1.1.1 European Designated Sites

In the context of assessing whether the Proposed Development is likely to result in an impact on the integrity of any European sites, the NIS considers whether the Proposed Development will affect the conservation objectives supporting the favourable conservation condition of any European site's QIs / SCIs and as a result presents an assessment of whether the integrity of any European sites would be affected (i.e. if the Proposed Development would adversely affect the integrity of a European site), as this would constitute a likely significant effect in the context of the EIA Directive.

In view of best scientific knowledge and in view of conservation objectives, the nature and scale of the Proposed Development, and the identified potential impacts and their relationship to European sites were considered in order to determine which European sites were located within the ZoI of the Proposed Development, and therefore potentially at risk of the Proposed Development affecting their conservation objectives. The potential impacts associated with the Proposed Development are discussed below in relation to those European sites within its ZoI (further information can also be found in Section 7.1 and 7.2 of the NIS, which accompanies the Planning application).

The ZoI is a distance within which the Proposed Development could potentially affect the conservation condition of QI habitats or QI / SCI species of a European site.

The mechanism to define the ZoI is summarised as follows:

- Consider the nature, size and location of the Proposed Development;
- Consider the sensitivities of the ecological receptors;
- Identify impact sources and pathways; and,
- Determine the ZoI based on the extent of the impact.

Considering the ZoI, in the absence of mitigation measures, the Proposed Development was assessed as having the potential to adversely affect the integrity of the following European sites:

- River Nanny Estuary and Shore SPA [004158]
- North-west Irish Sea SPA [004236]

The locations of these European sites, relative to the Proposed Development, are shown on Figure 7-4. The following potential effects on European sites during construction have been identified based on the existing baseline ecological environment and the extent and characteristics of the Proposed Development (see information provided below for a detailed description of each potential impact):

- Habitat degradation / effects on QI / SCI species as a result of hydrological impacts.

Habitat loss and fragmentation, habitat degradation as a result of hydrogeological impacts, habitat degradation as a result of introducing/spreading non-native invasive species, disturbance and displacement impacts, and habitat degradation as a result of air quality impacts were scoped out from further assessment at the Stage 1 AA Screening stage, as confirmed in the Stage Two NIS (Scott Cawley Ltd 2025b).

The Proposed Development does not lie within or overlap with the boundary of any European site. Therefore, there are no European sites at risk of direct habitat loss impacts. As the Proposed Development does not traverse any European sites there is no potential for habitat fragmentation to occur, as discussed in Section 6.2 of the NIS.

There are no European sites with groundwater dependent habitats and species in the same groundwater body as the Proposed Development, therefore the Proposed Development cannot influence groundwater conditions in this European site, as discussed in Section 6.4 of the NIS.

No species currently listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) and Habitats Regulations and the European Union (Invasive alien species) Regulations 2024 (S.I. 374/2024) were recorded within the site during the 2024 and 2025 surveys. While no species were recorded, there is the possibility that invasive species may be bought to the site during construction or brought in landfill waste during operation therefore there is a potential that invasive species could colonise downstream terrestrial areas of European sites, as discussed in Section 5.5 of the NIS.

Whilst there will be habitat loss for wintering bird species in the vicinity of the Proposed Development in terms of potential *ex-situ* foraging areas, the combined loss of this land, and the numbers of SPA populations of SCI species observed, is not considered significant with respect to their national or international populations, and will not affect the conservation objectives of any European site, as discussed in Section 6.6 of the NIS.

There are no European sites within 200m of the Proposed Development, therefore there is no possibility of the Proposed Development undermining the conservation objectives of the QIs or SCIs of any European site as a result of air quality impacts, as discussed in Section 6.7 of the NIS.

Habitat degradation / effects on QI / SCI species as a result of hydrological impacts

Surface water run-off and discharges from the Proposed Development will drain to the existing local surface water drainage network, ultimately discharging into the Irish Sea via the River Nanny. The potential Zone of Influence of potential effects on water quality from the Proposed Development could extend downstream of the study area, via the local surface water network.

Due to the close proximity of surface water features to the Proposed Development, in the absence of mitigation, the associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the discharge point or location of the accidental pollution event. Such an occurrence, of a sufficient magnitude, either alone or in combination with other pressures on water quality, and in the absence of mitigation, could affect aquatic and wetland habitats in the receiving environment, undermining the conservation objectives of River Nanny Estuary and Shore SPA and North-west Irish Sea SPA. In addition, impacts on water quality if of a sufficient magnitude and duration, could negatively affect the SCI populations for which SPAs are designated by affecting their foraging resources, negatively affecting the quality of wetland habitat and the quantity and quality of prey available to QI populations.

During construction, suspended solids, silt and other harmful materials generated as a result of the Proposed Development could be released into the local drainage infrastructure and travel downstream via Knockharley Stream and the River Nanny to Nanny Estuary. Cement-based products used in the Construction Phase of the Proposed Development (e.g. concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, the potential to be negatively impacted from a wide range of pollutants contained within surface water runoff remains. Habitat degradation as a consequence of construction effects on surface water quality has the potential to affect the conservation status of downstream estuarine and coastal habitats in the previously mentioned estuaries and the European sites within, and therefore, has the potential to result in a significant negative impact from a Local to an International scale.

As the Proposed Development has the potential to result in habitat degradation and effects on the QIs/SCIs of European sites as the result of hydrological impacts, there is the potential for in combination effects to occur. All other European sites are not hydrologically connected to the Proposed Development, and therefore are not at risk of any hydrological impacts as a result of the Proposed Development.

7.6.1.1.2 National Sites

In the case of pNHAs, the assessment considers whether the integrity of any such site would be affected by the Proposed Development, with reference to the ecological features for which the site is designated or is proposed for designation. There are no NHAs within the ecological ZoI, as stated in Section 7.4.3.

Considering the ZoI of the Proposed Development, in the absence of mitigation measures, the Proposed Development has the potential to have a likely significant effect at a national geographic scale upon the following two pNHAs:

- Balrath Woods pNHA [001579]; and,
- Laytown Dunes/Nanny Estuary pNHA [000554].

The locations of these designated areas for nature conservation, relative to the Proposed Development, and the predicted ZoI, are shown on Figure 7-3 in this EIAR. The potential effects on European sites arising from the Proposed Development, described in Section 7.6.1.1.1 may also negatively affect the pNHA sites located within the boundaries of these European sites.

The pNHA site Laytown Dunes/Nanny Estuary is primarily designated for dune habitats. Potential impacts arising from the Proposed Development on this pNHA site could result in a significant effect at a National geographic scale. Therefore, the potential impacts during construction on these National sites would be as previously described for River Nanny Estuary and Shore SPA in Section 7.6.1.1.1 (European Designated Sites).

The assessment of potential impacts arising from the Proposed Development on Balrath Woods pNHA is provided in the sections below. The Proposed Development will not result in any direct impacts on the above pNHAs as they are all located outside of the Proposed Development boundary and are not being impacted by construction of the Proposed Development. Potential indirect impacts as a result of negative effects on surface water quality to the Knockharley Stream which forms a hydrological connection between these pNHA and the Proposed Development, is addressed below.

Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and / or an accidental spillage or pollution event directly into Knockharley Stream, or any surface water feature, including existing drainage infrastructure, has the potential to have a significant negative effect on water quality and consequently woodland habitats in Balrath Woods as well as dune and estuary habitats in Laytown Dunes/Nanny Estuary. The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. It is considered unlikely that a pollution event of such a magnitude would occur during construction, due to the nature of the Proposed Development and the surface water infrastructure draining to retention ponds. Any pollution event would be temporary in nature. Nevertheless, a precautionary approach has been adopted in the assessment of potential risk of impacts on water quality. Consequently, detailed mitigation measures are required to further minimise the risk of contaminated surface water runoff and / or an accidental spillage or pollution events having any perceptible effect on water quality during construction of the Proposed Development.

7.6.1.2 Habitats

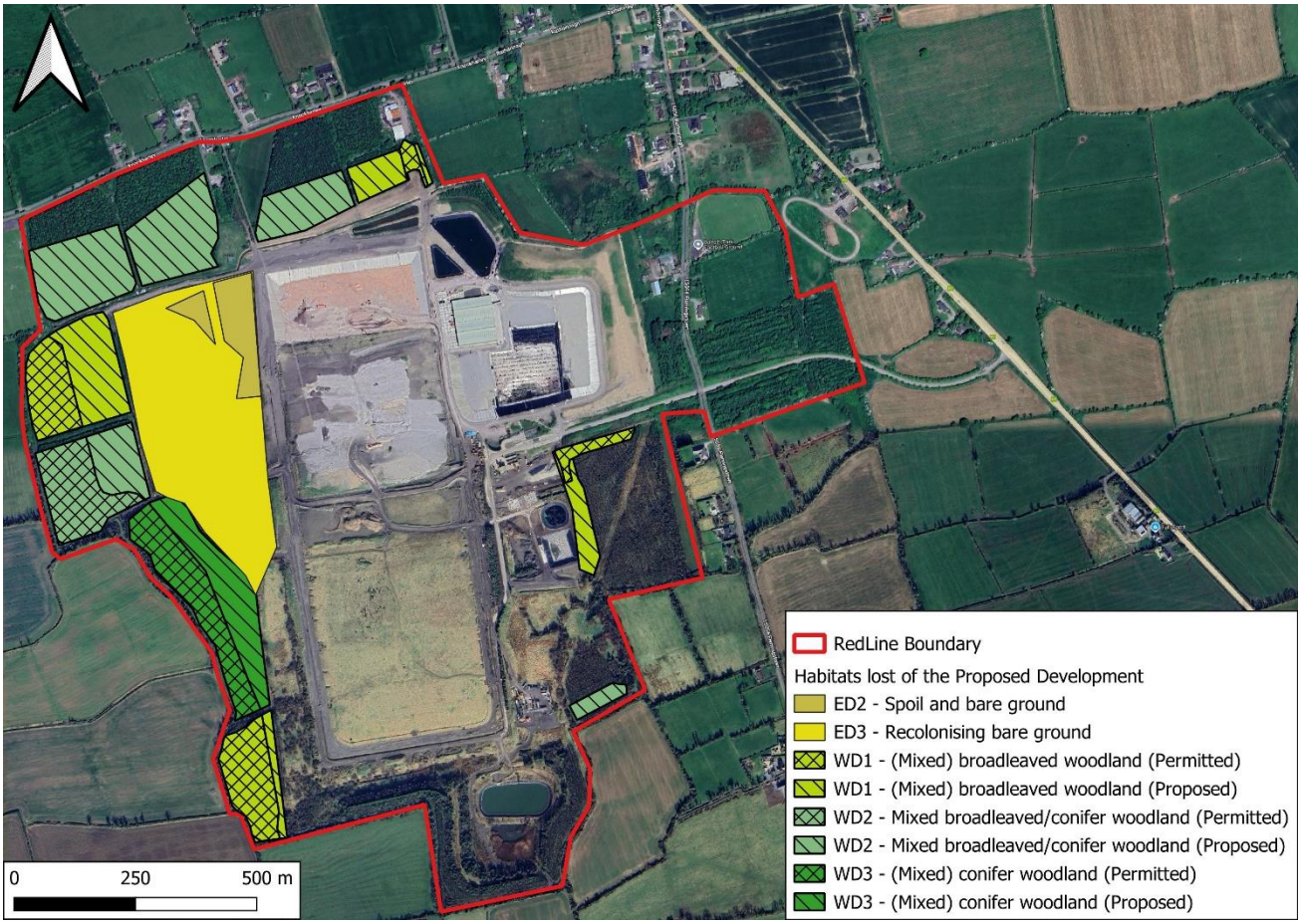
This Section assesses the potential impacts of the Proposed Development on habitats. In terms of quantifying the magnitude of effects on habitats, the estimated percentage of the local habitat resource being affected is based upon the total area of a given habitat type that was recorded within the study area of the Proposed Development. This provides some local context as to the magnitude of the habitat loss and whether the impact is significant or not, and at what geographic scale.

7.6.1.2.1 Habitat Loss and Fragmentation

In general, there will be habitat loss as a result of the Proposed Development. The bulk of the works will involve the preparation and creation of the new void for landfilling. However some habitat loss will occur in areas where Construction Compounds, substation compounds, access routes, electricity pylons, and the diversion of Knockharley Stream. Habitat loss will be minimised as much as possible, with construction compounds located on existing areas of hardstanding. Access routes already exist from tracks around the site, with additional routes into the new void. To facilitate the Proposed Development, there will be approximately 38 ha of habitat removal, comprising of previously planted screening forestry, spoil and bare ground, recolonising bare ground, improved agricultural grassland, dry meadows, grassy verges and scrub. See Figure 7-11 below. The realignment of Knockharley Stream will result in the loss of 0.08ha of Spoil and bare ground (ED2).

All of the habitats due for removal are valued as being of Local Importance (Higher and Lower Value). Habitats due for removal that are Local Importance (Higher Value), include, hedgerows (WL1), treelines (WL2), (mixed) broadleaved woodland (WD1), Mixed broadleaved/conifer woodland (WD2) and (Mixed) conifer woodland (WD3). The length of removal for hedgerows totals approximately 87m. The total proposed area of woodland to be removed is approximately 12.9 ha, as illustrated in Figure 7-11. Though the Meath Biodiversity Action plan, protective objectives to prevent the reduction of woodland habitats, the permanent loss of such habitat types which are of Local Importance (Higher Value) is not considered to have the potential to affect the conservation status of these habitat types due to the small amount of removal across such a large area and for the fact that it is planted, and therefore will not result in a significant effect at any geographic scale. Additionally, landscape plans for the proposed development show of creation of 8.86 ha of newly created native woodland across the site during the operational and reinstatement phase (Refer to the Biodiversity Management Plan (BMP); Scott Cawley Ltd., 2025c).

Figure 7-11 Habitat loss due to construction activities



The remaining areas of Local Importance (Lower Value) include, spoil and bare ground (ED2) and recolonising bare ground (ED3). These habitats are highly disturbed and are located on the site of the proposed landfill void. The overall total area of these habitat types which overlaps which the Proposed Development boundary and will be lost as a direct impact during construction of the Proposed Development, is not significant at any geographic scale.

7.6.1.2.2 Introducing or Spreading non-native invasive plant species

Planting, dispersing, or allowing / causing the dispersal, spread or growth of certain non-native plant species is controlled under Article 49 of the Birds and Habitats Regulations and refers to plant or animal species listed on the Third Schedule of the Birds and Habitats Regulations.

The accidental spread of such non-native invasive plant species as a result of construction works has the potential to impact on terrestrial habitats, potentially affecting plant species composition, diversity and abundance over the long-term. The effects of introducing such non-native invasive plant species to highly sensitive and ecologically important habitat areas (i.e. designated areas for nature conservation or areas of Annex I habitat) have the potential to result in a likely significant negative effect, at geographic scales ranging from Local to International.

No non-native invasive plant species, listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011) (as amended) and Habitats Regulations and the European Union (Invasive alien species) Regulations 2024 (S.I. 374/2024), were identified within the Proposed Development. However, due to the nature of the site there is the possibility of invasive plant species being introduced in waste disposed into the landfill.

In an unmitigated scenario, there is a potential that invasive species will colonise downstream EU sites via Knockharley Stream which could be a potential vector for the spread of these species. It is highly unlikely that such an event would occur with the implementation of the Invasive Species Management Plan (ISMP) and monitoring of the site. Any impacts to habitats by these invasive species could affect QI/SCI species that may utilise the River Nanny, including those from River Nanny Estuary and Shore SPA.

Habitat degradation as a consequence of construction effects on the spread of invasive species has the potential to affect the conservation status of downstream estuarine and coastal habitats in the previously mentioned estuaries and the European sites within, and therefore, has the potential to result in a significant negative impact from a local to an international scale.

7.6.1.2.3 Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water feature has the potential to have significant negative effects on water quality and consequently affect aquatic and wetland habitats in the baseline environment. The effects of frequent and / or prolonged pollution events have the potential to be extensive and far-reaching and could potentially have significant long-term effects. In a worst-case scenario, estuarine and coastal habitats downstream could also be affected. It is unlikely that a pollution event of such a magnitude would occur during construction, due to the nature of the Proposed Development and the surface water infrastructure draining to retention ponds. Any pollution event would be temporary/short-term in nature. Nevertheless, a precautionary approach has been adopted in the assessment of the potential risk of impacts on water quality. Consequently, detailed mitigation measures are required to further minimise the risk of contaminated surface water runoff and / or an accidental spillage or a pollution event as a result of the Proposed Development having any perceptible effect on water quality during construction.

During construction, suspended solids, silt and other harmful materials generated as a result of the Proposed Development could be released into the local drainage infrastructure and travel downstream via Knockharley Stream and the River Nanny to Nanny Estuary. Cement-based products used in the Construction Phase of the Proposed Development (e.g. concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, the potential to be negatively impacted from a wide range of pollutants contained within surface water runoff remains. Habitat degradation as a consequence of construction effects on surface water quality has the potential to affect the conservation status of downstream estuarine and coastal habitats in the previously mentioned estuaries and the European sites within, and therefore, has the potential to result in a significant negative impact from a Local to an International scale.

7.6.1.2.4 Habitat Degradation – Groundwater

Any effects on the existing hydrogeological baseline supporting wetland habitats have the potential to negatively affect habitat extent and distribution, and vegetation structure and composition. The potential effects upon the existing hydrogeological regime are not necessarily limited to habitats within the Proposed Development boundary but can be far-reaching, with significant negative long-term effects.

The following habitats are potentially dependent on groundwater, in providing the suitable edaphic conditions for their establishment and maintenance, and are present within the survey area for habitats of the Proposed Development (refer to section 7.3.4.1 for details of the habitats and flora survey methodologies):

- Reed and large sedge swamps (FS1);
- Depositing / lowland rivers (FW2); and
- Wet grassland (GS4)

As detailed in Chapter 6 (Hydrogeology and Hydrology), there will be an engineered landfill liner and leachate collection system, an under cell drainage system and leachate recording and monitoring programme. The leachate collection rising main will discharge to the existing leachate lagoons or tanks on site. Additionally, a network of foul drainage collects foul waste from the existing buildings and is treated in the biotreatment plant on site prior to discharge into the waste leachate lagoon which is then Tankered offsite for further treatment. The mitigation measures to protect groundwater quantity and quality during the Construction Phase are also outlined in Chapter 6 (Hydrogeology and Hydrology).

As detailed in the Construction Environmental Management Plan (CEMP) for the Proposed Development, specific controls / mitigation measures (i.e., pollution control plan) will be put in place on a precautionary basis (despite the absence of significant groundwater impacts) to manage runoff and minimise pollution to receiving water bodies during the Construction Phase.

In addition, it is predicted that while there may be no direct impact on the groundwater regime, there is potential for indirect impacts associated with the Proposed Development through surface water interaction. Given that surface water is controlled by adequate attenuation in the project design, the magnitude of this impact is negligible.

There are no predicted impacts that could give rise to a likely significant negative impact at any geographic scale on any habitats or species at any time scale.

7.6.1.2.5 Habitat Degradation – Air Quality

The Proposed Development has the potential to generate dust during construction works which could affect vegetation in habitat areas adjacent to the Proposed Development. As discussed previously, NOx concentrations and deposition rates were modelled for the Construction Phase of the Proposed Development at distances up to 250m from the Proposed Development (refer to Chapter 8 (Air Quality) for details).

The risk of dust impacts as a result of the Proposed Development are summarised in Table 8-13 of Chapter 8 (Air Quality). The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity to prevent significant impacts occurring. In accordance with the EPA Guidelines (EPA 2022) the likely effects associated with the Construction Phase dust emissions pre-mitigation are overall negative, slight, and short-term.

As detailed in Chapter 8 (Air Quality) there are no sensitive ecological receptors within the study area. The results from the air quality assessment deem the potential impacts of the Proposed Development on habitats, to not be significant at a local geographic scale.

7.6.1.3 Mammals

7.6.1.3.1 Badger

Badger surveys confirmed evidence of some badger activity, although no setts nor evidence of suitably-sized burrows were found within the footprint of the Proposed Development. However, due to the presence of suitable habitat it is likely that the area is suitable for badgers setts. Although it cannot be predicted if badger will establish new setts within the ZoI of the Proposed Development before construction works commence, it is a possibility, and this scenario has been taken into account in the mitigation strategy (refer to Section 7.7.1.3.1).

Loss of Breeding/Resting Places

No badger setts were identified within the boundary of the Proposed Development during field surveys. Therefore, there will not be any loss of setts as a result of construction works. As a result, the Proposed

Development will not have a significant effect on the conservation status of badger, as there will be no loss of setts, and will not have a significant negative effect, at any geographic scale.

Mortality Risk

Site clearance works have the potential to sever badger commuting trails and result in the mortality of badger. The potential for this impact to occur would be expected to be greater during the breeding season (December to June inclusive) when juveniles venture out of the maternal sett or indeed when males leave the sett earlier on.

Furthermore, the potential for direct mortality to badger would be greater in more vegetated areas, as these areas would offer more in terms of breeding / resting / foraging habitat for badger. No setts were located during the surveys, however given the suitable habitat within and adjacent to the Proposed Development, there is potential for setts to be present. Thus, there remains the risk that commuting / foraging badger might become entrapped in excavations, particularly in areas adjacent to open parkland and along watercourse corridors, where egress ramps are available..

Given the relatively low numbers of badger that might be expected to be affected (given that they are typically small and territorial populations) , and that these species are highly mobile, the risk of mortality due to site clearance and/or excavation is unlikely to result in a level of mortality that would affect the species' conservation status, and result in a significant negative effect, even at a local geographic scale. However, on a precautionary basis, mitigation measures have been designed to protect badger from such impacts.

7.6.1.3.2 Otter

Field surveys did not record the presence any otter holts or evidence of otter activity within the footprint of the Proposed Development. Knockharley Stream which intersects the site is narrow and has been canalised, a significant portion of the riparian vegetation has been removed as part of the stream realignment, and the stream itself is shallow and likely absent of prey. Therefore it is unlikely to be utilised by otters.

Habitat and Food Source Degradation – Water Quality

During construction, contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently an impact on potential downstream otter; either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats). The effects of frequent and/or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects.

However, it is considered unlikely that a pollution event of such a magnitude would occur during construction, due to the nature of the Proposed Development and the surface water infrastructure draining to retention ponds. Any pollution event would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed development having any perceptible effect on water quality during construction.

Any works in proximity to existing drainage infrastructure, or within Knockharley Stream, could potentially result in the release of sediment, and other materials generated during construction works, which could be transferred downstream. In this way, suspended solids and other materials generated during construction works could be transferred to watercourses within the ZoI, namely the River Nanny and Nanny Estuary. Cement based products used in the construction phase of the Proposed Development (e.g. concrete and / or bentonite which are highly corrosive and alkaline materials), if released into the any of these watercourses may cause surface water degradation and damage to aquatic fauna.

This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment, and therefore has the potential to result in significant negative effects on food supply for aquatic mammals such as otter. Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely significant negative effect, at a local geographic scale. This is in consideration of the temporary nature. Mitigation measures have been designed to protect water quality during construction.

Loss of Breeding/Resting Places

No otter breeding or resting places, holt or couch sites, were identified within the boundary of the Proposed Development during field surveys. Therefore, there will not be any loss of holt or couch sites as a result of construction works. Therefore, the Proposed Development will not have a likely significant effect on the conservation status of otter, as there will be no loss of breeding / resting sites, and will not have a likely significant negative effect, at any geographic scale.

7.6.1.3.3 Other Mammals

Multidisciplinary surveys carried out within the Proposed Development recorded the presence of red deer and Irish hare, both protected under the Wildlife Acts.

Additionally, based on the results of the desk study, pine marten and hedgehog, protected under the Wildlife Acts, are known to occur in the wider environment.

Habitat Loss

The construction of the Proposed Development will result in the permanent loss of some suitable habitat for mammals located within the boundary of the Proposed Development. Given the relatively low numbers of individuals of each species that are likely to be affected (i.e. red deer and Irish hare) observed during surveys, and with alternative suitable woodland and scrub habitat available locally, the effects of habitat loss associated with construction works are unlikely to affect the long-term viability of their local populations. Therefore, habitat loss is unlikely to affect the species' conservation status or result in a significant negative effect, at any geographic scale.

Mortality Risk

Site clearance works have the potential to result in the mortality of mammal species. The potential for this impact to occur would be expected to be greater during the breeding season when juveniles would be present in nests. Furthermore, the potential for direct mortality to mammals would be greater in more vegetated areas, as opposed to disturbed ground, as these areas would offer more in terms of breeding / resting habitat for mammal species, as the extent of the works will involve the removal of these habitats in localised areas within the Proposed Development.

The relatively low numbers of individuals of each species that are likely to be affected observed during surveys, and the fact that they are highly mobile species, means that site clearance is unlikely to result in a level of mortality that would affect the species' conservation status, and result in a significant negative effect, even at a local geographic scale.

Disturbance / Displacement

In conjunction with any displacement effects associated with habitat loss, noise and vibration associated with construction works has the potential to displace mammals from both breeding / resting places and from foraging habitat. Mammals residing within the wider study area are likely to be habituated to disturbance within the landfill from passing trucks. As construction works in areas of suitable foraging habitat will typically be undertaken during normal daylight working hours and the relevant mammal species

are nocturnal in habit, displacement of mammal species from foraging areas (outside of areas where foraging habitat will be lost as a result of the Proposed Development) is extremely unlikely to affect the local mammal population and will not result in a likely significant negative effect, at any geographic scale.

7.6.1.3.4 Bats

Roost Loss

Bats, and their breeding and resting places, are strictly protected under the Habitats Regulations, and under the Wildlife Acts, and it is an offence under that legislation to intentionally kill or injure bats, or to interfere with or destroy their breeding or resting places.

There were no confirmed bat roosts from trees or buildings identified from the bat surveys undertaken across the Proposed Development. Although roosts were not identified, due to the high activity levels recorded during surveys and numbers of bat records across the site, the precautionary principle has been applied, and subsequent mitigation measures (Section 7.7.1.3.4) prescribed to reduce the risks of injury/mortality to bats as a result of the Proposed Development. The precautionary principle is also applied in regards to the loss of trees and their suitability for roosting bats. Therefore, mitigation measures are required to minimise or reduce the risk of the loss of bat tree roost during tree removal or result in bats being accidentally killed or injured during construction.

Habitat degradation as a result of fragmentation of foraging/commuting habitat and commuting routes

Bats rely on suitable semi-natural habitats which support the insect prey upon which they feed. The Proposed Development will result in the loss of such habitats used for feeding by all bat species recorded in the vicinity of the Proposed Development. Suitable habitat for foraging and commuting bats within the footprint of the Proposed Development includes hedgerows, drainage ditches, streams, treelines, and mixed broadleaved woodland. Habitats due for removal that are Local Importance (Higher Value), include, hedgerows (WL1), treelines (WL2) and broadleaved woodland (WD1 and WD2). The length of removal for hedgerows totals c. 87m. The total area of woodland to be removed is approximately 12.9 ha. The area of the habitats which will be lost (c. 25.2 ha) as a result of the Proposed Development is provided in Section 7.6.1.2.1 and shown in Figure 7-11. This is not deemed a significant quantity of suitable habitat impacted, in the local vicinity due to the amount of removed relative to the woodland within area adjacent to the Proposed Development. Additionally, it is planned for 8.86 ha of woodland to be planted around the perimeter of the proposed landfill berms during the operational phase, the perimeter of the proposed landfill following final capping, during the reinstatement phase, along with other areas around the site to compensate for this loss, and to enhance the existing woodland areas (BMP; Scott Cawley Ltd., 2025c).In assessing the impacts of habitat loss as a result of fragmentation of foraging / commuting habitat on bat populations, consideration was given to a species Core Sustenance Zone (CSZ). A CSZ refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the 'resilience and conservation status' of the colony using the roost. The industry standard guidance *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins 2023) states that:

'With reference to development, the CSZ could be used to indicate: The area surrounding the communal roost within which development work may impact the flight-paths and foraging habitat of bats using that roost, and; The area within which it may be necessary to ensure no net reduction in the quality and availability of foraging habitat for the colony.'

The CSZ of the four bat species recorded on site are as follows: Common pipistrelle bat (2km), Soprano pipistrelle bat (3km), Leisler's bat (3km), and *Myotis* species (2km).

Notwithstanding the fact, that there is evidence of bats commuting within the Proposed Development, and that the Proposed Development contains some suitable habitat likely to be within the CSZ of at least one bat roost outside the Proposed Development, considering the type of works proposed and the open area surrounding the landfill, there is limited potential for the Proposed Development to act as a barrier to flight

paths for bat species, and the hedgerow and woodland habitats within and adjacent to the Proposed Development will continue to provide commuting and foraging habitat.

Considering the extent of tree/vegetation across and adjacent to the Proposed Development, within the context of its current extent, the removal of sections of screening forest and hedgerows during the construction phase will result in the loss of foraging habitat, but relative to the total area of woodland and hedgerows within the Proposed Development will not result in complete fragmentation. This impact on the loss of foraging resource will be significant at the local level only.

7.6.1.4 Birds

7.6.1.4.1 Breeding Birds

The assessment carried out in the AA Screening and NIS for the Proposed Development (Scott Cawley Ltd., 2025 a,b) considered the potential for the Proposed Development to affect the bird species listed as SCIs for SPA sites within the vicinity of the Proposed Development. That assessment concluded that the Proposed Development would not affect their breeding colonies or have any long-term effects on the local breeding populations due to the lack of suitable breeding sites and the relatively low numbers of SPA populations observed during surveys. Therefore, for these species, the Proposed Development will not affect the conservation status of the breeding populations and will not result in a significant negative effect on the integrity of the European sites.

Non-SCI breeding birds

Habitat Loss and Loss of Breeding/Resting Places

The Proposed Development will result in the loss of breeding bird nesting and foraging habitat within the footprint of the Proposed Development. The areas of habitat loss are described in Section 7.6.1.2.1. These areas are comprised of scrub, hedgerows, treelines, agricultural grasslands, and (mixed) broadleaved woodland, all of which may provide nesting and/or foraging habitat for birds. These areas will be removed during construction of the Proposed Development.

The primary consequence of habitat loss will be increased competition for resources (e.g., nesting habitat and/ or prey / food source) both between and amongst breeding bird species. The magnitude of this effect will be largely defined by many unquantifiable factors such as future land use changes and whether the local habitat resource has reached its' carrying capacity or not in terms of breeding bird species. For species with larger home ranges during the breeding season, habitat loss at the scale of the Proposed Development is not likely to have any perceptible effects on breeding success or population dynamics.

The habitat areas that will be lost as a result of the Proposed Development form a relatively small part of larger expanses of similar habitat types and mosaics in the wider locality. Agricultural land and woodlands form a vital resource for breeding birds within a rural setting. These areas of suitable breeding bird nesting and/or foraging habitat available in the wider locality of the Proposed Development.

None of the habitat areas to be lost are unique to the locality and, either individually or collectively, are not likely to support a significant proportion, or the only population, of any given breeding bird species locally as few breeding bird species were observed during surveys, and site is primarily bare ground which is not suitable to provide nesting sites for breeding birds. Although a temporary decline in overall breeding bird abundance could potentially occur at a very local level, this is unlikely to affect the local range of the breeding bird species present nor is it likely to affect the ability of these breeding bird populations to maintain their local populations in the long-term.

Mitigation measures will be implemented to reduce the effects of habitat loss on breeding bird species locally (see Section 7.7.1.4.1).

Mortality Risk

If site clearance works were to be undertaken during the breeding bird season (i.e. March to August, inclusive) it is likely that nest sites holding eggs or chicks will be destroyed and birds killed.

Mortality of birds at the scale of the Proposed Development over what is likely to be a single breeding bird season in terms of completing site clearance works, will result in a likely short-term significant negative effect on local breeding bird population abundance.

However, in the longer-term this would be unlikely to affect the ranges of the breeding bird species recorded in the study area, nor would it be likely to affect the long-term viability of the local populations, as few breeding bird species were observed during surveys, and site is primarily bare ground which is not suitable to provide nesting sites for breeding birds. Mortality of birds during site clearance works is not predicted to significantly affect the conservation status of any of the breeding bird species present within the study area at any geographic scale.

Disturbance and Displacement

Assessment of construction related noise disturbance to wintering waterbirds is based on the research presented in C*onstruction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance* (Cutts *et al.,* 2009) and "*Exploring Behavioural Responses of Shorebirds to Impulsive Noise"* (Wright *et al.*, 2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging birds or roosting birds during both day and nighttime hours. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds (i.e. birds becoming alert and some behavioural changes (i.e. reduced feeding activity)), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity are generally below 60dB or, in most cases, are approaching the 50dB threshold (BSI 2008). As such, disturbance effects for general construction activities across the majority of the Proposed Development would not be expected to extend beyond a distance of approximately 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond. Chapter 10 (Noise and Vibration) of this EIAR, details the noise levels across the Proposed Development throughout the Construction Phase.

The noise, vibration, increased human presence and the visual deterrent of construction traffic, associated with site clearance and construction will temporarily locally disturb breeding bird species over a number of season as phased works are proposed over c. 21 years and is likely to displace breeding birds from habitat areas adjacent to the footprint of the Proposed Development. Construction activities will largely involve excavations of the land. The magnitude of the impact will be dependent on the type of construction works and their duration. In terms of its ZoI, the Construction Phase of the Proposed Development will be completed on a phased basis, over a period of 21 years. Disturbance to birds will be greatest during Phase 1 of the construction programme (Years 0-2) due to site clearance, berm construction, and excavating the void for the landfill cells. Construction activities during Phases 2-7 involve infilling landfill cells, of which birds will be habituated to disturbance due to the presence of heavy machinery during the operation of the landfill.

Although it is not possible to definitively quantify the magnitude of this potential impact (or the potential effect zone) in a worst-case scenario it could potentially extend for several hundred metres from the Proposed Development. As such, the construction works have the potential to affect the conservation status of affected breeding bird species and will result in a likely short-term significant negative effect, at a local geographic scale.

Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature has the potential to have a negative impact on water quality and consequently an impact on breeding birds; either directly (e.g. bird species coming into direct contact with pollutants) or indirectly (e.g. acute or sub-lethal toxicity from pollutants affecting their food supply or supporting habitats). The effects of frequent and/or prolonged pollution events in a waterbody have the potential to be extensive and far-reaching and could potentially have significant long-term effects.

However, it is unlikely that a pollution event of such a magnitude would occur during construction, due to the nature of the Proposed Development and the surface water infrastructure draining to retention ponds. Any pollution event would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Development having any perceptible effect on water quality during construction.

During construction, suspended solids, silt and other harmful materials generated as a result of the Proposed Development could be released into the local drainage infrastructure and travel downstream Via Knockharley Stream and the River Nanny to Nanny Estuary downstream of the Proposed Development. Cement based products used in the Construction Phase of the Proposed Development (e.g. concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, estuarine/ coastal foraging habitats downstream could also be affected.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely significant negative effect, at a range of local to international geographic scale. Mitigation measures have been designed to protect water quality during the Construction Phase in Chapter 6 (Hydrogeology and Hydrology) of this EIAR.

7.6.1.4.2 Wintering Birds

This Section of the impact assessment deals with wintering bird species (i.e. those bird species which are SCIs of SPAs for their wintering populations or are listed on either the BoCCI Red or Amber lists for their wintering populations). The assessment carried out in the NIS (Scott Cawley Ltd, 2025b) for the Proposed Development considered the potential for the Proposed Development to affect the bird species listed as SCIs of River Nanny Estuary and Shore SPA and North-West Irish Sea SPA and their wintering populations. That assessment concluded that the Proposed Development would not affect their wintering bird colonies or have long-term effects on the local wintering populations.

Non-SCI Wintering birds

Habitat loss

There will be no direct loss of feeding habitat to accommodate the Proposed Development, as the habitats loss is associated with habitat types which are not suitable for foraging for wintering birds. Notwithstanding the loss of habitat across the Proposed Development, the availability of large areas of suitable foraging and/or roosting habitat for wintering bird species in the wider locality of the Proposed Development, and given the low numbers recorded during surveys, habitat loss is not likely to affect the conservation status of wintering bird species and will not result in a likely significant negative effect, at any geographic scale.

Disturbance/displacement

A temporary and / or permanent increase in noise, vibration and / or human activity levels during the construction of the Proposed Development could result in disturbance to and / or displacement of wintering bird species present within the footprint and / or the vicinity of the Proposed Development.

Assessment of construction related noise disturbance to wintering waterbirds is based on the research presented in C*onstruction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance* (Cutts *et al.,* 2009) and "*Exploring Behavioural Responses of Shorebirds to Impulsive Noise"* (Wright *et al.*, 2010). In terms of construction noise, levels below 50dB would not be expected to result in any response from foraging birds or roosting birds during both day and nighttime hours. Noise levels between 50dB and 70dB would provoke a moderate effect / level of response from birds (i.e. birds becoming alert and some behavioural changes (i.e. reduced feeding activity)), but birds would be expected to habituate to noise levels within this range. Noise levels above 70dB would likely result in birds moving out of the affected zone or leaving the site altogether. At approximately 300m, typical noise levels associated with construction activity are generally below 60dB or, in most cases, are approaching the 50dB threshold (BSI 2008). As such, disturbance effects for general construction activities across the majority of the Proposed Development would not be expected to extend beyond a distance of approximately 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance and beyond. Chapter 10 (Noise and Vibration) of this EIAR, details the noise levels across the Proposed Development throughout the Construction Phase.

Due to the presence of heavy machinery as part of the normal operations of the existing landfill facility, birds would be habituated to noise. As the construction works will be performed in seven distinct phases over a c. 21-year period, this will result in a short-term significant negative effect at a local geographic scale during construction Phase 1 due to site clearance, berm construction, and excavating the void for the landfill cells. Construction activities during Phases 2-7 involve infilling landfill cells, of which birds will be habituated to disturbance due to the presence of heavy machinery during the operation of the landfill.

Habitat Degradation – Surface Water Quality

During construction, contaminated surface water runoff and/or an accidental spillage or pollution event into any surface water feature has the potential to have a negative impact on water quality and consequently an impact on wintering birds; either directly (e.g. bird species coming into direct contact with pollutants) or indirectly (e.g. acute or sub-lethal toxicity from pollutants affecting their food supply or supporting habitats). The effects of frequent and/or prolonged pollution events in a waterbody have the potential to be extensive and far-reaching and could potentially have significant long-term effects.

However, it is unlikely that a pollution event of such a magnitude would occur during construction or be any more than temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed Development having any perceptible effect on water quality during construction.

During construction, suspended solids, silt and other harmful materials generated as a result of the Proposed Development could be released into the local drainage infrastructure and travel downstream Via Knockharley Stream and the River Nanny to Nanny Estuary downstream of the Proposed Development. Cement based products used in the Construction Phase of the Proposed Development (e.g. concrete and/or bentonite which are highly corrosive and alkaline materials), if released into any watercourse may cause surface water degradation and damage to aquatic fauna. This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment. In a worst-case scenario, estuarine/ coastal foraging habitats downstream could also be affected.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely significant negative effect, at a range of local to international geographic scale. Mitigation measures have been designed to protect water quality during the Construction Phase and are outlined in Chapter 6 (Hydrogeology and Hydrology) of the EIAR.

7.6.1.5 Amphibians

Common frog tadpoles were recorded during the multidisciplinary surveys carried out along the Proposed Development.

Disturbance and Mortality Risk

Site clearance and / or construction works in areas within, or adjacent to, suitable amphibian habitat, have the potential to result in disturbance to, and the direct mortality of amphibians. Given the relatively small area of potentially suitable habitat for amphibians in the Proposed Development study area and its immediate locality, the number of individuals that would potentially be at risk is low. As the construction works will be performed in seven distinct phases over a c. 21-year period, potential impacts arising from increased disturbance or mortality risk are not likely to affect the local populations of any amphibian species in the long-term nor their conservation status and as such there is no potential for a likely significant effect, at any geographic scale.

Habitat Severance / Barrier Effect

The temporary to short-term physical disruption of the existing landscape during site clearance and construction will fragment habitat used by amphibians. As a temporary to short-term impact, this is unlikely to present a significant barrier to the movement of the species across the bulk of the Proposed Development such that it would affect the local amphibian population in the long-term. Therefore, habitat severance during construction and any associated barrier effect are not likely to affect the species' conservation status and are not predicted to result in a likely significant negative effect to amphibians, at any geographic scale.

Habitat Degradation – Surface Water Quality

As discussed in Section 7.6.1.2.3, the Construction Phase of the Proposed Development could result in contamination of receiving water bodies. This could result in significant negative impacts on amphibians either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats). Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the species' conservation status and result in a likely significant effect, at a Local geographic scale.

7.6.1.6 Common Lizard

There were no reptile species recorded during the multidisciplinary surveys, but suitable habitat is present within the Proposed Development; namely in areas of grassland, bare ground, and scrub. The desk study returned no records for reptile species within the wider surrounding area. A precautionary approach has been adopted which has not excluded the possibility of common lizard being present in the vicinity of the Proposed Development during construction.

Disturbance and Mortality Risk

Site clearance works have the potential to result in disturbance to, and the direct mortality of, common lizard, especially during hibernation. There is suitable habitat within the Proposed Development, but due to the constant disturbance within the landfill site, the number of individuals that would potentially be at risk is low and would be unlikely to affect the local populations in the long-term. Therefore, disturbance or mortality risks are not likely to affect the species' conservation status or result in a likely significant

negative effect, at any geographic scale, particularly as the construction activity at any one location would be temporary/short-term in nature. Nevertheless, mitigation is provided to avoid harm/injury to reptiles.

Habitat Severance / Barrier Effect

The temporary physical disruption of the existing landscape during site clearance and construction will fragment habitat used by common lizard. As a temporary, short-term impact, this is unlikely to present a significant barrier to the movement of the species such that it would affect the local common lizard population in the long-term. Therefore, habitat severance during construction and any associated barrier effect are not likely to affect the species' conservation status and are not predicted to result in a likely short-term significant negative effect to the common lizard, at any geographic scale.

7.6.1.7 Fish

This section only describes fish species in the local watercourses which surface water drains to from the site, outside of European sites. Impacts on QI species within downstream European sites are described above in Section 7.6.1.1.1 and in Section 5.3.5 of the NIS (Scott Cawley Ltd, 2024b).

Habitat degradation – Surface Water Quality

During construction, contaminated or heavily silted surface water runoff, pump discharges and/or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently on aquatic habitats and fish species, and potentially also in the marine environment downstream. This could be either directly (e.g. acute or sub-lethal toxicity from pollutants or siltation events damaging spawning habitat downstream) or indirectly (e.g. affecting their food supply or supporting habitats).

The effects of frequent and/or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects. It is unlikely that a pollution event of such magnitude would occur during construction due to the nature of the Proposed Development and the surface water infrastructure draining to retention ponds. If such an event did occur, it would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk (albeit low due to the distance between surface water features and the main construction activities) of water quality impacts and detailed mitigation measures in Section 7.7.1.2.1 are required to further minimise the risk of the Proposed Development having any perceptible effect on water quality during construction.

Habitat degradation as a result of effects on surface water quality during construction has the potential to affect the conservation status of affected fish species and result in a likely significant negative effect, at a local geographic scale.

Habitat Loss

The diversion of Knockharley Stream will result in habitat loss, primarily due to the loss of riparian vegetation during the diversion. Biological Water Quality surveys of Knockharley Stream show that it is poor quality, and as it is low volume it is unlikely to support any aquatic species. Therefore, habitat loss impacts are not likely to affect the conservation status of aquatic species or result in a likely significant effect, at any geographic scale.

7.6.2 Operational Phase

7.6.2.1 Designated Areas of Nature Conservation

7.6.2.1.1 European sites

Habitat Loss and Fragmentation

During the Operational Phase of the Proposed Development, there will be no requirement to carry out works in any European site. Therefore, there are no potential habitat loss and fragmentation impacts on QI/SCI species as a result of the Operational Phase of the Proposed Development.

Habitat Degradation – Surface Water Quality

The Proposed Development is hydrologically connected to Nanny Estuary via the River Nanny as discussed in Section 7.6.1.1.1. The potential release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include the release of sediment into receiving waters and the subsequent increase in suspended solids, and the accidental spillage and / or leaks of contaminants (i.e. fuel, oils, chemicals and concrete washings) into receiving waters.

The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge point and therefore impact the downstream European Sites. This reduction in water quality (either alone or in combination with other pressures on water quality) could result in the degradation of sensitive habitats present within these European sites, which in turn, would negatively affect the SCI bird species that rely upon these habitats as foraging and / or roosting habitat. It could also negatively affect the quantity and quality of prey available to SCI bird species. These potential impacts could occur to such a degree that the conservation objectives of River Nanny Estuary and Shore SPA and North-West Irish Sea SPA are undermined. The magnitude of this effect will be largely defined by many unquantifiable factors, and by virtue of coastal dilution, only a localised percentage of the marine environment would be impacted temporarily.

7.6.2.1.2 National sites

The potential impacts on National sites arising from the Construction Phase during the Proposed Development, may also negatively affect hydrologically connected pNHA sites, outlined in section 7.4.3, during the Operational Phase. Potential impacts arising from the Proposed Development on these pNHA sites would result in a likely negative and significant effect at a National geographic scale.

In the case of the Balrath Woods pNHA and Laytown Dunes/Nanny Estuary pNHA, the potential impacts arising from the Proposed Development on these pNHA sites includes habitat degradation as a result of effects on surface water quality.

Habitat Degradation – Surface Water Quality

The Proposed Development is hydrologically connected to Balrath Woods pNHA and Laytown Dunes/Nanny Estuary pNHA via the River Nanny as discussed in Section 7.6.1.1.2. The potential release of contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water features during operation, has the potential to affect water quality in the receiving aquatic environment. Such a pollution event may include the release of sediment into receiving waters and the subsequent increase in suspended solids, and the accidental spillage and / or leaks of contaminants (i.e. fuel, oils, chemicals and concrete washings) into receiving waters.

The associated effects of a reduction of surface water quality could potentially extend for a considerable distance downstream of the location of the accidental pollution event or the discharge point and therefore impact the downstream pNHA sites. This reduction in water quality (either alone or in combination with other pressures on water quality) could result in the degradation of sensitive habitats present within these pNHA sites.

7.6.2.2 Habitats

7.6.2.2.1 Habitat Degradation – Surface Water Quality

Mitigation for the Operational Phase has been built into the design of the Proposed Development. The drainage system for the Proposed Development will discharge to the following surface water receptors:

- River Nanny (via Knockharley Stream)

The potential impacts predicted for the Operational Phase are related to water quality and surface runoff which may occur due to increased impermeable areas from the IBA facility, which may lead to increased surface runoff and an increase in pollution and sediment load entering surface water receptors. While the IBA facility (a consented project under ABP 303211-18[26]) is not part of the Proposed Development, this building will be located within the site and the assessment will take this into account when assessing impacts.

The potential for increased runoff is expected to be minimal as the flows will be controlled by attenuation ponds. As such there will be no increase in surface water discharge during the Operational Phase. The primary activity during the Operational Phase is the occasional access for maintenance activities which may result in accidental spills, oil leaks, etc. These occasional visits may result in surface water pollution in the absence of mitigation measures which would likely be imperceptible or brief effect (lasting less than a day).

7.6.2.3 Mammals

7.6.2.3.1 Badger

Mortality risk

The operational phase could result in increases in mortality due to the increased likelihood of collisions.

The creation of tracks to new landfill cells may increase the risk of road traffic collisions with badger within the Proposed Development. The risk is likely to be higher near badger setts, where tracks are severing badger territories, or is passing through habitats where high levels of badger activity was recorded.

No badger setts were recorded and there was limited evidence of badger recorded within the Proposed Development. Badger residing within the Proposed Development are likely to be habituated to disturbance within the landfill from passing trucks. Although it is not possible to quantify the magnitude of the effect, the increased collision risk on the local badger population is not likely to be significant at any geographic scale.

7.6.2.3.2 Otter

Habitat Degradation – Water Quality

During operation, contaminated surface water runoff and / or an accidental spillage or pollution event into any surface water feature has the potential to have a significant negative impact on water quality and consequently an impact on otter; either directly (e.g. acute or sub-lethal toxicity from pollutants) or indirectly (e.g. affecting their food supply or supporting habitats). The effects of frequent and/or prolonged pollution events in a river system have the potential to be extensive and far-reaching and could potentially have significant long-term effects.

However, it is considered unlikely that a pollution event of such a magnitude would occur due to the nature of the Proposed Development and the surface water infrastructure draining to retention ponds. Any

[26] https://www.pleanala.ie/en-ie/case/303211

pollution event would be temporary in nature. Nevertheless, a precautionary approach is being taken in assuming a level of risk of water quality impacts and detailed mitigation measures are required to further minimise the risk of the Proposed development having any perceptible effect on water quality during construction.

This has the potential to result in significant negative effects on water quality and consequently affect aquatic and wetland habitats in the receiving environment, and therefore has the potential to result in significant negative effects on food supply for aquatic mammals such as otter. Habitat degradation as a result of effects on surface water quality during operation has the potential to affect the species' conservation status and result in a likely significant negative effect, at a local geographic scale. This is in consideration of the temporary nature. Mitigation measures have been designed to protect water quality during construction.

7.6.2.3.3 Other Mammals

There are no operational phase significant impacts to other mammals that would affect their long term distribution or abundance, predicted to arise from the Proposed Development at any geographic scale.

7.6.2.3.4 Bats

Direct Mortality/Injury

The presence of new pylon structures and the IBA facility within the Proposed Development site could potentially result in direct mortality of bat species that utilise the site for foraging and/or commuting, through collisions. Recent studies, investigating the cause of bat collisions with buildings found that building material is an important factor to be considered (Greif *et al.,* 2017) Whilst the design of the facades of the buildings do include windows, no large surfaces of glass are proposed.

Irish bat species navigate largely by echolocation calls, and fixed structures such as those proposed as part of the Proposed Development present a low risk in terms of collision. Within a national context, the conservation status of the species recorded at this site are all favourable. Therefore, the Proposed Development will not have a significant negative effect on the bat populations at any geographic scale.

Barrier/Severance effects

Changes to the landscape after completion of the Proposed Development has the potential to impact of the movement of bats across the landscape. Research has shown that many species follow linear features, such as hedges, treelines, forest edges, or waterways, and are reluctant to cross wide open spaces. This behaviour means that activities which sever these sorts of connections are likely to have consequences for bats (Kyheröinen *et al.,* 2019).

Severance effects in the absence of mitigation are likely to result in a significant negative effect at a local geographic scale. Mitigation to reduce barrier effects within the operation of the Proposed Development are detailed in Section 7.7.1.3.4.

Indirect Disturbance of Flight Patterns Due to Operational Lighting

Bats are nocturnal in habit and as such any operational and maintenance works undertaken during the hours of darkness that may alter the existing environmental conditions in areas of suitable habitat have the potential to impact on bats. Bats are particularly sensitive to light disturbance and as such any changes in existing light levels as a result of the Proposed Development could impact on local bat populations, including their roosting, foraging and/or commuting behaviours.

No bat roosts were identified within the Proposed Development. There is lighting only proposed around the existing office buildings which are largely already illuminated, as well as the IBA facility.

The following elements of the operational lighting design will ensure minimal impacts on bats from light disturbance:

- All proposed lighting will be from a LED light source, which is a more bat-friendly light source as it contains very little/no ultra-violet (UV) frequency lighting that bats are particularly sensitive to (BCI, 2010);
- Lighting will include an automatic dimming and switching off mechanism in order to reduce the duration of light disturbance as much as possible;
- Lighting will be directional, i.e. there will be no upward light projection and lighting will not be projected behind lighting columns in order to reduce any backward lighting and any obtrusive lighting into adjacent areas.
- Where possible, the shortest lighting columns will be used to further reduce any light spill.

Given the design measures that will be in place during operation, there is no potential for operational lighting to result in a significant negative effect on bat populations at any geographic scale.

7.6.2.4 Birds

7.6.2.4.1 Breeding Birds

Disturbance/Displacement

Noise levels associated with the use of heavy machinery within the landfill may have a negative effect on bird abundance and occurrence in the locality. Increased noise levels, as well as causing disturbance to birds in the locality, may also affect the breeding success of local bird populations as bird mating calls would become drowned out by noise, therefore affecting the establishment of breeding bird territories.

Breeding birds within the locality of the Proposed Development would already be habituated to passing noise and disturbance from machinery. As the Proposed Development is the creation of a new void for the landfill, replacing the previous void, there is not likely to be an increase in noise and thus the effect of noise is not likely to be significant at any geographic scale.

Therefore, the Proposed Development is not likely to affect the conservation status of breeding bird species and will not result in a likely significant negative effect, at any geographic scale.

7.6.2.4.2 Wintering Birds

Disturbance/Displacement

Noise levels associated with the use of heavy machinery within the landfill may have a negative effect on bird abundance and occurrence in the locality. Increased noise levels, as well as causing disturbance to birds in the locality, may also affect the foraging success of local bird populations.

Wintering birds within the locality of the Proposed Development would already be habituated to passing noise and disturbance from machinery. As the Proposed Development is the creation of a new void for the landfill, replacing the previous void, there is not likely to be an increase in noise and thus the effect of noise is not likely to be significant at any geographic scale.

Therefore, the Proposed Development is not likely to affect the conservation status of wintering bird species and will not result in a likely significant negative effect, at any geographic scale.

Direct Mortality/Injury

The presence of new pylons and the IBA facility within the Proposed Development site could potentially result in direct mortality of breeding bird species that utilise the site for foraging and/or commuting, due to collisions.

From a review of available literature on the subject, bird collisions with man-made structures are common and well documented (Banks, R.C., 1979, Jenkins, *et al.*, 2010, Klem, D., 1990, Erickson, *et al.*, 2005, Erickson, *et al.*, 2001) with migratory passerine species the most prevalent collision victims (Bing *et al.*, 2012, Longcore *et al.*, 2013). Bird collision with buildings is generally associated with reflective material such as windows or large surfaces of glass which create a mirror and appear to show the continuation of the sky or surrounding landscape, an effect that can be exacerbated by lighting (Sheppard, C. & Phillips, G., 2015). Whilst the design of the facades of the buildings do include windows, no large surfaces of glass are proposed.

Bird collisions and electrocution with power pylons is documented (Demerdzhiev, 2014) and (Janss, 2000) with 'poor fliers' and raptor species being the most prevalent victims. Line marking of power lines has been demonstrated to reduce bird mortality[27].

In the absence of mitigation, the review of literature suggests there could be a low level of mortality attributable to bird collision with glazing on the proposed buildings and power pylons, however this impact will not cause any significant effect at a local scale or any other geographic scale.

7.6.2.5 Amphibians

The Operational Phase of the Proposed Development is not predicted to result in any significant effects to populations of amphibians in the vicinity of the Proposed Development. Therefore, no mitigation is proposed.

7.6.2.6 Common Lizard

The Operational Phase of the Proposed Development is not predicted to result in any significant effects to populations of common lizard in the vicinity of the Proposed Development. Therefore, no mitigation is proposed.

7.6.2.7 Fish

Habitat Degradation – Surface Water

As discussed in Section 7.6.2.2.1, without the design mitigation incorporated into the design of the Proposed Development, the Operational Phase of the Proposed Development could result in contamination of receiving water bodies. This could result in significant negative impacts on fish species either directly (e.g., acute or sub-lethal toxicity from pollutants) or indirectly (e.g., affecting their food supply or supporting habitats).

The Proposed Development will not exacerbate the existing surface water quality conditions in any of the receiving surface waters. As outlined in Chapter 6 (Hydrogeology and Hydrology), the development includes pollution control measures, with the implementation of SuDS and an attenuation system to ensure the risks are minimised during the Operational Phase.

Habitat degradation as a result of effects on surface water quality during the Operational Phase does not have the potential to affect the conservation status of fish and will not result in a significant negative effect, at any local geographic scale.

[27] Guidance - Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds (Scottish Natural Heritage, 2025). Available from https://www.nature.scot/doc/guidance-assessment-and-mitigation-impacts-power-lines-and-guyed-meteorological-masts-birds#acknowledgements

7.7 Mitigation Measures

7.7.1 Construction Phase Mitigation

A suitably experienced and qualified ecologist (Ecological Clerk of Works (ECoW)) will be employed by the appointed contractor to advise on ecological matters during the c. 21-year Construction Phase, communicate all findings in a timely manner to statutory authorities, acquire any licences or consents required to conduct the work, and supervise and direct the ecological measures associated with the Proposed Development.

7.7.1.1 Designated Areas for Nature Conservation

7.7.1.1.1 European sites

The mitigation measures that are required to ensure that the Proposed Development will not adversely affect the integrity of the European sites within the ZoI are presented in the NIS. Following a consideration and assessment of the Proposed Development on the identified relevant European sites, the following mitigation measures were developed to address potential impacts that were identified:

- Measures to protect surface water quality during construction

A Surface Water Management Plan (SWMP) will be included as part of the detailed Construction Environmental Management Plan (CEMP) prepared by the construction contractor which will detail control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment for the Construction Stage. This includes measures relating to:

- A requirement for a Pollution Incident Response Plan;
- Construction Compound management including the storage of any fuels and materials;
- Control of Sediments;
- Use of concrete; and
- Management of vehicles and plant including refuelling and wheel wash facilities.

As well as these general mitigation measures, other specific mitigation and/or monitoring measures are required, which will include, but will not be limited to:

- Works in Flood Zones A and B are avoided where possible. In these areas, the Contractor will be required to provide a method statement for the removal of materials and personnel to minimise sediment discharge into the river and risk to personnel during flood events;
- Construction works in areas prone to flooding are to take place during dry seasons. The Contractor must follow the weather forecast prior to commencing instream works and concrete pouring. It is noted that track levels for the entirety of the development are well above flood levels.
- Works areas to be kept dry at all times through the use of bunds of non-erodible material adjacent to watercourses to avoid contaminated water entering the watercourse.
- Settlement tanks, silt traps/bags and bunds will be used where required to remove silt from surface water runoff. Sizing of the tanks will be based on best available guidelines, CIRIA (2006). Any construction work within a 10m buffer zone must be provided with these measures to minimise sediment discharge to a watercourse (CIRIA, 2006);
- Refuelling of all plant, machinery, and vehicles will be undertaken only in designated areas where leaks and spills are can be contained relatively easily. Spill kits will be made available on all temporary and permanent construction sites. Refuelling areas must be kept at least 50m away from any watercourse, considered to be a conservative approach based on professional judgement, including, but not limited to; estuarine, transitional, and coastal waterbodies;
- Construction materials to be managed in such a way as to effectively minimise the risk posed to the aquatic environment;

- Construction Compounds and haul roads will avoid high flood risk zones as much as possible and maintain a minimum buffer of 50m from surface watercourses, considered to be a conservative approach based on professional judgement; and
- Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses.

The mitigation measures to protect surface water during the Construction Phase are also outlined in Chapter 6 (Hydrology and Hydrogeology).

7.7.1.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Development on pNHAs within the ZoI are as per those for European sites as the boundaries coincide with the SACs and SPAs. Therefore, the mitigation measures outlined above in Section 7.7.1.1.1, and as detailed in the NIS (Scott Cawley Ltd., 2025b, will prevent the Proposed Development resulting in a significant effect on these pNHAs at the national geographic scale.

In terms of mitigation, measures are detailed in section 7.7.1.1.1. It should be noted that the full suite of mitigation measures proposed to protect surface water during the Construction Phase for European and national sites are set out in full in Chapter 6 (Hydrology and Hydrogeology).

7.7.1.2 Habitats

7.7.1.2.1 Habitat Degradation – Surface Water Quality

In terms of mitigation, measures are detailed in section 7.7.1.1.1. The mitigation measures to protect surface water during the Construction Phase are also outlined in Chapter 6 (Hydrology and Hydrogeology).

7.7.1.2.2 Habitat Degradation – Non-Native Invasive Species

The mitigation strategy in relation to non-native invasive plant species is based on the TII guidance (TII, 2020a) with the objectives of monitoring for and permanently removing all non-native invasive plant species from the working area, where they might accidentally become established) and preventing the spread of any established populations present with the boundary of the proposed road development (a legal requirement for species such as Third schedule invasives such as Japanese knotweed, as well as other non-native species such as Winter heliotrope that can proliferate along road corridors).

A Non-native Invasive Species Management Plan has been prepared and to be included in the CEMP and will be implemented sufficiently far in advance of the construction works commencing, so as to allow time to adequately control all target non-native invasive species populations within the ZoI of the proposed road development, having regard to the specific timing/seasonal constraints that apply in relation to each individual species. The Invasive Species Management Plan will direct the appointed contractor in implementing the specific mitigation measures required in relation to individual non-native invasive plant species.

As species may have spread, or their distribution may have changed, between the habitat surveys carried out for this EIA Report and the commencement of construction works, a confirmatory pre-construction non-native invasive species survey shall be undertaken by a suitably qualified specialist to confirm the absence and / or extent of all Third Schedule non-native invasive species within the footprint of the Proposed Development. Where an infestation is confirmed / identified, this will require the implementation of the Invasive Species Management Plan (ISMP).

Following the confirmatory pre-construction survey, the following mitigation measures shall be implemented, as required.

- Where a pre-construction non-native invasive species re-survey has confirmed the presence of previously identified Third Schedule non-native invasive species, or identified newly established non-native invasive species within the footprint of the Proposed Development, the ISMP produced will provide a detailed description of the infestations (e.g., approximate area of the respective colonies (m^2), where feasible; approximate total number of stems, pattern of growth and information on other vegetation present), and where necessary, will include calculations of volumes of infested soils to be excavated.
- The ISMP will be updated following the pre-construction survey and as advised by a suitably qualified specialist, with regard to the guidance, including the requirements of, but not limited to, The Management of Invasive Alien Plant Species on National Roads (Technical Guidance) (TII, 2020a; 2020b) and other species-specific guidance documents including those listed in the ISMP, as necessary.
- The Appointed Contractor shall ensure that all control measures specified in the ISMP will be implemented by a suitably qualified and licensed specialist prior to the construction of the Proposed Development to control the spread of non-native invasive species within the footprint of the Proposed Development. Furthermore, the appointed contractor will adhere to control measures specified within the ISMP throughout the Construction Phase of the Proposed Development (and where they continue into the Operational Phase.

The site will be monitored by the suitably qualified and licensed specialist retained by the appointed contractor after control measures have been implemented. Any re-growth will be subsequently treated as detailed in the ISMP.

In respect of non-native or noxious plant species (e.g. Not Third schedule species) and in accordance with the Transport Infrastructure Irelands, 2020a guidelines, where cut, pulled or mown noxious weed or non-native invasive plant species material arises, its disposal will not lead to a risk of further spread of the plants. Care will be taken near watercourses as water is a fast medium for the dispersal of plant fragments and seeds. Material that contains flower heads or seeds will be disposed of either by composting or burial at a depth of no less than 0.5m in the case of noxious weeds, or by incineration (at a licenced facility having regard to relevant legislation) or disposal to licensed landfill in the case of non-native invasive plant species (NRA, 2010).

The taproots of docks and roots of creeping thistle are not suitable for composting or shallow burial, requiring disposal to landfill, incineration or burying at a depth of no less than 1.5m (practical only during the construction phase) (NRA, 2010). All disposals will be carried out in accordance with the Waste Management Acts 1996 as amended.

7.7.1.2.3 Habitat loss and Fragmentation

Whilst the habitat loss during the construction phase was not deemed to be significant at any geographic scale, compensatory planting is required for forest felled to satisfy the conditions of a future felling license. A total of c. 12.9ha of forestry will be removed as part of the construction phase. It is planned for c. 7.26 ha of woodland to be planted to compensate for habitat loss during the operational phase and a further c. 1.6 ha will be planted during the reinstatement phase. This will enhance the existing woodland areas existing within the Proposed Development. There is not sufficient land within the Proposed Development to plant compensatory forest habitat, therefore 4.04 ha of land will need to be sourced offsite.

7.7.1.3 Mammals

7.7.1.3.1 Badger

Badger, and their breeding and resting places, are protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure a badger or to wilfully interfere with or destroy their breeding or resting places (setts).

Preconstruction survey

Evidence of badgers was recorded utilising the lands within the Proposed Development, however no setts were identified within the boundary. As badgers could establish new setts between the time of lodgement and construction, a pre-confirmatory pre-construction check will be required of all suitable badger habitat, completed within 12 months prior to any construction works commencing.

Disturbance/Displacement

The presence of any new setts or significant badger activity will be treated and/or protected in accordance with The Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (NRA 2005).

Protection of Badgers from Accidental Harm during Construction (Excavations)

Uncovered excavations could be potentially hazardous for badgers commuting and foraging in the area. Badgers could fall into these excavations, becoming trapped and potentially hurt and distressed.

To protect badgers from direct harm during construction, where practicable, short term open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor. Longer term excavations (with no egress ramp) will fenced off where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow badgers to safely exit should they fall in.

7.7.1.3.2 Otter

Otter are listed on Annex II and Annex IV of the Habitats Directive and are strictly protected under the Birds and Habitats Regulations. Otter, and their breeding and resting places, are also protected under the Wildlife Acts and it is an offence under that legislation to intentionally kill or injure an otter or to wilfully interfere with or destroy their breeding or resting places (holts / couches).

No evidence of otters and their resting places was recorded utilising the lands within the Proposed Development.

Preconstruction survey

The client will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed within 12 months prior to any construction phase commencing.

Loss of Breeding/Resting Sites

Although there were no evidence of otters or their holts recorded during field surveys, otter could potentially establish new holt or couch sites within the ZoI of the Proposed Development. A confirmatory pre-construction check of all suitable otter habitat will be completed by a suitably qualified ecologist within 12-month period prior to any construction works commencing.

In the unlikely event where a new active holts/couches are recorded within 150m of the Proposed Development the appointed ecologist will ensure that adequate mitigation is provided in accordance with *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2006), and a derogation licence is sought from the NPWS where necessary.

Precautionary Mitigation measures for new active holts/couches recorded within 150m of the Proposed Development

Until such time as otters have been successfully evacuated from active holts under derogation sought from NPWS, the following provisions will apply to all construction works:

- No works will be undertaken within 150m of any holts at which breeding females or cubs are present. Until consultation with NPWS, works closer to such breeding holts may take place - provided appropriate mitigation measures detailed below are in place;
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence; and
- The prohibited working area associated with otter holts will where appropriate, be fenced with temporary fencing prior to any possibly invasive works. Fencing will be in accordance with Clause 303 of the TII's Specification for Roadworks (TII, 2011). Appropriate awareness of the purpose of the enclosure will be conveyed through notification to site staff and sufficient signage should be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt.

Habitat Degradation/Reduced Prey Availability – Water Quality

In terms of mitigation, Chapter 6 (Hydrology and Hydrogeology) of this EIAR details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 6 (Hydrology and Hydrogeology).

7.7.1.3.3 Other Mammals

Protected mammal species were recorded during the multidisciplinary surveys carried out along the Proposed Development. The Construction Phase of the Proposed Development is not deemed to affect the local populations of small, protected mammal species and will not result in a significant negative effect, at any geographic scale. There remains a risk to small numbers of individual mammal species, and the following precautionary mitigation measures are recommended:

Where possible, habitats of importance providing refuge / shelter to other protected mammals such as woodland, scrub, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, that are not directly impacted will be retained. Vegetation to be removed is shown on Figure 7-11. Tree removal, particularly where understorey vegetation is abundant, will be undertaken outside of the bird nesting season, but as late in the wintering season (e.g., February) so as to give mammals such as hedgehog that might be hibernating a chance to move in order to escape potential threats.

7.7.1.3.4 Bats

Protection of Bats during Vegetation Clearance

All bat species and their roost sites are strictly protected under both European and Irish legislation including:

- Wildlife Acts;
- The Habitats Directive; and
- Birds and Habitats Regulations.

It is an offence to kill a bat or to damage or destroy the breeding or resting place of any bat species, and it is not necessary that the action should be deliberate for on offence to occur. This puts a statutory onus of due diligence on anyone proposing to carry out works that might result in such damage or destruction. Under Section 54 of the Birds and Natural Habitats Regulations, a derogation may only be granted by the Minister where there is no satisfactory alternative, and the derogation is not detrimental to the

maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range.

While no active roosts were identified during the surveys within the footprint of the Proposed Development, a number of trees will be removed during the Construction Phase of the Proposed Development, and the following mitigation measures will be implemented by the appointed contractor:

- Where the qualified arborist engaged by the appointed contractor is required to assess the condition of, and advise on any repair works necessary to, any trees which are to be retained, these will be notified to the appointed ecologist to be surveyed to confirm if these trees have potential roost features (PRFs) or have developed PRF(s) during the interim between the surveys and grant of planning. Where trees with PRF(s) require works including removal for example due to poor condition, they will be subject to mitigation as described below, under the PRF Re-Appraisal; and
- There will be no additional lighting within 5m of any tree with PRFs during the Construction Phase of the Proposed Development to avoid potential disturbance to roosting bats, as far as reasonably practical, but will not involve direct lighting on any roost features.

Roost Loss

As previously mentioned, there are no known roosts within the Proposed Development. However, as there is a number of trees with suitability for roosting bats (Table 7-7) are due to be removed, a precautionary approach is taken to avoid any harm to local bat species. Where reasonably practicable the removal of trees with PRFs, will occur only between April – May, and September – October to avoid the most sensitive time periods for bats (i.e. during breeding season and hibernation). However, to ensure the protection of bats and if the Proposed Development timeframe does not allow for this, the following mitigation will be undertaken.

PRF Re-Appraisal (First Step of Pre-Construction Survey)

A pre-construction survey of all trees being removed, to rechecked for PRFs will be undertaken by an experienced bat specialist/ecologist engaged as part of the pre-construction surveys. The survey will confirm trees due for removal with PRFs.

Pre-Construction Survey for trees

In the event that additional PRFs or uptake of use by bats of previously identified tree PRF are detected during the pre-construction survey, it is recommended that:

- In advance of any clearance, all trees deemed to contain PRFs which are subject to felling / clearance will be checked for the presence of bats by a suitably qualified / licensed bat specialist (using an endoscope);
- In the event that bats are confirmed in tree PRFS on the Proposed Development site during preconstruction surveys and or later monitoring of construction works such as vegetation clearance, works will immediately cease in that area and the local NPWS Conservation Ranger will be contacted;
- An application will then be made to the NPWS for a derogation licence seeking to permit actions affecting bats or their roosts that would normally be prohibited by law;
- After licence approval from the NPWS (which may include the necessity for additional mitigation measures to those recommended here) bats may be removed by a bat specialist licensed to handle bats and released in the area in the evening following capture; and
- Only then will PRF trees be felled, and this should be undertaken 'in sections' where the section can be handled to avoid sudden movements or jarring of the sections.

Habitat Loss and Fragmentation

Where practicable, habitats of importance to bats such as woodland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, that are not directly impacted by the Proposed Development will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance.

Disturbance/displacement - Lighting

During construction, the use of security lighting such as that around the Construction Compounds and or additional lighting required for night-time works could impact on commuting / foraging territory.

Where deemed necessary, a suitably qualified licensed ecologist(s), engaged by the appointed contractor will ensure that lighting at the Construction Compounds and in active work areas, which are in close proximity to watercourses and other areas with known bat activity, will be designed to minimise light spill and be cognisant of downward light-spill onto watercourses.

Mitigation measures to reduce light spill will include the following:

- The use of sensor / timer triggered lighting;
- LED luminaires to be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- Column heights to be considered to minimise light spill;
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed; and
- Where night time works are required the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works (especially works carried adjacent to watercourses with known bat activity).

7.7.1.4 Birds

7.7.1.4.1 Breeding birds

Habitat Loss and Fragmentation

Where possible, habitats of importance to breeding birds such as woodland, treelines, and hedgerows, which lie within the footprint or along the boundary of the Proposed Development, and that are not directly impacted, will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be removed is shown on the Proposed Removals Plan drawing (drawing ref. LD.PROJECTWEST 1.4) prepared by Macroworks, and submitted with the planning application.

Planting of treeline, hedgerow and grassland habitats within the Proposed Development footprint will be carried out by the appointed contractor, as detailed in the landscape drawings. Refer to the Landscape Plan (drawing ref. LD.PROJECTWEST 1.5) and Reinstatement Plan (drawing ref. LD.PROJECTWEST 1.6) prepared by Macroworks, and submitted with the planning application. Whilst the planting is not likely to fully offset the loss of breeding and foraging habitat, it is likely to provide additional foraging habitat for some species.

Mortality Risk

Where reasonably practicable, vegetation (e.g., hedgerows, trees, scrub, and grassland) will not be removed, between 1 March and 31 August, to avoid potential direct impacts on nesting birds.

Where the construction programme does not allow this seasonal restriction to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the

presence of breeding birds prior to clearance. Therefore, any vegetation removal will only happen outside of the active nesting bird season.

Areas found not to contain nests will be cleared within three days of the nest survey, otherwise repeat surveys will be required. Vegetation clearance will not commence where nests are present, works will resume when birds have fledged, and nests are no longer in use.

Disturbance/Displacement

Similar to the requirements provided above in terms of reducing mortality risk, vegetation clearance undertaken in the appropriate time (i.e. outside of the breeding bird season) should ensure that breeding birds have adequate time in which to identify alternative vegetation in which to establish nests.

Habitat Degradation - Water Quality

In terms of mitigation, the mitigation measures in Section 7.7.1.2.1 detail the controls and management measures for avoiding, preventing, or reducing any significant negative effects on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 6 (Hydrology and Hydrogeology).

7.7.1.4.2 Wintering Birds

Measures to Prevent Disturbance and Displacement Impacts to non-SCI Birds Due to Vegetation Loss During Construction

Where practicable, the removal of vegetation (e.g., hedgerows, trees, scrub, and grassland) will be undertaken outside of the breeding bird season (01 March to the 31 August) and before the arrival of the wintering birds at the start of October. However, where the construction programme does not allow these seasonal restrictions to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to clearance.

Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken.

Habitat Degradation - Water Quality

In terms of mitigation, the mitigation measures in Section 7.7.1.2.1 detail the controls and management measures for avoiding, preventing, or reducing any significant negative effects on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 6 (Hydrology and Hydrogeology).

7.7.1.5 Reptiles

No reptile species were recorded during the multi-disciplinary surveys carried out along the Proposed Development. The Construction Phase of the Proposed Development is not deemed to affect the local reptile population and will not result in a significant negative effect, at any geographic scale. However, it is considered good practice to provide precautionary mitigation to avoid harm/injury to reptiles that may be using scrub and verges.

Reasonable avoidance measures

Where works will occur, avoid vegetation clearance in sensitive areas in the winter hibernation period, rather undertaking vegetation clearance in the summer period when individuals will be mobile and able to disperse quickly.

Immediately prior to the commencement of construction works, a suitably licensed and experienced ecologist (ECoW) to supervise vegetation clearance.

7.7.1.6 Amphibians

Habitat Degradation – Surface Water Quality

In terms of mitigation, an SWMP will be prepared and included as part of the detailed CEMP prepared by the construction contractor, which will detail control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 6 (Hydrology and Hydrogeology).

7.7.1.7 Fish

Habitat Degradation – Surface Water Quality

In terms of mitigation, an SWMP will be prepared and included as part of the detailed CEMP prepared by the construction contractor, which will detail control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 6 (Hydrology and Hydrogeology).

7.7.2 Operational Phase Mitigation

7.7.2.1 Designated Areas for Nature Conservation

7.7.2.1.1 European sites

The mitigation measures that are specifically required to ensure that the Proposed Development will not adversely affect the integrity of the European sites within the ZoI are presented in the NIS. Following a consideration and assessment of the Proposed Development on the identified relevant European sites, the following mitigation measures were developed to address potential impacts that were identified:

- Measures to protect surface water quality during operation.

7.7.2.1.2 National Sites

The mitigation measures in relation to potential impacts arising from the Proposed Development on pNHAs within the ZoI are as set out for European sites as the boundaries of the pNHAs follow those of the SACs and SPAs. Therefore, the mitigation measures outlined in Section 7.7.1.1.2, and as detailed in the NIS, will likewise prevent the Proposed Development resulting in a significant negative effect on these pNHAs.

7.7.2.2 Habitats

7.7.2.2.1 Habitat Loss – Positive changes landscaping design over longer term

The Construction Phase will result in the loss of 25.2ha of habitats, primarily comprised 12.9 ha of of ED2, WD2 - Mixed broadleaved/conifer woodland, WD1 - (Mixed) broadleaved woodland and WD3 - (Mixed) conifer woodland, and ED3 - Recolonising bare ground, and - Spoil and bare ground. To compensate for this loss, a landscape is proposed within the Biodiversity Management Plan which will result in a net gain in biodiversity over the existing baseline. The biodiversity enhancement measures will to be implemented during the operational and reinstatement phases will involve planting 8.86 ha of native woodland around the proposed berms, proposed landfill area and other areas of the site.

An additional 4.04 ha of native woodland will be established off site to compensate for the loss of forestry on site.

7.7.2.2.2 Habitat Degradation – Non-Native Invasive Species

Due to the nature of the site, there is the potential for non-native invasive species to be introduced from waste bought to the landfill. Precautionary monitoring of Invasives is recommended as per the IMSP (Scott Cawley Ltd., 2025d).

7.7.2.2.3 Habitat Degradation – Surface Water Quality

Measures to control the risk of flooding and contamination to local waterbodies and the hydrological environment have been included within the design of the Proposed Development. Maintenance will be on-going to ensure the risks are minimised during the Operational Phase. Maintenance activities will be in accordance with best practice procedures to ensure that no additional risks to waterbodies are encountered. More detail on these can be found in Chapter 6 – Hydrology and Hydrogeology.

7.7.2.3 Mammals

7.7.2.3.1 Badger

Landscape planting for badgers

The planting specification has been prepared through an iterative design discussion between the landscape architect and Scott Cawley Ltd., in respect of badger mitigation purposes (BMP; Scott Cawley Ltd., 2025c).

As part of the landscape design for the Proposed Development, and where practicable, areas of vegetation habitats of Local Importance (Higher Value) that could be used, or provide cover, for foraging badger have will be retained. Proposed cover planting has been incorporated into the landscape plan, and will be implemented by the appointed contractor.

Screening planting (typically trees and shrubs) will ensure that foraging badgers are encouraged towards new or realigned mammals corridors and thus reducing severance and barrier affect the Proposed Development poses at operation.

No additional mitigation measures are required in respect of badgers for the operational phase of the Proposed Development.

7.7.2.3.2 Otter

For mitigation to avoid the effects of habitat degradation as a result of downstream impacts on surface water quality on otter, refer to Section 7.7.1.3.2.

No additional mitigation measures are required in respect of otter for the operational phase of the Proposed Development.

7.7.2.3.3 Other Mammals

The Operational Phase of the Proposed Development is not predicted to result in any significant effects to populations of other mammals in the vicinity of the Proposed Development. Therefore, no mitigation is proposed in respect of other mammals for the operational phase of the Proposed Development.

7.7.2.3.4 Other Mammals

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7.7.2.3.5 Bats

Landscape planting for bats

The planting specification has been prepared through an iterative design discussion between the landscape architect and Scott Cawley Ltd., in respect of bat mitigation purposes. As part of the landscape design for the Proposed Development, and where practicable, areas of forest and hedgerow habitat will be retained or enhanced with additional planting. Proposed planting for additional hedgerows and forest have been incorporated into the landscape plan, and will be implemented by the appointed contractor (BMP; Scott Cawley Ltd., 2025c).

Planting of hedgerows will ensure that foraging bats retain connectivity around the site, and are encouraged towards new or realigned mammals corridors and thus reducing severance and barrier affect the Proposed Development poses at operation.

Measures to Control and Reduce Light Spill During Operation

Any light spill affecting bat use of habitats will be avoided. Light levels during operation in these areas will be maintained at baseline levels.

This will be achieved through sensitive siting and design of the lighting elements. This will include careful consideration of light placement on buildings, column heights and luminaire design. Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct light to where it is needed. Ideally luminaires should be selected which do not emit UV light (e.g. metal halide and fluorescent light sources should be avoided). LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.

Where monitoring detects light spill is affecting these habitat areas, remedial measures will be implemented to ensure that background light levels are maintained. Following a review of the lighting design, these measures may include modification of lighting locations and column heights, luminaire design and/or introducing additional screening to reduce light spill.

7.7.2.4 Birds

7.7.2.4.1 Breeding birds

Landscape planting for Breeding birds

As part of the landscape design for the Proposed Development, and where practicable, areas of grassland, forest and hedgerow habitat will be retained. Proposed planting for additional grassland, hedgerows, forest have been incorporated into the landscape plan, and will be implemented by the appointed contractor.

No additional mitigation measures are required in respect of Breeding Birds for the operational phase of the Proposed Development.

7.7.2.4.2 Wintering birds

For mitigation to provide additional suitable habitat for Wintering birds to replace habitat lost during construction, please refer to Section 7.7.2.4.1.

No additional mitigation measures are required in respect of Wintering Birds for the operational phase of the Proposed Development.

7.7.2.5 Reptiles

The Operational Phase of the Proposed Development is not predicted to result in any significant effects to reptiles in the vicinity of the Proposed Development. Therefore, no mitigation is required in respect of reptiles for the operational phase of the Proposed Development.

7.7.2.6 Amphibians

Habitat Degradation- Surface Water Quality

For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on amphibians, please refer to Section 7.7.1.3.2.

No additional mitigation measures are required in respect of amphibians for the operational phase of the Proposed Development.

7.7.2.7 Fish

Habitat Degradation – Surface Water Quality

For mitigation to avoid the effects of downstream habitat degradation as a result of impacts on surface water quality on fish, please refer to Section 7.7.1.3.2.

No additional mitigation measures are required in respect of fish for the operational phase of the Proposed Development.

7.8 Residual Effects of the Proposed Development

7.8.1 Construction Phase

Following the implementation of the mitigation measures outlined in Section 7.7.1, the Proposed Development is not likely to result in any significant residual effects above the local scale on the KERs identified on its own, or cumulatively together with other Proposed Developments during the Construction Phase.

7.8.2 Operational Phase

Following the implementation of the mitigation measures outlined in Section 7.7.2, the Proposed Development is not likely to result in any significant residual effects on the KERs identified on its own, or cumulatively together with other Proposed Developments during the Operational Phase.

7.9 Cumulative Impacts of the Proposed Development

Cumulative effects is defined in the EPA (2022) guidance as "The addition of many minor or insignificant effects, including the effects of other projects, to create larger, more significant effects".

Information on the relevant projects within the vicinity of the proposed development is described in Appendix 2.1 of Chapter 2 of this EIAR. The information was sourced from a search of the local authorities planning registers, EPA website, planning applications, EIAR documents and planning drawings which facilitated the identification of past and future projects, their activities and their potential environmental impacts. Key projects with the potential for cumulative effects are described further below.

7.9.1 Projects

Curraghtown Gas-fired power plant (Planning ref: Meath County Council - 2460842)

The proposed development consists of a 180 Megawatt gas-fired power plant, consisting of 3 no. open cycle gas turbines and a Liquid fuel storage facility. This development is planned to be located west of Knockharley landfill, directly adjacent to the site. The site is currently is 7.9ha of agricultural land. An EIA of the proposed development was undertaken (BES, 2024) and identified potential impacts which included; Habitat loss and Disturbance. The EIA concluded that the proposed power plant will be constructed and operated in strict accordance with the design, best practise, and mitigation as described within the application, and as such significant effects on ecology are not anticipated. Considering the above and the lack of connectivity, there is therefore no potential cumulative effects within the proposed development under appraisal in this report.

Highfield Solar Limited Solar Farm (Planning ref: Meath County Council – 23576 LB/160898)

The consented development consists of a 150.29 hectares of ground-mounted Solar PV panels, two electrical substation buildings and 69 electrical transformer and inverter station modules. The site was primarily agricultural grassland. An EIA of the development and identified potential impacts which included; Habitat loss, Disturbance, and Contamination. The EIA concluded that with the implementation of mitigation measures, the solar farm would not significantly impact local fauna and flora. Considering the above and the lack of connectivity, there is therefore no potential cumulative effects within the proposed development under appraisal in this report.

Highfield Solar Limited Solar Farm (Not submitted currently)

The proposed development consists of a 165 hectares of ground-mounted Solar PV panels. The site is currently primarily agricultural grassland. The proposed development has not been submitted for planning yet. As there has been no assessment of the site, it is proposed that the potential impacts include; Habitat loss and Disturbance. The implementation of mitigation measures should prevent any significantly impact to local fauna and flora. Considering the above and the lack of connectivity, there is therefore no potential cumulative effects within the proposed development under appraisal in this report.

7.9.2 Plans

Meath County Development Plan 2021-2027

The proposed development site is located in the Meath County administrative area. The Meath County Development Plan 2021-2027 includes policies and objectives which are associated with the protection of the natural environment, (HER POL 27, HER POL 28, HER POL 31, HER POL 35, HER POL 47, INF OBJ 29). Additionally, Section 6.17.3.6 from the Meath County Development Plan states that "*Knockharley regional landfill, near Kentstown, accessed off the N2 National Primary Route is a privately operated landfill facility which has capacity beyond the lifetime of this Plan. It is recognised that a contingency capacity for landfill is required to facilitate emergency situations for example, the management of waste from a foot and mouth disease outbreak*."

All new plans and projects proposed within the county must adhere to the above-mentioned policies and objectives. Adherence to the Council's policies and objectives will ensure that all new plans and projects proposed within the area will not result in significant effects on biodiversity and international and national sites. Considering the above, there is no potential for significant cumulative effects on biodiversity.

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Chapter 8 – Air Quality and Odour

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8. AIR QUALITY AND ODOUR

8.1 Introduction

This chapter assesses the likely air quality and odour impacts associated with the Proposed Development existing Knockharley Landfill facility, located in Knockharley, Navan, Co. Meath. The assessment of impacts has been undertaken in the context of current relevant standards and guidance, and identifies any requirements or possibilities for mitigation. A full description of the development is available in Chapter 2.

8.2 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction phase and operational phase of the Proposed Development. The information presented in this section is informed by the project design, but it is not a complete description of the Proposed Development. Therefore, it should be read in conjunction with the full development package. For a more comprehensive understanding of the Proposed Development, please refer to Chapter 2 (Description of the Proposed Development) of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the Proposed Development.

8.2.1 Construction Phase

The proposed works will comprise an extension to the existing Knockharley landfill which will allow for the continued landfill operations at the site. The proposed extension will increase the landfill area by approximately 17.68 ha and add an additional 4.12 million m^3 of void space for landfilling..

The key civil engineering works which will have a likely impact on air quality during construction are summarised below:

- Site preparation prior to landfill cell construction, which requires clearance of woodland and other vegetation and removal of material excavated in the construction of permitted landfill cells (currently stored on the proposed landfill cell area).
- During construction, an amount of soil will be generated as part of the site preparation works and during excavation for the proposed landfill cells. This excavated material will either be used to form berms or removed off site for appropriate reuse, recycling or disposal.
- Temporary storage of construction materials such as cement.
- Construction traffic accessing the site will emit air pollutants, primarily nitrogen oxides (NOx) and particulate matter (As PM_{10} and $PM_{2.5}$) during transport.

8.2.2 Operational Phase

The key works which will have a likely impact on air quality during operation of the Proposed Development are summarised below:

- The extension of the landfill area to create additional void space for landfilling, which will release odour emissions from new landfill cells. There will be no change in quantity of waste accepted per annum by the Proposed Development.
- Road traffic accessing the site will emit air pollutants, primarily NO_X and particulate matter (as PM_{10} and $PM_{2.5}$).

The existing Knockharley Landfill facility has an existing IED Licence (W0146-04) issued by the EPA. The facility is required to comply with specific licence conditions, including monitoring and reporting on their

emissions (such as emissions to air and odour), to ensure that they do not pose a risk to human health or the environment.

8.2.3 Decommissioning and Remediation Phase

Key site-specific activities during the Decommissioning and Remediation Phase are consistent with those required for the existing landfill as set out in Chapter 2, Section 2.6 and include:

- Final landfill capping, undertaken in accordance with the Construction Environmental Management Plan (CEMP, which will generate dust through the movement of soil and heavy duty vehicles;
- The ongoing site activities post completion of landfilling will be carried out in line with the existing facility requirements:
  - the existing IED Licence (W0146-04) and any additional conditions imposed during licence review;
  - the Closure, Restoration and Aftercare Management Plan (CRAMP) as agreed with EPA for the existing facility;
  - the planning permission granted by the planning authority, including relevant conditions; and
  - road traffic accessing the site will emit air pollutants, primarily NO_X and particulate matter (as PM_{10} and $PM_{2.5}$).
  - landfill gas flaring and combustion of gas by the gas utilisation engines will continue as per existing operations.
- The final site closure plan will be agreed with the EPA once all closure, restoration and aftercare requirements are nearing completion.

8.3 Relevant Legislation & Guidance

- Directive (EU) 2024/2881 *of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe (recast); and*
- Air Quality Standards Regulations 2022 (S.I. 739 of 2022).

The principal guidance and best practice documents used to inform the assessment of potential impacts on air quality are summarised below.

- Air Dispersion Modelling from Industrial Installations Guidance Note (AG4) (EPA, 2020);
- *Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (EPA, 2006);
- Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition (Dublin City Council (DCC), 2018);
- Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance (UK Office of Deputy Prime Minister (ODPM), 2002);
- Controlling Particles, Vapours & Noise Pollution from Construction Sites (BRE, 2003);
- Guidance on the Assessment of Dust from Demolition and Construction v2.2 (Institute of Air Quality Management (IAQM), 2024) (hereafter referred to as 'the IAQM Guidance');
- H4 – Odour Management (UK Environment Agency (UKEA), 2011)
- IPPC Draft Horizontal Guidance for Odour Part 1- Regulation and Permitting (UKEA, 2002);
- IPPC Draft Horizontal Guidance for Odour Part 2 – Assessment and Control (UKEA, 2003);
- Licence Application Instruction Note 2 (IN2) (DRAFT) Assessing the Impact of Ammonia Emissions to Air and Nitrogen Deposition from EPA licensable activities on European Sites) (EPA, 2024c);
- Odour Emissions Guidance Note (AG9) (EPA, 2019)
- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (Transport Infrastructure Ireland (TII), 2022) (hereafter referred to as 'the TII Guidance'); and
- Planning Advice Note PAN50 Annex B: Controlling the Environmental Effects of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings (The Scottish Office, 1996).

In addition to specific air quality guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018); and
- Environmental Impact Assessment (EIA) Directive Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017).

8.4 Assessment Criteria

8.4.1 Human Health

8.4.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

8.4.1.2 CAFE Directive

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland are set out in Directive (EU) 2024/2881 *of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe (recast)*. This directive supersedes EU Directive 2008/50/EC *of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe* (CAFE Directive). Directive (EU) 2024/2881 sets out air quality standards for pollutants to be reached by 2026 and by 2030 which are more closely aligned with the World Health Organisation (WHO) air quality guidelines.

The ambient air quality limit values for pollutants are set out in Annex I of Directive (EU) 2024/2881. Table 1 of Annex I in Directive (EU) 2024/2881 sets out the updated air quality limit values for pollutants to be achieved by 1 January 2030, which are more closely aligned with the WHO air quality guidelines. Table 2 of Annex I in Directive (EU) 2024/2881 sets out the limit values for air pollutants which are to be achieved by 11 December 2026 and are also applicable up to 2030. The limit values in Table 2 of Annex I are the same as the limits set under Directive 2008/50/EC and the Air Quality Standards Regulations 2022.

The Ambient Air Quality Standards Regulations 2022 (S.I. 739 of 2022) (the Air Quality Standards Regulations 2022) further transposed the CAFE Directive and revoked the Air Quality Standards Regulations 2011, as amended. With the adoption of Directive (EU) 2024/2881, Ireland must transpose this directive into national law, i.e. update the Air Quality Standards Regulations, before December 2026.

The ambient air quality standards applicable for the current assessment to determine the potential impact of PM_{10} on ambient air quality for protection of human health are outlined are outlined in Table 8-1.

Table 8-1. CAFE Directive Ambient Air Quality Limit Values

Pollutant	Directive (EU) 2024/2881			
	Limit Type	Limit Value (to be attained by 2026 and applicable until 2030) [a]	Limit Type	Limit Value (to be attained by 2030) [a]
Particulate Matter (as PM_{10})	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	45 µg/m^3
	Annual limit for protection of human health	40 µg/m^3	Annual limit for protection of human health	20 µg/m^3

a. Note µg/m^3 (micrograms per cubic metre).

8.4.1.3 WHO Air Quality Guidelines & Clean Air Strategy

In April 2023, the Government of Ireland published the *Clean Air Strategy for Ireland* (Government of Ireland, 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target 3 (IT3) by 2026 (Table 13-2), the IT4 targets by 2030 and the final targets by 2040 (Table 13-2). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m^3. The strategy also acknowledges that "*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2*".

Annex II of Directive (EU) 2024/2881 gives assessment thresholds which align with the clean air strategy final 2040 WHO targets. Directive (EU) 2024/2881 states that *"Member States shall endeavour to achieve and preserve the best ambient air quality and a high level of protection of human health and the environment, with the aim of achieving a zero-pollution objective as referred to in Article 1(1), in line with WHO recommendations, and below the assessment thresholds laid down in Annex II."*

These assessment thresholds relate to monitoring of ambient air quality by Member States, where *"exceedances of the assessment thresholds specified in Annex II shall be determined on the basis of concentrations during the previous 5 years where sufficient data are available. An assessment threshold shall be deemed to have been exceeded if it has been exceeded during at least 3 separate years out of those previous 5 years."*

Table 8-2 WHO Air Quality Guidelines 2021

Pollutant	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
PM (as PM_{10})	24-hour limit for protection of human health	75 µg/m^3	50 µg/m^3	45 µg/m^3
	Annual limit for protection of human health	30 µg/m^3	20 µg/m^3	15 µg/m^3

The applicable air quality limit values for the purposes of this assessment are those set out in Table 8-1. The limit values stipulated under Table 2 of Annex I in Directive (EU) 2024/2881 and the Air Quality Standards Regulations 2022 are applicable for the Proposed Development as it will be constructed and operational prior to 2030.

8.4.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust that are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$). The EU ambient air quality standards outlined in Table 8-1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no criteria have been stipulated for nuisance dust for this specific type of proposed development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m^2/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled *Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (EPA, 2006). The document recommends that the TA-Luft limit of 350 mg/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the Proposed Development, in terms of both sensitive human and ecological receptors.

8.4.3 Odour Assessment Criteria

The following sections provide some background on odour as a pollutant and detail how the potential for odour impacts was assessed for the purpose of this report. Odour dispersion modelling has been used to predict the impacts of the Proposed Development on the surrounding environment and the assessment has been conducted in compliance with the EPA guidance documents titled *Odour Emissions Guidance Note (AG9)* (EPA, 2019) and *Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)* (EPA, 2020). Further details of the dispersion modelling methodology and input data can be found in Section 8.5.2.

8.4.3.1 Defining and Describing Odour

Odours are sensations resulting from the reception of a stimulus by the olfactory sensory system, which consists of two separate subsystems: the olfactory epithelium and the trigeminal nerve. The olfactory epithelium, located in the nose, is capable of detecting and discriminating between many thousands of different odours and can detect some of them in concentrations lower than those detectable by currently available analytical instruments (UKEA, 2003a). The function of the trigeminal nerve is to trigger a reflex action that produces a painful sensation. It can initiate protective reflexes such as sneezing to interrupt inhalation. The olfactory system is extremely complex and peoples' responses to odours can be variable. This variability is the result of differences in the ability to detect odour; subjective acceptance or rejection of an odour due to past experience; circumstances under which the odour is detected and the age, health and attitudes of the human receptor.

8.4.3.1.1 Odour Intensity and Threshold

Odour intensity is a measure of the strength of the odour sensation and is related to the odour concentration. The odour threshold refers to the minimum concentration of an odorant that produces an olfactory response or sensation. This threshold is normally determined by an odour panel consisting of a specified number of people, and the numerical result is typically expressed as occurring when 50% of the

panel correctly detect the odour. This odour threshold is given a value of one odour unit and is expressed as 1 OU_E/m^3. The odour threshold is not a precisely determined value, but depends on the sensitivity of the odour panellists and the method of presenting the odour stimulus to the panellists. An odour detection threshold relates to the minimum odorant concentration required to perceive the existence of the stimulus, whereas an odour recognition threshold relates to the minimum odorant concentration required to recognise the character of the stimulus. Typically, the recognition threshold exceeds the detection threshold by a factor of 2 to 10 (UKEA, 2002; 2003).

8.4.3.1.2 Odour Character

The character of an odour distinguishes it from another odour of equal intensity. Odours are characterised on the basis of odour descriptor terms (e.g. putrid, fishy, fruity etc.). Odour character is evaluated by comparison with other odours, either directly or through the use of descriptor words.

8.4.3.1.3 Hedonic Tone

The hedonic tone of an odour relates to its pleasantness or unpleasantness. When an odour is evaluated in the laboratory for its hedonic tone in the neutral context of an olfactometric presentation, the panellist is exposed to a stimulus of controlled intensity and duration. The degree of pleasantness or unpleasantness is determined by each panellist's experience and emotional associations. The responses among panellists may vary depending on odour character; an odour pleasant to many may be declared highly unpleasant by some.

8.4.3.1.4 Adaptation

Adaptation, or Olfactory Fatigue, is a phenomenon that occurs when people with a normal sense of smell experience a decrease in perceived intensity of an odour if the stimulus is received continually. Adaptation to a specific odorant typically does not interfere with the ability of a person to detect other odours. Another phenomenon known as habituation or occupational anosmia occurs when a worker in an industrial situation experiences a long-term exposure and develops a higher threshold tolerance to the odour.

8.4.3.2 Odour Guidelines

The exposure of the population to a particular odour consists of two factors; the concentration and the length of time that the population may perceive the odour. By definition, 1 OU_E/m^3 is the detection threshold of 50% of a qualified panel of observers working in an odour-free laboratory using odour-free air as the zero reference (the selection criteria result in the qualified panel being more sensitive to a particular odorant than the general population).

Currently there is no general statutory odour standard in Ireland relating to industrial installations. Guidance from the UK (UKEA, 2011), and adapted for Irish EPA use, recommends that odour standards should vary from 1.5 – 6.0 OU_E/m^3 as a 98^{th} percentile of one hour averaging periods at the worst-case sensitive receptor based on the offensiveness of the odour and with adjustments for local factors such as population density. The relevant exposure criteria vary from 1.5 OU_E/m^3 for highly odorous sources, 3.0 OU_E/m^3 for moderately odorous sources to 6.0 OU_E/m^3 for the least offensive odours. A summary of the indicative criterion is provided in Table 8.3 (taken from EPA Guidance document AG9 (EPA, 2019)).

Table 8.3. Indicative Odour Standards Based on Offensiveness of Odour

Industrial Sectors	Relative Offensiveness	Odour Guideline
► Processes involving decaying animal or fish remains. ► Processes involving septic effluent or sludge.	Most Offensive	1.5 OU_E/m^3 as a 98^{th}%ile of hourly averages at the worst-case sensitive receptor

Industrial Sectors	Relative Offensiveness	Odour Guideline
► Waste sites including landfills, waste transfer stations and non-green waste composting facilities.		
► Intensive Livestock Rearing ► Fat Frying / Meat Cooking (Food Processing) ► Animal Feed ► Sugar Beet Processing ► Well aerated green waste composting Most odours from regulated processes fall into this category i.e., any industrial sector which does not obviously fall within the "most offensive" or "less offensive" categories.	Moderately Offensive	3.0 OU_E/m^3 as a 98th%ile of hourly averages at the worst-case sensitive receptor
► Brewery / Grain / Oats Production ► Coffee Roasting ► Bakery ► Confectionery	Less Offensive	6.0 OU_E/m^3 as a 98th%ile of hourly averages at the worst-case sensitive receptor

Based on the guidance above an odour threshold of 1.5 OU_E/m^3 as a 98th%ile of hourly mean values has been selected for identifying the potential for odour nuisance for the Proposed Development.

8.5 Methodology

8.5.1 Construction Phase

8.5.1.1 Construction Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2024) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022).

The IAQM states that as assessment of construction dust impacts is normally required where there is a human or ecological receptor within 250m of the boundary of the site (this should consider offsite construction compounds) and/or within 50 m of the route(s) used by construction vehicles on the public road network (on roads up to 250 m from the site entrance). This constitutes the Zone of Influence (ZoI) for the construction dust assessment.

The major dust generating activities are divided into four types within the IAQM Guidance to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site onto the public road network).

The magnitude of each of the four categories is divided into Large, Medium or Small scale depending on the nature of the activities involved. The criteria for determining the category for the works involved are outlined in Table 8-4, these are based on the IAQM Guidance. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined. The magnitude of each dust generating activity is established in Section 8.8.1.1.1 as part of the impact assessment.

Table 8-4 IAQM Criteria to Determine Dust Emissions Magnitude

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
► Total building volume <12,000 m^3 ► Construction material with low potential for dust release (e.g. metal cladding or timber) ► Demolition activities <6 m above ground ► Demolition during wetter months	► Total building volume 12,000 - 75,000 m^3 ► Potentially dusty construction material ► Demolition activities 6 – 12 m above ground level	► Total building volume >75,000 m^3 ► Potentially dusty construction material (e.g. concrete) ► On-site crushing and screening ► Demolition activities >12 m above ground level
Earthworks		
► Total site area <18,000 m^2 ► Soil type with large grain size (e.g. sand) ► <5 heavy earth moving vehicles active at any one time ► Formation of bunds <3 m in height ► Earthworks during wetter months	► Total site area 18,000 m^2 - 110,000 m^2 ► Moderately dusty soil type (e.g. silt) ► 5 – 10 heavy earth moving vehicles active at any one time ► Formation of bunds 3 – 6 m in height	► Total site area >110,000 m^2 ► Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) ► >10 heavy earth moving vehicles active at any one time ► Formation of bunds >6 m in height
Construction		
► Total building volume <12,000 m^3 ► Construction material with low potential for dust release (e.g. metal cladding or timber)	► Total building volume 12,000 - 75,000 m^3 ► Potentially dusty construction material (e.g. concrete) ► On-site concrete batching	► Total building volume >75,000 m^3 ► On-site concrete batching ► Sandblasting
Trackout (Truck Movements)		
► <20 HDV (>3.5 t) outward movements in any one day ► Surface material with low potential for dust release ► Unpaved road length <50 m	► 20 – 50 HDV (>3.5 t) outward movements in any one day ► Moderately dusty surface material (e.g. high clay content) ► Unpaved road length 50 – 100 m	► >50 HDV (>3.5 t) outward movements in any one day ► Potentially dusty surface material (e.g. high clay content) ► Unpaved road length >100 m

Once the dust emission magnitude has been determined the next step, according to IAQM Guidance, is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling,

human health and ecological effects. The level of risk associated with each activity is determined using the criteria in Table 8-5. The level of risk of each dust generating activity is established in Section 8.8.1.1.2 as part of the impact assessment.

Table 8-5 IAQM Criteria to Determine Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Construction			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

8.5.1.2 Construction Phase Traffic Assessment

Construction phase traffic also has the potential to impact air quality. The TII Guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022), states that road links meeting one or more of the following criteria can be defined as being '*affected*' by a proposed development and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects, the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5m or greater.

As per Chapter 13 - Material Assets - Traffic and Transportation of this EIAR, it has been determined by the traffic consultant that the construction stage traffic will not increase by 1,000 AADT, or 200 HDV AADT. The construction stage traffic has been reviewed, and it has been determined that the construction stage traffic will not increase by 1,000 AADT, or 200 HDV AADT; additionally, the development will not result in speed changes or changes in road alignment. Therefore, the traffic does not meet the above scoping criteria. A detailed air quality assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to local air quality with respect with human or ecological receptors.

8.5.2 Operational Phase

8.5.2.1 Operational Phase Traffic Assessment

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Proposed Development. The TII Guidance scoping criteria detailed in Section 8.5.1.2 were used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air dispersion modelling assessment. The Proposed Development will not result in the operational phase traffic increasing by more than 1,000 AADT or 200 HDV AADT. In addition, there are no proposed changes to the traffic speeds or road alignment. Therefore, no road links impacted by the Proposed Development satisfy the screening criteria (Section 8.5.1.2). A quantitative assessment of the impact of traffic emissions on ambient air quality is not necessary as there is no potential for significant impacts to local air quality with respect with human or ecological receptors.

8.5.2.2 Odour Dispersion Modelling Methodology

The United States Environmental Protection Agency (USEPA) approved AERMOD dispersion model has been used to predict the ground level concentrations (GLC) of pollutants emitted from the principal emission sources on-site.

The modelling incorporated the following features:

- All on-site buildings and significant process structures were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.
- Detailed terrain has been mapped into the model using SRTM data with 30m resolution. The site is located in an area of complex terrain. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP (USEPA, 2017).
- Hourly-sequenced meteorological information has been used in the model. Meteorological data over a five year period (Dublin Airport 2020 – 2024) was used in the model (see Section 8.6.1 and Appendix 8.1).
- The source and emissions data, including stack dimensions, gas volumes and emission temperatures have been incorporated into the model.

8.5.2.2.1 Terrain

The AERMOD air dispersion model has a terrain pre-processor AERMAP (USEPA, 2017) which was used to map the physical environment in detail over the receptor grid. The digital terrain input data used in the AERMAP pre-processor was obtained from SRTM. This data was run to obtain for each receptor point the terrain height and the terrain height scale. The terrain height scale is used in AERMOD to calculate the critical dividing streamline height, H_{crit}, for each receptor. The terrain height scale is derived from the Digital Elevation Model (DEM) files in AERMAP by computing the relief height of the DEM point relative to the height of the receptor and determining the slope. If the slope is less than 10%, the program goes to the next DEM point. If the slope is 10% or greater, the controlling hill height is updated if it is higher than the stored hill height.

In areas of complex terrain, AERMOD models the impact of terrain using the concept of the dividing streamline (H_c). As outlined in the AERMOD model formulation (USEPA, 2022) a plume embedded in the flow below H_c tends to remain horizontal; it might go around the hill or impact on it. A plume above H_c will ride over the hill. Associated with this is a tendency for the plume to be depressed toward the terrain surface, for the flow to speed up, and for vertical turbulent intensities to increase.

AERMOD model formulation states that the model "captures the effect of flow above and below the dividing streamline by weighting the plume concentration associated with two possible extreme states of the boundary layer (horizontal plume and terrain-following). The relative weighting of the two states depends on: 1) the degree of atmospheric stability; 2) the wind speed; and 3) the plume height relative to terrain. In stable conditions, the horizontal plume "dominates" and is given greater weight while in neutral and unstable conditions, the plume traveling over the terrain is more heavily weighted" (USEPA, 2005).

8.5.2.2.2 Geophysical Considerations

AERMOD simulates the dispersion process using planetary boundary layer (PBL) scaling theory (USEPA, 2022). PBL depth and the dispersion of pollutants within this layer are influenced by specific surface characteristics such as surface roughness, albedo and the availability of surface moisture. Surface roughness is a measure of the aerodynamic roughness of the surface and is related to the height of the roughness element. Albedo is a measure of the reflectivity of the surface whilst the Bowen ratio is a measure of the availability of surface moisture.

AERMOD incorporates a meteorological pre-processor AERMET (USEPA, 2018) to enable the calculation of the appropriate parameters. The AERMET meteorological pre-processor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10 km from the meteorological station for Bowen Ratio and albedo and to a distance of 1 km for surface roughness in line with USEPA recommendations (USEPA, 2008; 2018) as outlined in Appendix 8.1.

In relation to AERMOD, detailed guidance for calculating the relevant surface parameters has been published (USEPA, 2008). The most pertinent features are:

- The surface characteristics should be those of the meteorological site rather than the installation;
- Surface roughness should use a default 1 km radius upwind of the meteorological tower and should be based on an inverse-distance weighted geometric mean. If land use varies around the site, the land use should be sub-divided by sectors with a minimum sector size of 30º;
- Bowen ratio and albedo should be based on a 10 km grid. The Bowen ratio should be based on an un-weighted geometric mean. The albedo should be based on a simple un-weighted arithmetic mean.

AERMOD has an associated pre-processor, AERSURFACE (USEPA, 2008) which has representative values for these parameters depending on land use type. The AERSURFACE pre-processor currently only accepts NLCD92 land use data which covers the USA. Thus, manual input of surface parameters is necessary when modelling in Ireland. Ordnance survey discovery maps (1:50,000) and digital maps such as those provided by the EPA, National Parks and Wildlife Service (NPWS) and Google Earth® are useful in determining the relevant land use in the region of the meteorological station. The Alaska Department of Environmental Conservation has issued a guidance note for the manual calculation of geometric mean for surface roughness and Bowen ratio for use in AERMET (ADEC, 2008). This approach has been applied to the current site with full details provided in Appendix 8.1.

8.5.2.2.3 Building Downwash

When modelling emissions from an industrial installation, stacks which are relatively short can be subjected to additional turbulence due to 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 (but not greater than 800 m).

The USEPA has defined the "Good Engineering Practice" (GEP) stack height as the building height plus 1.5 times the lesser of the building height or maximum projected building width. It is generally considered unlikely that building downwash will occur when stacks are at or greater than GEP (USEPA, 1985).

When stacks are less than this height, building downwash will tend to occur. As the wind approaches a building it is forced upwards and around the building leading to the formation of turbulent eddies. In the lee of the building these eddies will lead to downward mixing (reduced plume centreline and reduced plume rise) and the creation of a cavity zone (near wake) where re-circulation of the air can occur. Plumes released from short stacks may be entrained in this airflow leading to higher ground level concentrations than in the absence of the building.

The Plume Rise Model Enhancements (PRIME) (Paine & Lew, 1997a; 1997b) plume rise and building downwash algorithms, which calculates the impact of buildings on plume rise and dispersion, have been incorporated into AERMOD. The building input processor BPIP-PRIME produces the parameters which are required in order to run PRIME. The model takes into account the position of each stack relative to each relevant building and the projected shape of each building for 36 wind directions (at 10º intervals). The model determines the change in plume centreline location with downwind distance based on the slope of the mean streamlines and coupled to a numerical plume rise model (Paine & Lew, 1997a).

Given that the stacks are less than 2.5 times the lesser of the building height or maximum projected building width, building downwash will need to be taken into account and the PRIME algorithm run prior to modelling with AERMOD. The dominant building for each relevant stack will vary as a function of wind direction and relative building heights.

8.5.2.2.4 Air Emissions

Emissions to air from the gas utilisation engines and flares will continue as per the existing IED Licence (W0146-04) and any additional conditions imposed during licence review. There are no changes to these operations as part of the proposed development.

8.5.2.2.5 Odour Emissions

The existing Knockharley Landfill Limited Installation is currently licensed by the EPA under Industrial Emissions Licence Reg. No. W0146-04. The existing landfill is licensed to accept 440,000 tonnes per annum (tpa) of domestic, commercial, industrial and construction wastes. Waste inputs are received between the hours of 08 :00 to 18:00 Monday to Saturday inclusive. Waste lorries enter the site via the access road from the N2 and waste is conveyed and deposited directly into the active filling area of a cell.

The Proposed Development primarily consists of an extension to the existing Knockharley landfill which will allow for the continued landfill operations at the site. The proposed extension will increase the landfill area and add additional void space for landfilling. There will be no increase in the permitted annual acceptance of up to 440,000 tonnes per annum of waste.

Modelling of the Proposed Development considers the maximum odour emissions scenario as the final phasing of the landfill. This consists of landfill cells 31 – 39 being capped, with Cell 40 "Piggyback" as the final cell being actively filled. The Proposed Operations modelling scenario consists of the following types of odour emissions sources (also shown in Figure 8-3).

The proposed Incinerator Bottom Ash (IBA) facility has not been considered as an odour source since the inert waste material it is designed to process has a negligible odour potential and will not contribute to landfill gas generation.

Area Sources

Table 8.6 provide details of the odour emission area sources included in the model. These sources comprise of:

- The active working face (which is limited to a depositional area of 625 m^2 as part of the existing site licence and will also apply to the proposed cells as they are filled). For a conservative assessment this area has been modelled at the northern boundary of Cell 40, which is closest to sensitive receptors. Odour offensiveness is moderate-high.
- Landfill cell area under temporary cover – a daily cover is applied to any area of the active cell which is not being filled. Odour offensiveness is low-high.
- Fresh waste tipping from the front-end loaders, which occurs in an approx. 25 m^2 area within the active working face area described above. Odour offensiveness is moderate-high.

The model input information for these sources is detailed in Table 8.6.

Table 8.6. Summary of Odour Emissions - Area Sources

Activity Type	Release Height	Total Area (m^2)	Operating Hours	Odour Emission Rate ($OU_E/m^2/s$) [c]
Proposed active working face (Cell 40)	10	625	08:00 – 18:00 Monday to Saturday	5.8 [a] / 0.4 [b]
Proposed temporary cover area (Cell 40)	10	25	Continuous	0.4
Proposed fresh waste tipping area (Cell 40)	10	77,000	08:00 – 18:00 Monday to Saturday	26.8

a. Odour emission rate applies from 08:00 – 18:00 Monday to Saturday.
b. Odour emission rate applies outside above operational hours.
c. Odour emission rates have been derived from previous odour assessment carried out and reported in *Regulation 10 Reply - BEPC22A_odour modelling_final*, submitted as part of the IE licence application process for the Installation (Reg. No. W0146-04).

Volume Sources

Table 8.7 provide details of the odour emission area sources included in the model. These sources comprise of:

- Landfill gas emissions from capped cells - an estimate of the landfill gas for each proposed cell (Cell 31-39) was derived using data from the LandGem model (USEPA, 2025), assuming 50% methane content, and based on the cell phasing schedule and cell waste volumes provided by the design team. A containment efficiency of 97% was assumed for the landfill gas generated by the proposed cells. Odour offensiveness is low-high.
- Lagoon tanker – leachate is collected through a leachate drainage layer and is then pumped to a covered leachate lagoon located to the east of the landfill area from which it is periodically loaded to road tankers. During filling, odorous air displaced from the tanker is treated in a carbon filter before being released to the atmosphere. Odour offensiveness is low-moderate.

Table 8.7. Summary of Odour Emissions - Volume Sources

Volume Source	Operating Hours	Release Height	Initial Lateral Dimension	Initial Vertical Dimension	Odour Mass Emission (OU_E/s) [a]
Cell 1 (existing)	Continuous	10	31	0.05	39
Cell 2 (existing)	Continuous	10	31	0.05	39
Cell 3 (existing)	Continuous	10	31	0.05	39
Cell 4 (existing)	Continuous	10	31	0.05	39
Cell 5 (existing)	Continuous	10	31	0.05	39
Cell 6 (existing)	Continuous	10	31	0.05	39
Cell 7 (existing)	Continuous	10	31	0.05	39
Cell 8 (existing)	Continuous	10	31	0.05	39
Cell 9 (existing)	Continuous	10	31	0.05	39
Cell 10 (existing)	Continuous	10	31	0.05	39
Cell 11 (existing)	Continuous	10	31	0.05	39
Cell 12 (existing)	Continuous	10	31	0.05	39
Cell 13 (existing)	Continuous	10	31	0.05	39
Cell 14 (existing)	Continuous	10	31	0.05	39
Cell 15 (existing)	Continuous	10	31	0.05	46
Cell 16 (existing)	Continuous	10	31	0.05	116
Cell 17 (existing)	Continuous	10	31	0.05	119
Cell 18 (existing)	Continuous	10	31	0.05	100
Cell 19 (existing)	Continuous	10	31	0.05	116
Cell 20 (existing)	Continuous	10	31	0.05	171
Cell 21 (existing)	Continuous	10	31	0.05	227
Cell 22 (existing)	Continuous	10	31	0.05	342
Cell 23 (existing)	Continuous	10	31	0.05	587
Cell 24 (existing)	Continuous	10	31	0.05	655
Cell 25 (existing)	Continuous	10	31	0.05	1601
Cell 26 (existing)	Continuous	10	31	0.05	1023
Cell 31 (proposed)	Continuous	10	31	0.05	2993
Cell 32 (proposed)	Continuous	10	31	0.05	2711
Cell 33 (proposed)	Continuous	10	31	0.05	4052
Cell 34 (proposed)	Continuous	10	31	0.05	3608
Cell 35 (proposed)	Continuous	10	31	0.05	4192
Cell 36 (proposed)	Continuous	10	31	0.05	4049
Cell 37 (proposed)	Continuous	10	31	0.05	2993
Cell 38 (proposed)	Continuous	10	31	0.05	7839
Cell 39 (proposed)	Continuous	10	31	0.05	9704
Lagoon tanker (existing)	During tanker filling	0.5	0.23	0.47	69

d. Odour emission rates have been derived from previous odour assessment of the existing cells and the lagoon tanker, carried out and reported in *Regulation 10 Reply - BEPC22A_odour modelling_final*, submitted as part of the IE licence application process for the Installation (Reg. No. W0146-04).

Point Sources

The existing Industrial Emissions Licence Reg. No. W0146-04 includes for the operation of a 4 no. gas utilisation plant engines and 4 no. flares. Based on current and predicted gas yield, no more than 2 no. engines and 1 no. flare (Flare No.2) are operational at any given time. There are no significant odour emissions from the flare operation (which is infrequent), therefore this has been screened out of the odour model. Odour emissions from 2 no. engines have been included in the model, as point sources, with emission details shown in Table 8.8. Odour offensiveness is low-moderate.

Table 8.8. Summary of Odour Emissions - Point Sources

Stack Reference	Co-ordinates (X ITM)	Co-ordinates (Y ITM)	Stack Height	Exit Diameter (m)	Temp (K)	Exit Velocity (m/sec)	Odour Mass Emission (OU_E/s)
Gas utilisation engine 3	663604	5946651	10	0.4	698	15.84	4164
Gas utilisation engine 4	663610	5946652	10	1.18	693	15.84	4014

8.5.3 Decommissioning and Remediation Phase

Decommissioning and Remediation phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Proposed Development. The TII Guidance scoping criteria detailed in Section 8.5.1.2 were used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air dispersion modelling assessment. The Proposed Development will not result in the Decommissioning and Remediation phase traffic increasing by more than 1,000 AADT or 200 HDV AADT. In addition, there are no proposed changes to the traffic speeds or road alignment. Therefore, no road links impacted by the Proposed Development satisfy the screening criteria (Section 8.5.1.2). A quantitative assessment of the impact of traffic emissions on ambient air quality is not necessary as there is no potential for significant impacts to local air quality with respect with human or ecological receptors.

Emissions to air from the gas utilisation engines and flares will continue as per the existing IED Licence (W0146-04) and any additional conditions imposed during licence review. There are no changes to these operations as part of the proposed development.

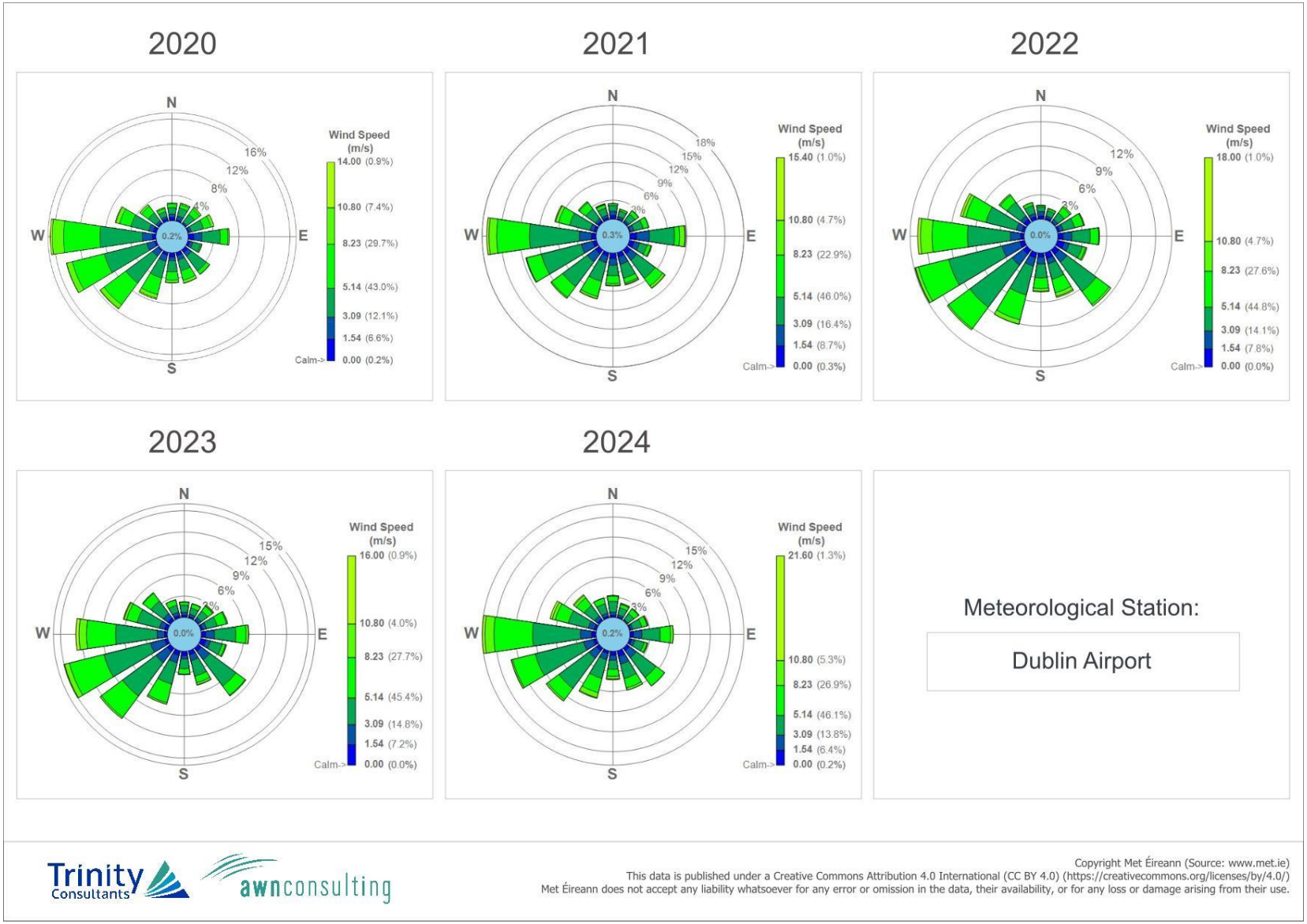
8.6 Receiving Environment

8.6.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport meteorological station, which is located approximately 46 km south-east of the site. Dublin Airport meteorological data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (Figure 8-1). For data collated during five representative years (2020 – 2024), the predominant wind direction is westerly to south-westerly with generally moderate wind speeds (Met Éireann, 2025).

Figure 8-1 Wind Roses for Dublin Airport Meteorological Station



8.6.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is *'Air Quality in Ireland 2024'* (EPA, 2025). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments.

As part of the implementation of the Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022), as amended, four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2024a). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the Proposed Development site is within Zone D (EPA, 2025). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the Proposed Development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

8.6.2.1 Particulate Matter (PM_{10})

Continuous PM_{10} monitoring was carried out at two representative Zone D rural background locations from 2020 – 2024; Kilkitt and Claremorris (EPA, 2025). Annual average PM_{10} concentrations across the sites ranged from 7 – 8 µg/m^3 in 2024 (see Table 8-9). There were no exceedances of the daily limit of 50 µg/m^3 in 2024 (35 exceedances are permitted per year) (EPA, 2024). The 5-year average data for these sites for the period 2020 – 2024 was used to estimate the current annual mean background PM_{10} concentration in the region of the Proposed Development. Over the period 2020 – 2024 annual mean PM_{10} concentrations at the selected sites ranged from 7 – 10 µg/m^3 with an overall 5-year average across the sites of 8 µg/m^3.

Based on these results, an estimate of the annual mean background PM_{10} concentration in the region of the Proposed Development is 8 µg/m^3.

Table 8-9. Background PM_{10} Concentrations (µg/m^3)

Station	Averaging Period	Year				
		2020	2021	2022	2023	2024
Claremorris	Annual Mean PM_{10} (µg/m^3)	8	8	9	7	7
	24-hr Mean > 50 µg/m^3 (days)	0	0	0	0	0
Kilkitt	Annual Mean PM_{10} (µg/m^3)	10	10	8	8	8
	24-hr Mean > 50 µg/m^3 (days)	0	0	0	0	0
Annual Mean PM_{10} (µg/m^3)	Limit Value (to be attained by 2026 and applicable until 2030)	40				
24 hr Mean PM_{10}		50				
24-hr Mean PM_{10} values > 50 µg/m^3		No more than 35 exceedances				

8.6.3 Sensitivity of the Receiving Environment

8.6.3.1 Construction Phase

In line with the IAQM Guidance, prior to assessing the impact of dust from a proposed development, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas (ZoI previously defined in Section 8.5.1) are taken into consideration.

The type of receptors and their sensitivity to dust soiling, human health effects of PM_{10} and ecological effects are defined in the IAQM Guidance. High sensitivity receptors are regarded as residential properties, hospitals, schools and residential care homes where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods (such as public footpaths or parks) or do not expect a high level of amenity. Table 8-10 outlines the criteria for determining the sensitivity of the area to dust soiling and dust-related human health effects as per the IAQM Guidance.

Table 8-10 Criteria for Determining the Sensitivity of the Area Update

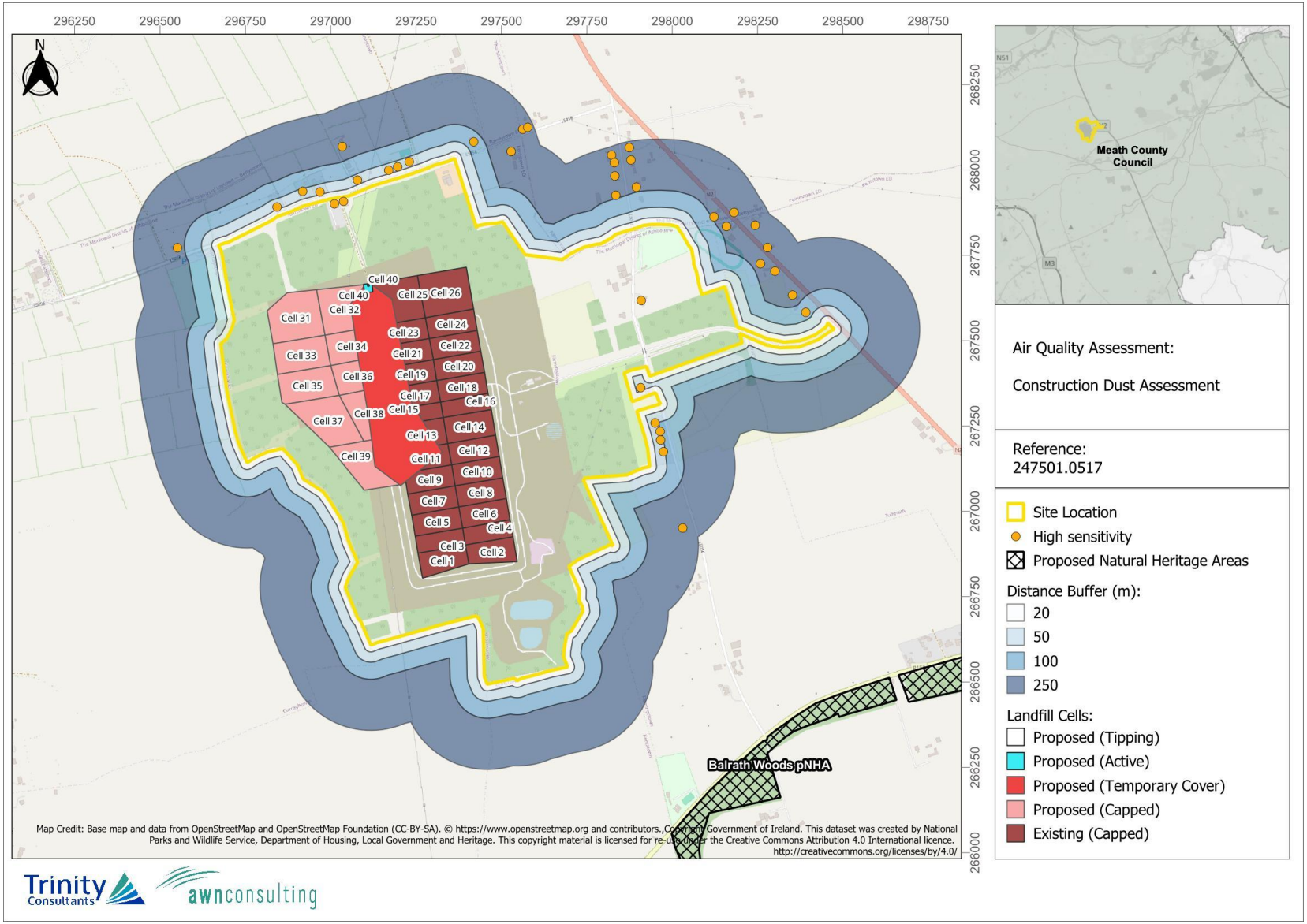
Sensitivity of the Area to Dust Soiling Effects on People and Property					
Receptor Sensitivity	**Number of Receptors**	**Distance from Source (m)**			
		<20	**<50**	**<100**	**<250**
High	>100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	**Medium**	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low
Sensitivity of the Area to Human Health Impacts					
Receptor Sensitivity	**Annual Mean PM_{10} Concentration**	**Number of Receptors**	**Distance from Source (m)**		
			<20	**<50**	**<100**	**<250**
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1 - 10	**Low**	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

In terms of receptor sensitivity to dust soiling, the area directly surrounding the Proposed Development (within 250 m of the boundary) is predominantly rural in nature. There are between 1-10 high sensitivity residential properties within 20 m of the site boundary (see Figure 8-2). Based on these receptor numbers and using the IAQM criteria in Table 8-10, the sensitivity of the area to dust soiling impacts from the Proposed Development is medium.

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the Proposed Development is 8 µg/m^3. There are between 1-10 high sensitivity residential properties within 20 m of the site boundary (see Figure 8-2). Based on the IAQM criteria outlined in Table 8-10 the most likely sensitivity of the area to dust-related human health effects is low.

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological impacts. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant, as well as other effects. The guidance states that dust impacts to vegetation can occur up to 50 m from the site, and 50 m from site access roads, up to 250 m for the site entrance. The sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present. There are no sensitive ecological receptors that meet these criteria within the study area and there is no potential for impacts to sensitive ecology from construction dust emissions and no further assessment is required.

Figure 8-2 Construction Dust Assessment – Sensitive Receptors within 250 m of Proposed Development



8.6.3.2 Operational Phase

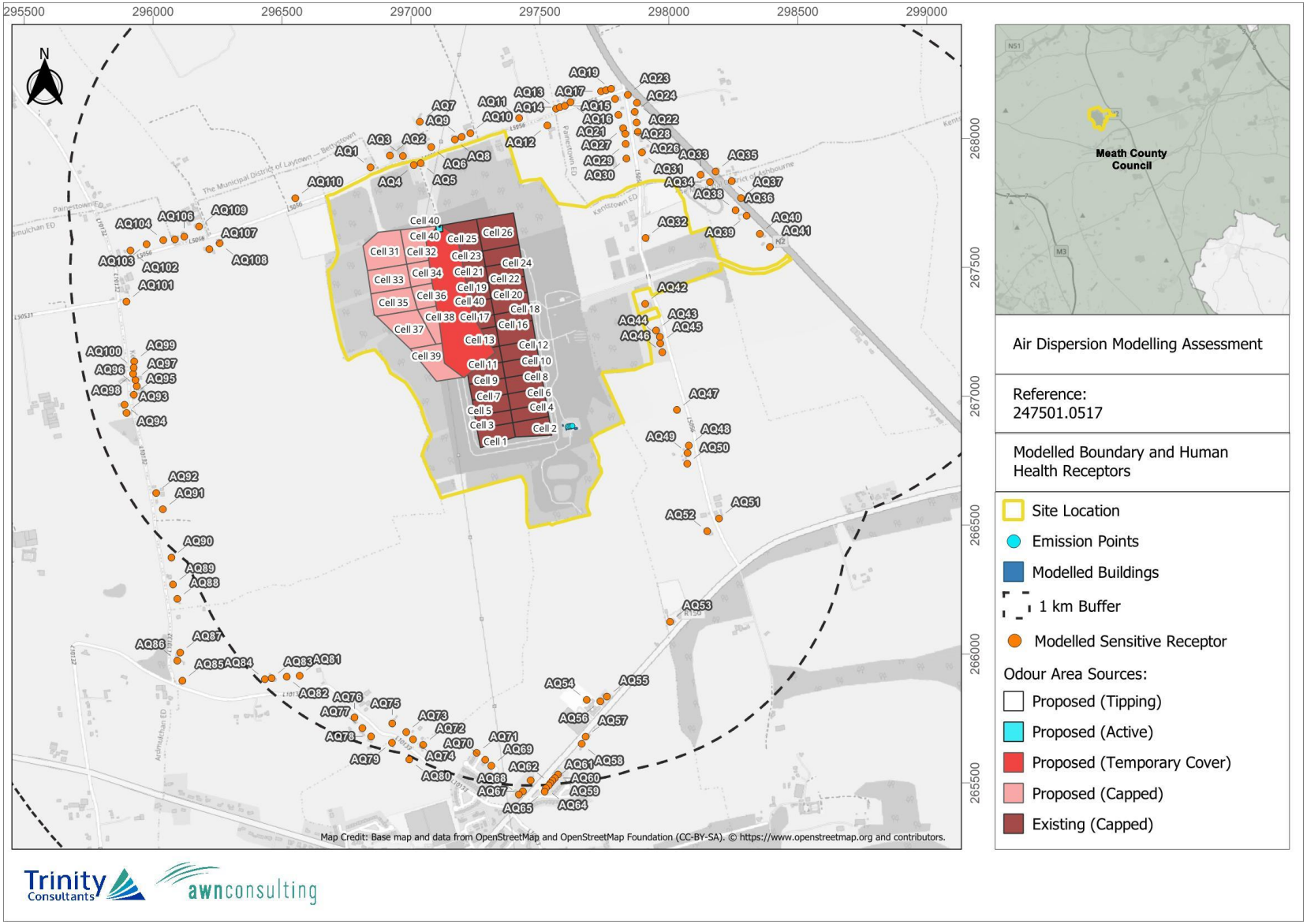
The dispersion modelling has incorporated a variety of receptors, including a gridded receptor network and individual discrete receptors representing specific residential properties. Receptors were modelled 1.5 m above ground to represent breathing height.

The Zone of Influence (ZoI) for the human health effects of the operational phase emissions of the Proposed Development was modelled as follows, and determined in line with AG4 guidance (EPA, 2020).

Three receptor grids were created at which concentrations would be modelled. Receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. The receptor grids were based on a Cartesian grid with the site at the centre. An outer grid measured 10 x 10 km with the site at the centre and with concentrations calculated at 200 m intervals. A medium density grid measured 3 x 3 km with the site at the centre and with concentrations calculated at 50 m intervals. A smaller, denser grid measured 1 x 1 km with concentrations calculated at 25 m intervals.

The impact of the emission sources was also measured at nearby residential receptors (AQ) (identified via a combination of satellite imagery and Eircode search) which were added to the model as discrete receptors (shown in Figure 8-3; 1 km buffer for scale purposes, ZoI as per above).

Figure 8-3 Sensitive Receptors Included in Operational Phase Odour Dispersion Modelling Assessment



8.7 The 'Do Nothing' Scenario

The existing Knockharley Landfill Limited Installation is currently licensed by the EPA under Industrial Emissions Licence Reg. No. W0146-04. The odour emissions associated with the existing licence conditions represents the Do Nothing scenario. Odour emissions in this scenario have been previously assessed and reported in *Regulation 10 Reply - BEPC22A_odour modelling_final*, submitted as part of the IE licence application process for the Installation (Reg. No. W0146-04).

This assessment concluded that the modelled odour concentrations would marginally exceed the relevant odour guideline value at several sensitive receptors in the assessment year with maximum model concentrations, but also noted that the level of odour complaints in the submission years of 2023 had reduced relative to the baseline year of 2018.

8.8 Potential Impacts of the Proposed Development

8.8.1 Construction Phase

8.8.1.1 Construction Dust Assessment

The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 250 m of a construction site, the majority of the deposition occurs within the first 50 m (IAQM, 2024). The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Dublin Airport meteorological data indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature (Section 8.6.1). In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30-year average data for Dublin Airport meteorological station indicates that on average 200 days per year have rainfall over 0.2 mm (Met Éireann, 2025). Therefore, it can be determined that 55% of the time dust generation will be reduced due to natural meteorological conditions.

To determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (Section 8.6.3). The major dust generating activities are divided into four types within the IAQM (IAQM, 2024) guidance to reflect their different potential impacts. These are: demolition, earthworks, construction and trackout (movement of heavy vehicles).

8.8.1.1.1 *Determining the Potential Dust Emission Magnitude*

The magnitude of the works under each category can be classified as either small, medium or large depending on the scale of the works involved. The magnitude of each activity has been determined below for the Proposed Development using the criteria in Table 8-4.

- Demolition: There is no demolition required as part of the Proposed Development.
- Earthworks: The dust emission magnitude for the proposed earthwork activities can be classified as large as the total site area is greater than 110,000 m^2.
- Construction: There is no significant construction of structures required as part of the Proposed Development.
- Trackout: The dust emission magnitude for the proposed trackout can be classified as medium, as there will be between 20 - 50 outward HGV movements per day during the construction phase of the Proposed Development.

8.8.1.1.2 *Determining the Risk of Dust Impacts*

Once the dust emission magnitude has been determined the next step, according to the IAQM Guidance, is to establish the level of risk by combining the magnitude with the overall sensitivity of the area to dust soiling and dust-related human health effects (Section 8.6.3). The level of risk associated with each activity is determined using the criteria in Table 8-5. The overall risk of dust impacts from the construction works is shown in Table 8-11 for each category.

There is at most a high risk of dust soiling impacts and a medium risk of dust-related human health impacts associated with the proposed works. As a result, standard practice dust mitigation measures associated with high risk works will be implemented to ensure there are no significant impacts at nearby sensitive receptors. In the absence of mitigation, the likely effect of the dust impacts within the ZoI are predicted to be direct, short-term, negative and slight.

Table 8-11 Risk of Dust Impacts used to Define Site-Specific Mitigation

Receptor	Receptor Sensitivity	Dust Emission Magnitude	Risk of Dust-Related Impacts
Demolition			
Dust Soiling	n/a	n/a	n/a
Human Health	n/a		n/a
Earthworks			
Dust Soiling	Medium	Large	High Risk
Human Health	Low		Medium Risk
Construction			
Dust Soiling	n/a	n/a	n/a
Human Health	n/a		n/a
Trackout			
Dust Soiling	Medium	Medium	Medium Risk
Human Health	Low		Low Risk

8.8.2 Operational Phase

8.8.2.1 Odour Dispersion Modelling Assessment

The odour modelling results with the Proposed Development in place are detailed in Table 8-12. The results indicate that the predicted ground level concentrations are below the relevant odour guideline value of 1.5 OU_E/m^3. Under the maximum emissions scenario of the Proposed Development (as described in Section 8.5.2.2.4), the 98th%ile of mean hourly odour concentrations ranges from 0.03 – 3.58 OU_E/m^3 at the modelled sensitive receptors. For the year with maximum concentrations and at the most impacted receptor, emissions from the site lead to predicted ambient hourly mean (measured as a 98th percentile) odour concentrations which are at most 238% of the of the odour guideline value at the worst-case receptor (location shown in Figure 8-4).

The geographical variations in ground level odour predicted environmental concentrations (PEC) beyond the Proposed Development boundary for the worst-case year modelled are illustrated as concentration contours in Figure 8-4, to demonstrate the direction and extent of the emission plume.

Of the modelled receptors, odour concentrations are predicted to be below the odour guideline value at 63 no., while 46 no. are predicted to experience odour concentrations above the odour guideline value. The exposure of sensitive receptors to odour nuisance is dependent on meteorological conditions such as wind speed and wind direction. These conditions vary frequently, on an hourly basis or less. Exposure to

any odour nuisance is therefore expected to be occasional and brief over the operational lifespan of the Proposed Development, according to the EPA guidelines which defines this as "*effects lasting less than a day*".

Receptors where modelled odour concentrations are predicted to be above the odour guideline value of 1.5 OU_E/m^3 may experience direct, negative, brief and significant effects due to odour nuisance.

Taking the likely brief duration and infrequent nature of any potential odour nuisance into account, the overall impact of the Proposed Development in terms of odour can be considered ***direct***, ***negative, long-term*** and ***slight***, which is overall ***not significant*** in EIA terms.

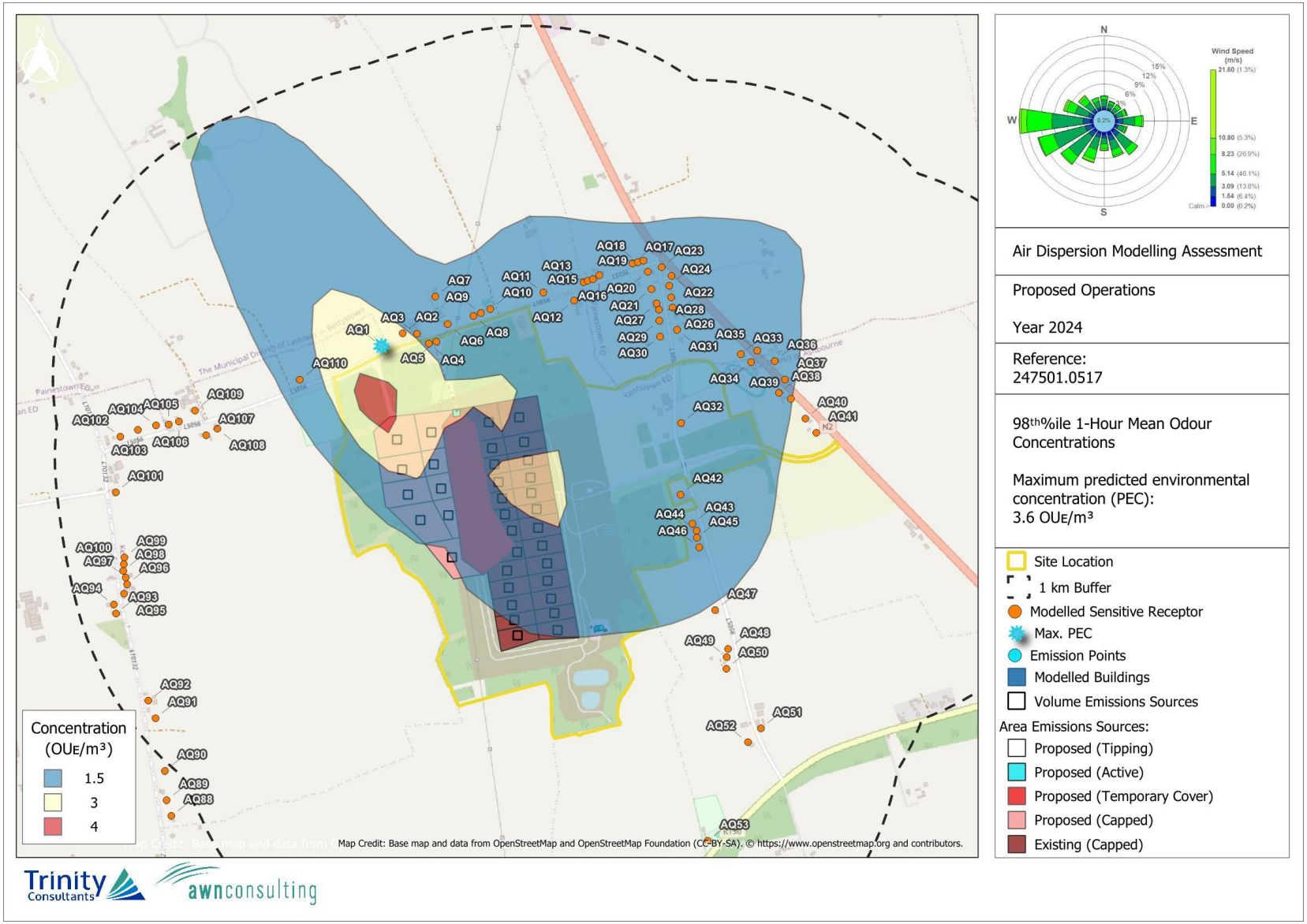
Table 8-12. Proposed Operations – Dispersion Model Results for Nitrogen Dioxide (NO_2)

Receptor	Co-Ordinates (UTM Zone 29 N)		1-Hour Mean (as a 98thO%ile) Odour Concentration (OU_E/m^3)					Guideline Value (OU_E/m^3)	Max. PC as % of Guideline
	X	Y	2020	2021	2022	2023	2024		
AQ1	662827	5947654	2.59	3.55	2.89	2.85	3.58	1.5	238%
AQ2	662903	5947700	2.33	3.04	2.49	2.50	3.10	1.5	207%
AQ3	662953	5947698	2.16	3.07	2.59	2.26	2.92	1.5	205%
AQ4	662996	5947663	2.10	3.13	2.72	2.31	2.84	1.5	209%
AQ5	663022	5947670	2.18	3.02	2.83	2.21	2.53	1.5	201%
AQ6	663063	5947732	2.21	2.72	2.68	2.06	2.12	1.5	181%
AQ7	663019	5947831	1.75	2.37	2.33	1.68	1.86	1.5	158%
AQ8	663155	5947761	2.28	2.91	2.82	2.36	2.35	1.5	194%
AQ9	663181	5947772	2.33	2.94	2.77	2.38	2.35	1.5	196%
AQ10	663215	5947786	2.32	2.90	2.86	2.38	2.40	1.5	194%
AQ11	663404	5947845	2.19	2.60	2.55	2.59	2.22	1.5	173%
AQ12	663513	5947816	2.19	2.64	2.54	2.63	2.29	1.5	176%
AQ13	663547	5947882	2.06	2.53	2.35	2.51	2.13	1.5	168%
AQ14	663562	5947887	2.06	2.53	2.41	2.49	2.15	1.5	169%
AQ15	663581	5947892	2.01	2.53	2.42	2.45	2.11	1.5	169%
AQ16	663603	5947907	1.94	2.48	2.36	2.39	2.06	1.5	166%
AQ17	663721	5947949	1.78	2.34	2.17	2.20	1.91	1.5	156%
AQ18	663741	5947953	1.72	2.30	2.14	2.16	1.87	1.5	153%
AQ19	663760	5947958	1.72	2.29	2.10	2.12	1.85	1.5	153%
AQ20	663776	5947919	1.74	2.43	2.16	2.16	1.93	1.5	162%
AQ21	663789	5947857	1.75	2.57	2.20	2.19	2.03	1.5	171%
AQ22	663861	5947904	1.65	2.46	2.14	2.11	1.95	1.5	164%
AQ23	663825	5947935	1.66	2.40	2.11	2.07	1.86	1.5	160%
AQ24	663852	5947869	1.69	2.42	2.23	2.14	2.05	1.5	161%
AQ25	663859	5947828	1.69	2.40	2.19	2.08	2.04	1.5	160%
AQ26	663864	5947791	1.69	2.45	2.15	2.15	2.06	1.5	163%
AQ27	663807	5947806	1.77	2.52	2.27	2.20	2.10	1.5	168%
AQ28	663815	5947784	1.77	2.47	2.29	2.17	2.08	1.5	165%
AQ29	663817	5947745	1.74	2.49	2.27	2.27	2.07	1.5	166%
AQ30	663820	5947688	1.87	2.59	2.31	2.32	2.07	1.5	172%

Receptor	Co-Ordinates (UTM Zone 29 N)		1-Hour Mean (as a 98th%ile) Odour Concentration (OU_E/m^3)					Guideline Value (OU_E/m^3)	Max. PC as % of Guideline
	X	Y	2020	2021	2022	2023	2024		
AQ31	663880	5947712	1.83	2.42	2.26	2.27	2.03	1.5	161%
AQ32	663894	5947380	2.07	2.62	2.48	2.33	2.19	1.5	175%
AQ33	664107	5947625	1.67	2.06	2.12	1.84	1.75	1.5	141%
AQ34	664144	5947597	1.65	1.99	2.08	1.81	1.71	1.5	139%
AQ35	664166	5947638	1.58	1.87	2.05	1.76	1.67	1.5	137%
AQ36	664228	5947600	1.58	1.83	2.03	1.74	1.63	1.5	135%
AQ37	664264	5947535	1.55	1.89	1.88	1.70	1.55	1.5	126%
AQ38	664243	5947488	1.52	1.87	1.82	1.69	1.55	1.5	124%
AQ39	664286	5947466	1.49	1.84	1.81	1.62	1.51	1.5	123%
AQ40	664337	5947396	1.42	1.63	1.65	1.43	1.44	1.5	110%
AQ41	664376	5947345	1.33	1.49	1.57	1.37	1.38	1.5	105%
AQ42	663893	5947124	2.00	2.16	2.04	1.99	2.23	1.5	149%
AQ43	663935	5947021	1.79	1.78	1.69	1.71	1.96	1.5	130%
AQ44	663949	5946996	1.70	1.71	1.63	1.65	1.92	1.5	128%
AQ45	663951	5946971	1.62	1.67	1.58	1.59	1.87	1.5	125%
AQ46	663959	5946937	1.53	1.54	1.55	1.54	1.83	1.5	122%
AQ47	664016	5946713	1.30	1.29	1.35	1.17	1.47	1.5	98%
AQ48	664062	5946575	1.07	1.08	1.15	1.00	1.10	1.5	76%
AQ49	664057	5946546	1.02	1.05	1.06	0.99	1.08	1.5	72%
AQ50	664056	5946504	1.00	1.01	1.05	0.95	1.06	1.5	71%
AQ51	664179	5946292	0.73	0.79	0.82	0.73	0.74	1.5	55%
AQ52	664133	5946242	0.65	0.74	0.69	0.73	0.68	1.5	49%
AQ53	663989	5945891	0.28	0.42	0.28	0.45	0.35	1.5	30%
AQ54	663666	5945588	0.09	0.11	0.08	0.11	0.08	1.5	7%
AQ55	663744	5945601	0.10	0.14	0.09	0.14	0.10	1.5	9%
AQ56	663719	5945583	0.09	0.13	0.08	0.13	0.09	1.5	9%
AQ57	663662	5945445	0.07	0.08	0.06	0.07	0.06	1.5	6%
AQ58	663646	5945418	0.07	0.08	0.06	0.07	0.06	1.5	5%
AQ59	663554	5945299	0.05	0.05	0.04	0.04	0.04	1.5	4%
AQ60	663542	5945285	0.05	0.05	0.04	0.04	0.04	1.5	3%
AQ61	663533	5945275	0.04	0.05	0.04	0.04	0.04	1.5	3%
AQ62	663525	5945265	0.04	0.05	0.04	0.04	0.04	1.5	3%
AQ63	663519	5945256	0.04	0.05	0.04	0.04	0.04	1.5	3%
AQ64	663507	5945245	0.04	0.04	0.04	0.04	0.04	1.5	3%
AQ65	663503	5945232	0.04	0.04	0.04	0.04	0.04	1.5	3%
AQ66	663448	5945276	0.04	0.04	0.04	0.04	0.04	1.5	3%
AQ67	663418	5945233	0.04	0.04	0.04	0.04	0.03	1.5	3%
AQ68	663403	5945221	0.04	0.04	0.03	0.04	0.03	1.5	3%
AQ69	663296	5945332	0.04	0.04	0.04	0.04	0.03	1.5	3%
AQ70	663272	5945356	0.04	0.04	0.04	0.04	0.03	1.5	3%

Receptor	Co-Ordinates (UTM Zone 29 N)		1-Hour Mean (as a 98th%ile) Odour Concentration (OU_E/m^3)					Guideline Value (OU_E/m^3)	Max. PC as % of Guideline
	X	Y	2020	2021	2022	2023	2024		
AQ71	663239	5945382	0.04	0.04	0.04	0.04	0.03	1.5	3%
AQ72	663032	5945413	0.04	0.04	0.04	0.04	0.03	1.5	3%
AQ73	662966	5945463	0.05	0.04	0.04	0.04	0.03	1.5	3%
AQ74	662992	5945435	0.04	0.04	0.04	0.04	0.03	1.5	3%
AQ75	662912	5945497	0.05	0.04	0.04	0.04	0.04	1.5	3%
AQ76	662765	5945520	0.05	0.04	0.04	0.04	0.04	1.5	3%
AQ77	662796	5945479	0.05	0.04	0.04	0.04	0.03	1.5	3%
AQ78	662830	5945446	0.05	0.04	0.04	0.04	0.03	1.5	3%
AQ79	662911	5945422	0.04	0.04	0.04	0.04	0.03	1.5	3%
AQ80	662978	5945357	0.04	0.03	0.04	0.03	0.03	1.5	3%
AQ81	662553	5945682	0.05	0.05	0.05	0.05	0.04	1.5	4%
AQ82	662503	5945678	0.05	0.05	0.04	0.05	0.04	1.5	4%
AQ83	662444	5945672	0.05	0.05	0.04	0.05	0.04	1.5	3%
AQ84	662418	5945668	0.05	0.05	0.04	0.04	0.04	1.5	3%
AQ85	662098	5945662	0.04	0.04	0.03	0.04	0.03	1.5	3%
AQ86	662078	5945740	0.04	0.04	0.03	0.04	0.03	1.5	3%
AQ87	662090	5945771	0.05	0.04	0.03	0.04	0.03	1.5	3%
AQ88	662078	5945980	0.05	0.05	0.04	0.05	0.04	1.5	4%
AQ89	662061	5946036	0.05	0.05	0.05	0.05	0.04	1.5	4%
AQ90	662055	5946140	0.06	0.05	0.05	0.05	0.05	1.5	4%
AQ91	662022	5946327	0.07	0.07	0.06	0.07	0.06	1.5	4%
AQ92	661996	5946391	0.07	0.07	0.06	0.07	0.06	1.5	5%
AQ93	661881	5946701	0.08	0.10	0.07	0.08	0.07	1.5	7%
AQ94	661874	5946733	0.09	0.10	0.08	0.09	0.08	1.5	7%
AQ95	661910	5946772	0.10	0.11	0.09	0.09	0.08	1.5	8%
AQ96	661921	5946805	0.10	0.12	0.09	0.10	0.09	1.5	8%
AQ97	661916	5946829	0.10	0.13	0.10	0.10	0.09	1.5	8%
AQ98	661907	5946853	0.10	0.13	0.10	0.10	0.09	1.5	9%
AQ99	661911	5946901	0.11	0.14	0.11	0.11	0.10	1.5	9%
AQ100	661909	5946877	0.10	0.14	0.11	0.10	0.10	1.5	9%
AQ101	661881	5947133	0.19	0.23	0.21	0.21	0.14	1.5	15%
AQ102	661896	5947331	0.29	0.49	0.43	0.42	0.21	1.5	33%
AQ103	661959	5947355	0.34	0.59	0.50	0.49	0.24	1.5	39%
AQ104	662024	5947371	0.39	0.74	0.57	0.56	0.28	1.5	50%
AQ105	662069	5947374	0.41	0.89	0.65	0.64	0.31	1.5	60%
AQ106	662105	5947385	0.44	0.97	0.68	0.74	0.34	1.5	65%
AQ107	662202	5947336	0.55	1.08	0.77	0.82	0.40	1.5	72%
AQ108	662242	5947360	0.64	1.24	0.94	0.99	0.51	1.5	82%
AQ109	662163	5947424	0.52	1.19	0.89	0.92	0.47	1.5	79%

Figure 8-4 Proposed Operations Scenario - Maximum 1-Hour Mean Odour Concentrations (as 98thO%ile) (OU_E/m^3)



8.8.3 Decommissioning and Remediation Phase

During decommissioning and the capping of the landfill, the primary risk relates to the potential for dust generation due to earthmoving, and handling of equipment and materials during restoration works. Dust impacts during the decommissioning phase are expected to be of similar type and similar or lesser in magnitude to those anticipated during the construction phase, but generally of a shorter duration. The same mitigation measures implemented during the construction phase will be applied during the decommissioning works and are also considered appropriate for the decommissioning demolition works. It can therefore be determined that the decommissioning phase will have a ***short-term, direct, negative*** and ***not significant*** effect on air quality.

8.8.4 Cumulative Effects

8.8.4.1 Construction Phase

The construction and operational phases of the proposed landfill development are anticipated to occur concurrently for a defined period. As such, potential cumulative impacts have been assessed with regard to potential impacts arising from the proposed development construction and operational phases in combination with other relevant plans and projects in the surrounding area as set out in Chapter 2, Section 2.2.1.1 and Appendix 2.1. As per the IAQM guidance, cumulative construction dust impacts may occur if large-scale developments within 500 m of the site are under construction simultaneously.

The following developments in Table 8-13 were identified to be of sufficient scale to potentially generative cumulative dust impacts with the proposed development.

Table 8-13 Summary of Committed Developments with Potential for Cumulative Effects

Planning Reference No.	Description
AA170901	Works to include 2 no. grass based soccer pitches with training areas, ball catch nets, upgrading of existing entrance to site, carparking for 50 cars and all associated site works.
AA180145	A solar farm to be installed over reclaimed landfill with an export capacity of approximately 3MW comprising photovoltaic panels on ground mounted frames, connection to existing single-storey ESB Sub-Station / switch room.
2360296	Works associated with the proposed upgrade of the existing Louth - Woodland 220 kV overhead powerline (OHL).
23576	a ten year permission and 35 year operation life for a solar farm described herein. The total site area for the proposed development is 188.9 hectares consisting of the following: solar photovoltaic panels on ground mounted steel frames and associated
2460587	New upgraded synthetic grass pitch, with boundary fence around perimeter of pitch 4 No. of 12metre high floodlight poles with a max 250 lux lighting and associated site works. Upgraded & extended parking area with associated site works.
2460432	Construction of 1 No. standalone ESB substation (20kV) with adjoining customer switch room

The dust mitigation measures outlined in Section 8.9 will be applied during the construction phase which will avoid significant cumulative impacts on air quality. Similar dust mitigation measures are required for other permitted developments as per their respective impact assessments and planning conditions. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the Proposed Development is ***short-term, direct, negative*** and ***not significant***. No significant cumulative impacts to air quality predicted for the construction phase.

8.8.4.2 Operational Phase

In line with AG4 and AG9 (EPA, 2019, 2020), permitted developments and EPA licenced facilities within 1 km were reviewed for odour emission sources. This is the most likely area where cumulative effects could occur based on the dispersion modelling results in Section 8.8.2.1. There are no permitted development or EPA licenced facilities within 1 km of the Proposed Development with the potential for significant cumulative effects due to odour emissions.

8.8.5 Summary

The following table summarises the identified likely significant effects during the construction phase of the Proposed Development before mitigation measures are applied.

Table 8-14 Summary of Effects in the Absence of Mitigation

Phase	Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction	Impact of dust from construction and trackout in terms of dust soiling, and human health	Negative	Slight	Study area as per Section 8.6.3.1.	Likely	Short-term	Direct
Operational	Impact of operational phase odour emissions from Proposed Development on sensitive receptors	Negative	Slight	Dispersion model study area as per Section 8.6.3.2.	Likely	Long-term	Direct
Decommissioning and Remediation	Impact of dust from landfill filling and capping, and trackout, in terms of dust soiling, and human health	Negative	Not significant	Study area as per Section 8.6.3.	Likely	Short-term	Direct

8.9 Mitigation Measures

8.9.1 Construction Phase

The Proposed Development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of construction and trackout activities (see Section 8.8.1.1). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the Proposed Development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC (2018), DLRCC (2022)), the UK (IAQM (2024), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

Table 8-15 Standard Construction Dust Management Measures

Mitigation Type	Location	Description of Mitigation or Monitoring Measures
Communications	Construction Compound/Site Boundary and throughout (as required)	► An Environmental Manager (EM) will be in assigned by the appointed contractor. The EM will be responsible for co-ordinating the day-to-day management of environmental impacts during the Construction Phase. The EM will be responsible for performing inspections as deemed necessary and manage responses to environmental incidents. The name and contact details of the EM will be responsible for construction dust management and air quality issues will be displayed at the construction compound/site boundary hoarding, as well as head/regional office contact details. ► A complaints register will be kept by the appointed contractor detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out. ► Previously established community engagement with neighbouring business will continue for the remainder of the construction works.
Construction Works Area Management	Construction Compound/Site Boundary and throughout (as required)	► Construction compounds will be laid out so that machinery and dust causing activities such as stockpiles are located away from receptors, as far as is practicable. ► The appointed contractor will provide a site hoarding of 2.4m height along noise sensitive boundaries, at a minimum, at the Construction Compounds, which will assist in minimising the potential for dust impacts off-site. Construction works area fencing, barriers and scaffolding will be kept clean using wet methods. ► Stockpiles will be covered to prevent wind whipping. ► Any chutes and conveyors will be enclosed and skips will be covered. ► Drop heights from any conveyors, loading shovels, hoppers and other loading or handling equipment will be minimised. Fine water sprays will be used on such equipment where visible dust plumes are generated. ► Cutting, grinding or sawing equipment will be fitted with or used in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. ► Equipment will be readily available in the construction works areas site to clean any dry spillages. Spillages will be cleaned up as soon as reasonably practicable after the event using wet cleaning methods. ► An adequate water supply for effective dust or particulate matter suppression and mitigation will be ensured, and non-potable water will be used where possible and appropriate. ► Construction works area runoff of water or mud will be managed as per the mitigation outlined in Chapter 6 of this EIAR and the CEMP submitted with the planning application..
Operating Vehicles / Machinery	Construction Compound/Site Boundary and throughout (as required)	► Engines of all vehicles will be switched off engines when stationary - idling vehicles are not permitted. ► The use of diesel- or petrol-powered generators will be avoided and mains electricity or battery powered equipment will be used where practicable. ► A Construction Traffic Management Plan (CTMP) has been developed as part of the CEMP to minimise use of the Local Road Network. The CTMP will be adhered to be the appointed contractor. ► The appointed contractor will prepare a Construction Stage Mobility Management Plan (CSMMP) to actively discourage personnel from using private vehicles to travel to the Proposed Scheme. The CSMMP will promote

Mitigation Type	Location	Description of Mitigation or Monitoring Measures
		the use of public transport, cycling and walking by personnel. Private parking at the Construction Compounds will be limited. Vehicle-sharing will be encouraged, subject to public health guidelines, where travel by private vehicle is a necessity (e.g. for transporting heavy equipment).
Demolition Activities	Areas where demolition is required	► During the demolition process, any cutting, grinding or sawing equipment will be fitted or used in conjunction with a suitable dust suppression technique such as water sprays or local extraction.
Earthworks Activities	Areas where earthworks are required	► Materials with the potential to produce dust, such as excavated material, will be removed from the construction works area as soon as possible, unless being re-used within the construction works area. Management of extracted material is detailed in the Construction and Demolition Resource and Waste Management Plan (Appendix 14.1 of this EIAR). ► Areas exposed by earthworks will be re-vegetated to stabilise surfaces as soon as practicable. Hessian, mulches or trackifiers will be used where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. Cover will only be removed in small areas during work and not all at once. ► During dry and windy periods and when there is a likelihood of dust nuisance (defined under "Monitoring" measures below), water-based dust suppression (e.g. bowser) will operate to ensure soil moisture content is high enough to increase the stability of the soil and thus suppress dust.
Construction Activities	Areas where construction is required	► Sand and other aggregates will be stored in bunded areas and will not be allowed to dry out, unless this is required for a particular process. ► Smaller supplies of fine power materials bags will be sealed after use and stored appropriately to prevent dust escaping.
Measures specific to trackout (transport of dust and dirt from the construction works areas onto the public road network)	Construction Compound/Site Boundary and throughout (as required)	► A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles. ► Vehicles transporting loose materials (e.g. spoil or sand) entering and leaving the Proposed Scheme works areas and construction compounds will be covered with tarpaulin to prevent escape of materials during transport. Before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place. ► Where construction work area or construction compound conditions result in large amounts of mud building up on truck wheels, wheel washing will be carried out for trucks before they use the public road network. ► Water-assisted dust sweeper(s) will be used at the access points to a construction compound and the immediate adjoining local road, to remove, as necessary, any material tracked out of the compound. ► Any on-site haul routes will be inspected for integrity and necessary repairs to the surface will be carried out as soon as reasonably practicable.
Monitoring	Construction Compound/Site Boundary and throughout (as required)	► To determine if any short-term dust impacts will occur, a minimum of daily visual inspections for dust soiling of receptors (including roads, and surfaces such as street furniture, cars and windowsills) adjoining the construction works areas will be undertaken. Inspection results will be recorded in the site inspection log. Cleaning will be provided if necessary, such as in the event of a dust complaint resulting from the Proposed Scheme construction works. ► The potential for dust generation increases when rainfall is less than 0.2 mm/day and at wind speeds of greater than 10 m/s. To determine if these conditions are likely to affect the site, the weather forecast will be consulted daily, specifically the hourly forecasts for wind speeds as well as 12 hour rainfall radar showing anticipated amounts of precipitation in mm.

Mitigation Type	Location	Description of Mitigation or Monitoring Measures
		► The frequency of site inspections by the EM responsible for dust management will be increased to a minimum of twice daily during the above conditions. The effectiveness of dust control methods will be monitored via visual inspections and work that would generate dust (e.g. moving materials from stockpiles, or transferring loose dry materials from trucks) will be limited in so far as is practicable during these weather conditions.

8.9.2 Operational Phase

The existing Knockharley Landfill facility has an existing IED Licence (W0146-04) issued by the EPA. The facility is required to comply with specific licence conditions, including monitoring and reporting on their emissions (such as emissions to air and odour), to ensure that they do not pose a risk to human health or the environment.

The IED licence specifies a number of conditions for odour management, which will also apply to the Proposed Development and will continue to be adhered to by the Applicant:

- Condition 2.2.2.6: The EMS shall include, as a minimum, the following elements: An odour management plan, noise management plan and accident management plan which incorporates all applicable elements outlined in Section 2.4 of CID 2019/2010.
- Condition 2.2.2.9: The licensee shall maintain and implement a Schedule of Environmental Objectives and Targets and performance indicators in relation to significant environmental aspects, including safeguarding compliance with applicable legal requirements. The Schedule shall, as a minimum, provide for a review of all operations and processes, as referred to in the conditions of this licence, including an evaluation of practicable options for: (vii) odour and noise management.
- Condition 3.22: Dust and Odour Control - The licensee shall maintain adequate measures for the control of dust and odour emissions, including diffuse dust emissions, from the installation.
- Condition 5.14: All odorous or odour-forming wastes shall be covered as soon as practicable and in any case at the end of the working day.
- Condition 5.16: When operating landfill gas infrastructure, regard shall be had to the potential for, and mitigation of, odour nuisance.
- Condition 6.16.1: The licensee shall carry out an odour survey of the site operations daily. (i) The survey programme shall be undertaken in accordance with the methodology specified in the 'Air Guidance Note 5 (AG5) Odour Impact Assessment Guidance for EPA Licensed Sites ' as published by the Agency.
- Condition 6.16.3: Within six months of the date of grant of this licence, and biennially thereafter, the licensee shall review the technology related to electronic odour monitoring and trial or implement a suitable device as part of odour management controls, unless otherwise approved by the Agency.
- Condition 6.17: Odour Management Plan
  - 6.17.1 The licensee shall revise, maintain and implement, to the satisfaction of the Agency, the site Odour Management Plan.
  - 6.17.2 The plan shall be submitted within three months of the date of grant of this licence.
  - 6.17.3 The plan shall outline odour reduction and abatement measures.
  - 6.17.4 The plan shall include measures to control potential sources of odour nuisance, and as a minimum address the following:
    - (i) The mitigation measures included in Section 7.5.2.4 of the main Environmental Impact Assessment Report;
    - (ii) Waste intake, including the acceptance of odourous waste deliveries;
    - (iii) Waste placement, working face active cell sizing and covering, daily cover, intermediate capping, permanent capping and associated operations;
    - (iv) Landfill area;

- (v) Landfill gas collection and management, including infrastructure operation and maintenance, locations of infrastructure including access haul roads, well design and density, monitoring, condensate management, field balancing, flare/combustion plant operation;
- (vi) Landfill gas utilisation and flaring management, including infrastructure;
- (vii) Leachate collection and management, including infrastructure and transport;
- (viii)Waste storage and quarantine areas and any other materials or areas with a potential for causing odour;
- (ix) Monitoring, including assessment and report on TVOC surface emissions at the installation following completion of waste acceptance in any cell/sub-cell, TVOC surface emissions from capped areas, odour checks on and off-site, receipt and assessment/verification of odour complaints received;
- (x) Use of sacrificial gas extraction systems; phased capping of the waste body; and an interim capping system at inter-cell boundaries;
- (xi) Working face active cell sizing and covering;
- (xii) Identification of diffuse sources of odour and of landfill gas emissions (e.g. from leachate management infrastructure and/or from side slopes);
- (xiii) Relevant Conditions of this licence; and
- (xiv) The provision of adequate resources and training.

- 6.17.5 The plan shall be prepared in accordance with the Agency's Odour Emissions Guidance Note (Air Guidance Note AG9).
- 6.17.6 The plan shall be reviewed annually.

8.9.3 Decommissioning and Remediation Phase

As the dust emissions associated with the final landfill capping during the decommissioning phase are expected to be of a similar or lesser magnitude to those identified during the construction phase, the mitigation measures applicable to construction phase dust emissions are also considered suitable for those during the decommissioning phase.

Then, in terms of ongoing site activities post completion of landfilling following completion of decommissioning, mitigation measures are expected to be in line with the implementation of the Closure, Restoration and Aftercare Management Plan (CRAMP) in line with EPA requirements. Key mitigation measures will include:

- Landfill gas management measures, including collection, treatment and/or utilisation, to continue until monitoring demonstrates that emissions are stable and no longer pose a risk.
- Landscaping and aftercare management to ensure the long-term stability and environmental integration of the capped landfill.
- Monitoring and reporting to verify the effectiveness of closure measures and demonstrate compliance with licence conditions.

These mitigation measures will need to remain in place for the duration of the decommissioning and remediation phase as required by the EPA. The site cannot be surrendered and formally closed until the EPA is satisfied that all closure, restoration and aftercare requirements have been met, in accordance with Condition 10 of the facility's licence.

8.10 Monitoring

8.10.1 Construction Phase

The assessment of impacts on air quality as a result of the construction phase of the Proposed Development are predicted to be not significant in EIA terms. Monitoring in the form of visual inspections for nuisance dust has been outlined in Section 8.9.1. Based on the predicted impacts it is concluded that no additional specific monitoring is required.

8.10.2 Operational Phase

The existing Knockharley Landfill facility has an existing IED Licence (W0146-04) issued by the EPA. The facility is required to comply with specific licence conditions, including monitoring and reporting on their emissions (such as emissions to air and odour), to ensure that they do not pose a risk to human health or the environment.

The IED licence specifies a number of conditions for odour management, which will also apply to the Proposed Development and will continue to be adhered to by the Applicant:

- Condition 6.16.1: The licensee shall carry out an odour survey of the site operations daily. (i) The survey programme shall be undertaken in accordance with the methodology specified in the 'Air Guidance Note 5 (AG5) Odour Impact Assessment Guidance for EPA Licensed Sites ' as published by the Agency.
- Condition 6.16.3: Within six months of the date of grant of this licence, and biennially thereafter, the licensee shall review the technology related to electronic odour monitoring and trial or implement a suitable device as part of odour management controls, unless otherwise approved by the Agency.
- Condition 6.17: Odour Management Plan
  - 6.17.4 The plan shall include measures to control potential sources of odour nuisance, and as a minimum address the following:
    - (ix) Monitoring, including assessment and report on TVOC surface emissions at the installation following completion of waste acceptance in any cell/sub-cell, TVOC surface emissions from capped areas, odour checks on and off-site, receipt and assessment/verification of odour complaints received.

8.10.3 Decommissioning and Remediation Phase

In terms of ongoing site activities post completion of landfilling following completion of decommissioning, monitoring is expected to be in line with the implementation of the Closure, Restoration and Aftercare Management Plan (CRAMP), in line with EPA requirements. Monitoring of landfill gas will be carried out, to determine the effectiveness of landfill gas management measures and demonstrate compliance with licence conditions.

Monitoring will need to remain in place for the duration of the decommissioning and remediation phase as required by the EPA. The site cannot be surrendered and formally closed until the EPA is satisfied that all closure, restoration and aftercare requirements have been met, in accordance with Condition 10 of the facility's licence.

8.11 Residual Effects of the Proposed Development

8.11.1 Construction Phase

To minimise dust emissions during construction, a series of mitigation measures have been prepared as outlined in Section 8.9.1. Provided the dust minimisation measures are adhered to, the predicted residual air quality impacts during the construction phase are ***short-term, direct, negative, localised*** and ***not significant***.

Best practice mitigation measures are proposed for the construction phase of the Proposed Development, which will focus on the proactive control of dust and other air pollutants, to minimise generation of emissions at source. The mitigation measures that will be put in place during construction will ensure that the impact complies with all EU ambient air quality legislative limit values (set out in Directive 2008/50/EC), which are based on the protection of human health (Table 8-1). Therefore, the predicted residual, dust-related, human health impact of the construction phase of the Proposed Development is ***short-term, direct, negative, localised*** and ***not significant***.

8.11.2 Operational Phase

Detailed odour dispersion modelling of emissions from the Proposed Development predicted exceedances of the relevant odour guideline value at several sensitive receptors which may experience direct, negative, brief and significant effects due to odour nuisance. However, taking the likely brief duration and infrequent nature of any potential odour nuisance into account, as well as the required mitigation and monitoring measures outlined in Section 8.9.2 and Section 8.10.2, the overall residual effect of the Proposed Development in terms of odour can be considered ***direct***, ***negative, long-term*** and ***slight***, which is overall ***not significant*** in EIA terms.

8.11.3 Decommissioning and Remediation Phase

Dust impacts during the decommissioning and remediation phase are expected to be of similar type and similar or lesser in magnitude to those anticipated during the construction phase, but generally of a shorter duration. The same mitigation measures implemented during the construction phase will be applied during the decommissioning works and are also considered appropriate for the decommissioning demolition works. It can therefore be determined that the residual effect decommissioning phase on air quality will be ***short-term, direct, negative*** and ***not significant***.

8.11.4 Summary of Post-Mitigation Effects

The following table summarises the identified likely significant residual effects during the construction, operational, and decommissioning and remediation phases of the Proposed Development following the application of mitigation measures.

Table 8-16 Summary of Residual Effects Post Mitigation

Phase	Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction	Impact of dust from construction and trackout in terms of dust soiling, and human health	Negative	Not significant	Study area as per Section 8.6.3.	Likely	Short-term	Direct
Operational	Impact of operational phase odour emissions from Proposed Development on sensitive receptors	Negative	Slight	Dispersion model study area as per Section 8.6.3.2.	Likely	Long-term	Direct
Decommissioning and Remediation	Impact of dust from landfill filling and capping, and trackout, in terms of dust soiling, and human health	Negative	Not significant	Study area as per Section 8.6.3.	Likely	Short-term	Direct

8.11.5 Cumulative Residual Effects

The cumulative impact of the Proposed Development with any/all relevant other planned or permitted developments are discussed below. For details on the developments considered refer to Chapter 2, Section 2.9 and Appendix 2.1.

The primary potential cumulative residual effect relates to construction dust emissions. According to the IAQM Guidance, if the construction phase of the Proposed Development coincides with the construction

phase of any other large scale permitted projects within 500m of the site, there is a possibility of cumulative residual dust effects occurring at any nearby sensitive receptors. Should simultaneous construction phases occur, it would lead to cumulative residual dust soiling and dust-related effects on human health, specifically localised to the works area associated with the proposed works.

Two projects of note in the proximity to the development are the proposed 180 Megawatt gas fired peaking power plant proposed to be located to the immediate southwest of the Proposed Development site, and a planned 165 ha solar farm in the vicinity of the Proposed Development site, however this has not yet within the planning system. The project is at non-statutory pre-planning community consultation stage.

However, should the construction phases of the development and any localised permitted developments coincide, it is predicted that once the mitigation measures outlined in Section 8.9.1 are put in place impacts will not be significant. The residual cumulative effect will be ***short-term, direct, negative*** and ***not significant***.

he potential for cumulative impacts during the Decommissioning and Remediation Phase has been considered; however, there are no known projects or developments that could interact with the site given the long-term time horizon for this phase. The existing landfill forms part of the baseline environment, and the proposed development represents an extension to that activity. Key site-specific activities during the Decommissioning and Remediation Phase are consistent with those required for the existing landfill and include:

- Final landfill capping, undertaken in accordance with the CEMP;
- Ongoing post- landfilling site activities, carried out in accordance with the CRAMP.

Through implementation of the CEMP and CRAMP, adherence to EPA guidance, and regulatory oversight, decommissioning and remediation will be managed to ensure that no significant adverse environmental effects arise. Given the long-term time horizon, any future proposed developments will be required to ensure that cumulative impacts in combination with this development remain at an acceptable level.

No significant cumulative adverse impacts to air quality are predicted for the construction, operational or decommissioning and remediation phases.

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Chapter 9 – Climate

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9. CLIMATE

9.1 Introduction

The chapter assesses the likely climatic impacts associated with the Proposed Development at the Knockharley Landfill facility, located in Knockharley, Navan, Co. Meath. The assessment of impacts has been undertaken in the context of current relevant standards and guidance and identifies any requirements or possibilities for mitigation. A full description of the development is available in Chapter 2. The proposed expansion does not seek to increase annual intake but instead aims to extend the life of the facility sustainably. This approach supports Ireland's circular economy goals by ensuring long-term waste security while continuing efforts to reduce landfill dependency. The Proposed Development primarily consists of an extension to the existing Knockharley landfill which will allow for the continued landfill operations at the site. The proposed extension will increase the landfill area by approximately 17.68 ha and add an additional 4.12 million m^3 of void space for landfilling.

The existing Knockharley Landfill facility is located on a c. 135.2 hectare site. The current ongoing development includes for the expanded landfill catering for c. 440,000 tonnes per year. The existing landfill is estimated to be filled to capacity by 2029. The existing landfill facility currently consists of:

- 26 No. landfill cells across 7 No. linear Phases for current landfilling and capping upon reaching capacity (cell Nos. 1 – 14 have been capped to date);
- Incinerator Bottom Ash (IBA) Cells (Cells 27, 28, 29) (currently under construction) for storage of up to 150,000 tonnes of IBA until recovery outlets are identified - to the east of landfill cell Nos. 20 and 22;
- IBA Process Building (currently under construction) for the future recovery of the IBA – is located in the corner of Cell 29 to the east of landfill cell Nos. 24 and 26;
- IBA Cell 30 is the allowed future "piggy back" cell for the IBA facility, which bridges between IBA cell 29 and the existing waste landfill cells.
- A landfill gas treatment compound located to the southeast of the landfill;
- 2 no. ESB Substations, one importing power to Administration and maintenance buildings, with the other exporting from gas treatment compound.

This chapter discusses the Proposed Development in the context of the recently published CAP25 and in the context of the relevant Carbon Budgets and the Electricity Sectoral Emission Ceilings, as outlined in EPA Report entitled "*Ireland's Greenhouse Gas Emissions Projections - 2024-2055*" (EPA, May 2025).

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9.2 Methodology

The climate assessment has been carried out in line with the guidance outlined in the European Commission publications "Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment" (EC, 2013) and "Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report" (EC, 2017) and the EPA publication "Guidelines on the Information to be Contained in Environmental Impact Assessment Reports" (EPA, 2022).

The climate assessment is divided into two distinct sections – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- Greenhouse Gas Emissions Assessment (GHGA) – Quantifies the GHG emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude.
- Climate Change Risk Assessment (CCRA) – Identifies the impact of a changing climate on a project and receiving environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience.

The assessment methodology has been derived with reference to the most appropriate guidance documents relating to climate which are set out in the following sections of this report. The EPA Guidelines (EPA, 2022) outlines the requirements for what an EIAR should contain based on Article 5(1) of the amended Directive (2014/52/EU).

"The information to be provided by the developer shall include at least:

a) a description of the project comprising information on the site, design, size and other relevant features of the project;

b) a description of the likely significant effects of the project on the environment;

c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;

e) a non-technical summary of the information referred to in points (a) to (d); and

f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."

An overview of the methodology undertaken for the climate impact assessment is outlined below, which is based on the EPA Guidelines (EPA, 2022):

- A detailed baseline review of GHG emissions has been undertaken in order to characterise the baseline environment. This has been undertaken through a review of available published GHG emission data;
- A review of the most applicable guidelines for the assessment of GHG emissions has been carried out in order to define the significance criteria for the Construction, Operational and Decommissioning Phases of the Proposed Development. These guidelines describe appropriate methods for quantifying the emissions of GHGs from the Proposed Development;
- Predictive calculations and impact assessments relating to the likely impact of the Proposed Development on climate (GHG emissions) have been undertaken;
- An assessment of the vulnerability of the Proposed Development to climate change has been undertaken; and
- A schedule of mitigation measures has been incorporated where required to reduce, where necessary, the identified potential climatic impacts associated with the Proposed Development.

9.2.1 Relevant Legislation & Guidance

All relevant plans and policies have been taken into account in this assessment including the following publications:

- Department of Environment, Climate and Communications (DECC) (2024) Future Framework for Offshore Renewable Energy Policy Statement
- Department of Environment, Climate and Communications (DECC) (2024) National Adaptation Framework 2024

- Department of Environment, Climate and Communications (DECC) (2024) Buying Greener: Green Public Procurement Strategy and Action Plan (2024–2027)
- Global Facility for Disaster Reduction and Recovery (GFDRR) (2025) ThinkHazard! Tool. Available online at: https://thinkhazard.org/en/
- Government of Ireland (2025) 2025 Climate Action Plan
- Institute of Air Quality Management (IAQM) (2024) Guidance on the assessment of dust from demolition and construction v2.2
- SEAI (2025) Interim National Energy Balance 2024
- Transport Infrastructure Ireland (TII) (2022a) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document

In addition, data of relevance to the climate impact assessment is outlined below:

- Environmental Protection Agency (EPA) (2025a) Ireland's Greenhouse Gas Emissions Projections – 2024 - 2055
- Environmental Protection Agency (EPA) (2025b) Ireland's Provisional Greenhouse Gas Emissions 1990-2024
- Met Éireann (2024a) Met Eireann website: https://www.met.ie/science/translate
- Met Éireann (2024b) Annual Statement for 2024

Following on from the European Climate Law (Regulation (EU) 2021/1119) (EU, 2021), and as part of the EU's "Fit for 55" legislative package where the EU has committed to a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 levels by 2020, the Regulation (EU) 2018/842 "Effort Sharing Regulation" (ESR) has been strengthened with increased ambition by the year 2030. Ireland is to increase the GHG emission reduction target from 30% to 42% relative to 2005 levels whilst the Emission Trading System (ETS) market will also have more stringent reductions from the currently proposed reduction of 43% by 2030 compared to 2005 to a 61% reduction by 2030 based on annual reductions of 4.2% compared to the previous annual reduction level of 2.2% per year (EU, 2021) with levels in 2024 reducing to 1,030 million tonnes CO_2eq.

9.2.2 National Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the 2015 Act). The purpose of the 2015 Act was to enable Ireland 'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050' (Section 3.(1) of No. 46 of 2015). This is referred to in the 2015 Act as the 'national transition objective'.

In June 2020, the Government published the Programme for Government – Our Shared Future (Government of Ireland, 2020). In relation to climate, there is a commitment to an average 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 (51% reduction over the decade) with an ultimate aim to achieve net zero emissions by 2050. Policy changes include the acceleration of the electrification of the transport system, including electric bikes, electric vehicles and electric public transport, alongside a ban on new registrations of petrol and diesel cars from 2030. In addition, there is a policy to ensure an unprecedented modal shift in all areas by a reorientation of investment to walking, cycling and public transport.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) was published in July 2021. The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'*. The 2021 Climate Act will also '*provide for carbon budgets and a sectoral emissions ceiling to apply to different sectors of the economy'*. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as first published in 2019, and a series of National Long Term Climate Action Strategies. In

addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority. The 2021 Climate Act has set a target of a 51% reduction in the total amount of greenhouse gases over the course of the first two carbon periods ending 31 December 2030 relative to 2018 annual emissions. The 2021 Climate Act defines the carbon budget as 'the total amount of greenhouse gas emissions that are permitted during the budget period'

Section 15 of the Climate Action & Low Carbon Development Act (Amended) 2021 states that:

(1) "A relevant body shall, in so far as practicable, perform its functions in a manner consistent with:
(a) the most recent approved climate action plan,
(b) the most recent approved national long-term climate action strategy,
(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,
(d) the furtherance of the national climate objective, and
(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

The Proposed Development is aligned with the above-mentioned plans, strategies and objectives as outlined in this chapter.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) outlines a series of specific actions including:

- To make a strategy to be known as the 'National Long Term Climate Strategy' not less than once in every five-year period with the first to be published for the period 2021 to 2035 and with each subsequent Strategy covering the next three five-year carbon budgets and also include a longer term perspective of at least 30 years;
- To adopt a system of carbon budgets which will be determined as part of a grouping of three five-year periods calculated on an economy-wide basis, starting with the periods 2021 to 2025, 2026 to 2030, and 2031 to 2035;
- To introduce a requirement for Government to adopt "sectoral emission ceilings" for each relevant sector within the limits of each carbon budget;
- To request all local authorities to prepare climate action plans for the purpose of contributing to the national climate objective. These plans should contain mitigation and adaptation measures that the local authority intends to adopt;
- Increasing the power of the Advisory Council to recommend the appropriate climate budget and policies;
- Requiring the Minister to set out a roadmap of actions to include sector specific actions that are required to comply with the carbon budget and sectoral emissions ceiling for the period to which the plan relates; and
- Reporting progress with the CAP on an annual basis with progress including policies, mitigation measures and adaptation measures that have been adopted.

In terms of wider energy policy, as outlined in the EPA publication "*Ireland's Greenhouse Gas Projections 2024-2055*" (EPA, 2025a) under the *With Existing Measures* (WEM) scenario, emissions from the waste sector are projected to decrease by 25% to 0.7 Mt CO_2eq over the period 2018 to 2030. Emissions are primarily attributable to methane emissions from landfill which reduce over the projected period in line with the projected reduction in waste going to landfill and the age of the waste already placed in them.

The 2025 Climate Action Plan (CAP25) (DECC, 2025) provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting Ireland on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021.

The plan outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry, Waste and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. CAP25 also detailed the required governance arrangements for implementation including carbon-proofing of policies and establishment of sectoral emission ceilings and carbon budgets. In relation to waste-to-energy facilities, CAP25 states that:

"Waste emissions in Ireland fell 9.4% in 2023 from 2018 figures and are projected to fall 27% by 2030. The key policy tools which have been successful in Ireland are:

- *Levies on* landfill*, certain forms of recovery and diversion regulations, including narrowing the scope for derogations.*
- Widespread *segregation of waste, capturing recyclables and biodegradable waste;*
- *Industry-*supported *recycling operations.*
- *Regional waste planning."* (P. 133, CAP25)

In relation to the Landfill Directive (1999/31/EC), CAP25 confirmed Ireland met the 2010, 2013 and 2020 targets due to increases in the levy for disposal of waste to landfill and requirements to divert biodegradable municipal waste (BMW) from disposal to landfill under the Landfill Directive targets.

As outlined in CAP24[1], methane contributes 84 to 86 times more to global warming per unit of mass than carbon dioxide during the first twenty years, and thus at COP26 in 2021, 121 countries (including Ireland and the wider EU) signed up to '*The Global Methane Pledge*' which:

"pledges to collectively reduce methane emissions by 30% between 2020 and 2030. This 30% methane reduction target is a collective one which will be accomplished by reducing methane emissions across various sectors, including the production of energy, agriculture, and waste management. Ireland will reduce the fugitive methane emissions which arise from the production and transportation of fossil fuels, especially natural gas, by increasing renewable energy and decreasing the demand for fossil fuels. Waste can also contribute to methane emissions. We will reduce methane from waste by sending less waste to landfill by 2030, by reducing waste overall, by adopting a circular economy which ensures products are renewable and reusable, and by ensuring that waste is a last resort…" (P. 383, CAP24)

CAP25 also outlined a number of waste-related measures included the Waste Action Plan for a Circular Economy (2020) which were given regulatory effect in 2024 including:

- The European Union (Household Food Waste and Bio-Waste) (Amendment) Regulations (SI No. 679/2023 were introduced in December 2023, requiring waste collection service providers to provide a bio-waste collection service (food and garden waste) to all households in the state with a waste collection service from 1st January 2024.
- Requirement for all plastic beverage containers up to three litres to have cap tethered to the container became mandatory for all products placed on the market from 3rd July 2024.
- Extended producer responsibility schemes are now in place for wet wipes, balloons and fishing gear since 31st December 2024.

As part of the preparation of a 'local authority climate action plan', each local authority shall consult and co-operate with an adjoining local authority in making a local authority climate action plan and co-ordinate the mitigation measures and adaptation measures to be adopted, where appropriate. Each local authority is also required to consider any significant effects the implementation of the local authority climate action plan may have on the adjoining local authority.

[1] "*Climate Action Plan 2025 builds upon last year's Plan by refining and updating the measures and actions required to deliver the carbon budgets and sectoral emissions ceilings and it should be read in conjunction with Climate Action Plan 2024*". Climate Action Plan 2025

Individual county councils in Ireland have published their own Climate Action Plans including climate change strategies in the area of GHG reductions, energy efficiencies and pathways to achieve net zero by 2050 which outline the specific climate objectives for that local authority and associated actions to achieve the objectives. The Meath CC Climate Action Plan 2024-2029 (MCC, 2024) (the MCC Plan) outlines a number of goals and plans to prepare for and adapt to climate change within Meath. The MCC Plan has outlined a target of a 51% reduction in carbon emissions and an energy efficiency improvement of 50% in MCC operations by 2030, creating a pathway to net zero by 2050. Of relevance to the Proposed Development is that waste GHG emissions currently accounts for 9% of Meath's GHG emissions with a targeted 50% reduction in waste GHG emissions by 2030.

The carbon budget programme was published in November 2021 and comprises three successive 5-year carbon budgets. In relation to carbon budgets, the Climate Action and Low Carbon Development (Amendment) Act 2021 states 'A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'. The carbon budget is to be produced for 3 sequential budget periods with the third carbon budget in draft format. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. The total emissions allowed under each budget is set out below in Table 9.1, as well as the average annual reduction for each 5-year period.

Table 9.1 Ireland's 5-Year Carbon Budgets

Period	Mt CO_2eq	Emission Reduction Target
2021-2025	295 Mt CO_2eq	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2eq	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2eq	Reduction in emissions of 3.5% per annum for the third provisional budget.

The 2025 Climate Action Plan (CAP25) (DECC, 2025) provides that the economy-wide carbon budgets will be supplemented by sectoral emissions ceilings, setting the maximum amount of GHG emissions that are permitted in a given sector of the economy during each five-year carbon budget. The Sectoral Emission Ceilings for each Sector are shown in Table 9.2. It should be noted that 5.25 $MtCO_2eq$ of annual emissions reductions are currently unallocated on an economy-wide basis for the second carbon budget period (2026-2030). These will be allocated following a mid-term review and identification of additional abatement measures. Waste is included under the 'Other' sector which emitted approximately 2 $MtCO_2eq$ in 2018 and has a ceiling of 1 $MtCO_2eq$ in 2030 which is a 50% reduction over this period.

Table 9.2 Sectoral Emission Ceiling 2030

Sector	Baseline ($MtCO_2eq$)	Carbon Budgets ($MtCO_2eq$)		2030 Emissions ($MtCO_2eq$)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Industry	7	30	24	4	35

Sector	Baseline ($MtCO_2eq$)	Carbon Budgets ($MtCO_2eq$)		2030 Emissions ($MtCO_2eq$)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, a new approach aligned with the EU LULCCF Regulation has been adopted.			
Total	**68**				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	**-**	**295**	**200**	**-**	**51**

The 2025 CAP has outlined the path towards the 'Other' (including waste) sectoral emission ceiling target of 1 Mtonnes of CO_2eq by 2030. The core measures already implemented are:

- Levies on landfill, certain forms of recovery and diversion regulations, including narrowing the scope for derogations.
- Widespread segregation of waste, capturing recyclables and biodegradable waste;
- Industry-supported recycling operations.
- Regional waste planning.
- New regulations for the provision of an organic waste bin for food waste and light garden waste to all households were implemented, to support reaching the targets for recycling Municipal Solid Waste (MSW) of 55% by 2025, 60% by 2030, and 65% by 2035
- Completion of negotiations on the Packaging and Packaging Waste Regulation, implementation of which will be key to driving circularity within the packaging sector
- A Council General approach was agreed in June 2024 for the European Commission proposal for targeted amendments to the Waste Framework Directive with respect to food waste and textiles (2023).

The Long-term Climate Action Strategy 2024 (DECC, 2024), published in August 2024, outlines a range of policies and strategies to address GHG emissions. In relation to waste, Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction 2024 report states:

"In 2018, waste accounted for 1.5% of Ireland's total greenhouse gas emissions –approximately 0.91 MtCO2eq. This figure accounts for emissions from waste treatment that are reported under the waste sector (predominantly methane emissions as a result of disposal to landfill). The gains in reducing material use, and substituting virgin material with recycled material, will be credited back up the supply chain. Minimising waste generation, and improving segregation, reuse and recycling, will lead to less emissions associated with waste transport and treatment." (P.72 (DECC, 2024a))

In terms of the unallocated savings gaps first identified in CAP21, CAP25 has set out an approach to deal with these unallocated savings no later than 2025. The approach is focused on exploring emerging technologies where there is evidence of technical/commercial readiness and the deployment of carbon removal technologies.

CAP25 also reinforces targets first outlined in CAP24 to reduce the embodied carbon of construction materials, with a 10% reduction by 2025 and 30% reduction by 2030 for materials produced and used in Ireland. Cement and high embodied carbon construction materials can be reduced through product substitution, reduced clinker content in cement and uptake of low-carbon construction methods, including those outlined in the Construction Industry Federation 2021 report "*Modern Methods of Construction*"

(Construction Industry Federation, 2021). There also remains scope for the construction industry to use more timber in construction. In 2022, 24% of new construction in Ireland was built using timber frames to satisfy the demand for housing. Public bodies are now required under the Public Sector Mandate to use best practice project design to reduce embodied carbon; procure concretes with clinker replacements (lower carbon); and require that large construction projects produce a whole life cycle GHG emissions assessment. Further guidance on how the built environment can contribute to a circular, low-carbon economy is detailed in the recently published *A Roadmap for a Resource Efficient Circular Built Environment* (IGBC, 2025).

Furthermore, CAP25 advances sector-specific measures in green procurement, electrification of transport and heat, and just transition (with the introduction of a Just Transition Commission) to support vulnerable communities and ensure equitable decarbonisation. While transport emissions increased by 0.3%, electric vehicles and the expanded use of biofuels are highlighted as the most effective short- to medium-term strategies for emissions reductions in the sector.

In summary, the CAP25 envisages that in tandem with the *Long-term Strategy on Greenhouse Gas Emissions Reductions*, and on the basis that carbon budgets and sectoral emission ceilings will assist with delivering the required greenhouse gas emissions abatement, the 2030 and 2050 climate targets are achievable. The current project is in line with this strategy as the GHG emissions associated with electricity supplied to the project will reduce in line with national policy to obtain net zero by 2050.

9.2.3 Climate Criteria For The Rating Of Impacts

9.2.3.1.1 Significance Criteria for GHGA

The Transport Infrastructure Ireland (TII) guidance document entitled *"PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document"* (TII, 2022a) outlines a recommended approach for determining the significance of GHG emissions both for the construction and operational phases of a development. This guidance document is now widely used to assess the climatic impact of a wide range of projects including industrial facilities. The approach is based on comparing the 'Do Something' scenario and the net project GHG emissions (i.e. Do Something – Do Minimum) to the relevant carbon budgets (Department of the Taoiseach, 2022). With the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2 project GHG emissions from the Proposed Development . The "Other" sector, which includes waste, emitted approximately 2 $MtCO_2eq$ in 2018 and has a ceiling of 1 $MtCO_2eq$ in 2030 which is a 50% reduction over this period (see Table 9.2).

The assessment of significance of GHG effects set out in PE-ENV-01104 (TII, 2022a) is based on the Institute of Sustainability and Environmental Professionals (ISEP) (formerly known as the Institute of Environmental Management and Assessment (IEMA)) guidance (ISEP, 2022) *"Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition"* which is broadly consistent with the terminology contained within Figure 3.4 of the EPA's (2022) *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'.*

The ISEP guidance note on (ISEP, 2022) states that:

"*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050".*

Mitigation has taken a leading role within the Guidance compared to the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings. The assessment aims to quantify the difference in GHG emissions between the Proposed Development and the baseline scenario. The baseline scenario is based on the landfill catering for c. 440,000 tonnes per

year. The existing landfill is estimated to be filled to capacity by 2029. This assessment is done by calculating the difference in whole life net GHG emissions between the two options. The ISEP EIA guidance (ISEP, 2022) does not recommend a particular approach for this due to variations of situations but instead it sets out advice for the key common components necessary for undertaking a GHG emissions assessment. During the assessment ISEP recommend use of a reasonable worst-case scenario rather than an absolute worst-case scenario. The ISEP Guidance (ISEP, 2022) states that a GHG emissions assessment should incorporate the following steps into any climate assessment:

1. Set the scope and boundaries of the GHG assessment;
2. Develop the baseline;
3. Decide upon the emissions calculation methodologies;
4. Data collection;
5. Calculate/determine the GHG emissions inventory; and
6. Consider mitigation opportunities and repeat steps 4 & 5.

Activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions, and where all such exclusions are clearly stated and total a maximum of 5% of total emissions.

When considering the cumulative assessment under the ISEP guidance, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed (ISEP, 2022). This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other. The following section details the specific appraisal methods utilised in order to complete the assessment in accordance with the ISEP Guidance (ISEP, 2022).

9.2.4 Greenhouse Gas Assessment (GHGA)

When assessing significance of GHG effects, the *2010 ISEP Principles Series on Climate Change Mitigation & EIA* (ISEP, 2010) defines three overarching principles:

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect;
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g. human health, biodiversity, water, land use, air quality); and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit; as such any GHG emissions or reductions from a project might be considered to be significant. The environmental limit is the national global GHG emission budget that defines a level of dangerous climate change, and any GHG emission that contributes to exceedance of that budget or threatens efforts to stay within it can be considered as significant.

The 2022 Guidance (ISEP, 2022) document builds on those principles with three points:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

The criteria for determining the significance of GHG effects is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. In relation to climate, the earth as a whole is a highly sensitive environment whilst the magnitude of impact is outlined below with the project

being assessed against the recommended ISEP (ISEP, 2022) significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

9.2.4.1.1 Major or Moderate Adverse Impact

- Major or moderate adverse impact (significant): A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the net zero[2] trajectory by 2050 or sectoral based transition to net zero targets, results in a significant adverse effect. It is down to the consultant completing the assessment to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects. A project's impact can shift from significant adverse to nonsignificant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero. Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect. This is particularly true where policy lags behind the necessary levels of GHG emission reductions for a science based 1.5°C compatible trajectory towards net zero.

9.2.4.1.2 Minor Adverse Impact

- Minor adverse impact (not significant): A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral[3] (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.

9.2.4.1.3 Negligible Impact

- Negligible Impact (not significant): A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.

9.2.4.1.4 Beneficial Impact

- Beneficial Impact (significant): A project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is significant. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.

TII (TII, 2022a) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. In line with ISEP Guidance (ISEP, 2022), TII state that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

[2] Net Zero: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period." Net zero is achieved where emissions are first reduced in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.
[3] Carbon Neutral: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required."

Significance is determined using the criteria outlined in Table 9.3 (derived from Table 6.7 of PE-ENV-01104 (TII 2022a)) along with consideration of the following two factors:

- the extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050;
- and the level of mitigation taking place.

Table 9.3 GHGA Significance Criteria

Effects	Significance level Description	Description
Significant adverse	Major adverse	► The project's GHG impacts are not mitigated. ► The project has not complied with do-minimum standards set through regulation, nor provided reductions required by local or national policies; and ► No meaningful absolute contribution to Ireland's trajectory towards net zero[4].
	Moderate adverse	► The project's GHG impacts are partially mitigated. ► The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and ► Falls short of full contribution to Ireland's trajectory towards net zero.
Not significant	Minor adverse	► The project's GHG impacts are mitigated through 'good practice' measures. ► The project has complied with existing and emerging policy requirements; and ► Fully in line to achieve Ireland's trajectory towards net zero.
	Negligible	► The project's GHG impacts are mitigated beyond design standards. ► The project has gone well beyond existing and emerging policy requirements; and ► Well 'ahead of the curve' for Ireland's trajectory towards net zero.
Beneficial	Beneficial	► The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration. ► The project has gone well beyond existing and emerging policy requirements; and ► Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

The assessment set out in PE-ENV-01104 (TII 2022a) aims to quantify the difference in GHG emissions between the Proposed Development and the baseline scenario. The assessment process is guided by the following documents:

- Publicly Available Specification (PAS) 2080:2016 on Carbon Management in Infrastructure (BSI 2016): this provides a framework that allows all parties involved in the development of an infrastructure project to work together to quantify the project's overall carbon impact.

[4] Net Zero: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period." Net zero is achieved where emissions are first educed in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

- The Institute of Environmental Management and Assessment Assessing Greenhouse Gas Emissions and Evaluating their significance (2nd Edition) (ISEP 2022): lays out the process of assessing GHG emissions to understand their significance in the context of an EIA.

The ISEP EIA guidance (ISEP 2022) recommend use of a reasonable worst-case scenario rather than an absolute worst-case scenario. The TII GHGA (TII 2022c) should incorporate the following steps into any climate assessment, these steps have been utilised when developing the methodology for this assessment:

- Evaluate early opportunities to reduce GHG emissions;
- Set the scope and boundaries of the GHG assessment;
- Data collection;
- Develop the baseline and Do-Minimum Scenario;
- Calculate/determine the GHG emissions from the Proposed Development;
- Identify mitigation measures;
- Access Significance; and
- Access cumulative impacts.

TII Guidance PE-ENV-01104 (TII 2022a) states that: "*activities that account for less than 5% of the total energy usage and/or 5% of the mass balance can be excluded from the assessment scope. e.g., if electricity for operating signage is less than 5% of total electricity used of the project infrastructure, it can be excluded from the assessment scope.*"

With respect to the requirement for a cumulative assessment PE-ENV-01104 (TII 2022a) states that:

"*for GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable.*"

However, by presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its national carbon reduction target. Therefore, the assessment approach is considered to be inherently cumulative.

PE-ENV-01104 (TII 2022a) outlines the recommended sources of input data and the appraisal methodology for the assessment of impacts for both the Construction Phase and Operational Phase as outlined in Table 9.4 (reproduced from Table 6.2 of PE-ENV-01104). A detailed discussion of the input data and appraisal methodology for both the Construction and Operational Phases is detailed in Section 9.5. The assessment is broken down into stages (construction and operational) and individual assessment techniques for each of these stages are conducted in the same manner as for an infrastructure project, rail project, housing project or commercial development.

The GHG systems boundary for assessment and life cycle stages scoped in include: preconstruction, products utilised in construction, the construction activities, maintenance of materials during the lifespan of the Proposed Development and the use or operational phase.

To define the boundary of the assessment consideration should be given to the system boundary and to the temporal boundary. The system boundary includes the emission sources of the project and the lifecycle stage in which they arise, Table 9.4 shows an overview of such sources. The temporal boundary is the time period which the assessment covers, in this case a design life of 17 years is considered. The Proposed Development is based on 10 no. landfill cells which will be excavated on a phased basis over a 17 year period.

9.2.4.2 Construction Phase - Embodied Construction Emissions

GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII 2022c) provides guidance on the use of the TII Carbon Tool for assessing lifecycle carbon emissions for National Road and light rail infrastructure projects in Ireland. The Tool aligns with Section 7 of PAS 2080, which was published by the British Standards Institution (BSI), the Construction Leadership Council and the Green Construction Board in 2016.

The embodied construction emissions for the Proposed Development were calculated using the online TII Carbon Assessment Tool (TII 2022c). The TII Online Carbon Tool (TII 2022c) uses emission factors from recognized sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013), UK National Highways Carbon Tool v2.4 and UK Government 2021 Greenhouse Gas Reporting Conversion Factors. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction / maintenance phase. The TII Online Carbon Tool (TII 2022c) has been commissioned by TII to assess GHG emissions associated with infrastructure projects using Ireland-specific emission factors and data. The goal of the tool is to assist project development as a decision-making tool that drives lower carbon infrastructure and to facilitate the integration of environmental issues into infrastructure planning, construction and operation. While this project is not a TII related project, the emissions factors remain the same for the materials.

The Construction Phase of the Proposed Development will result in GHG emissions from various sources, as outlined in Table 9.4. Embodied carbon refers to GHGs emitted during the manufacture, transport and use of building materials, together with end-of-life emissions. As part of the Proposed Development, Construction Phase embodied GHG emissions are categorised under the following headings:

- Land clearance activities;
- Manufacture of materials and transport to site;
- Construction works (including excavations, construction, water usage, electrical power/fuel usage, personnel travel and project size); and
- Construction waste products (including transport off-site).

Detailed project information including volumes of materials required for construction and generated during the construction phase were obtained from Beauparc. The landfilling element of the Proposed Development is expected to have an operational lifespan of 17 years. The predicted embodied emissions can be averaged over the full construction phase and the lifespan of the Proposed Development to give the predicted annual emissions to allow for direct comparison with annual emissions and targets. Emissions have been compared to the Other (including waste) sectoral budget (Department of the Taoiseach 2022) which has a ceiling of 1,000 $ktCO_2eq$ in 2030 and compared against the Ireland's non-ETS 2030 target of 27.7 Mt CO_{2eq} (as set out in Regulation (EU) 2023/857 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999).

The assessment commences with the preliminary design of the Proposed Development, through the pre-construction or site clearance period, followed by the assessment of the embodied carbon associated with all materials used in the construction of the Proposed Development, the emissions during the construction phase and additionally emissions related to waste generated during the Construction Phase. The TII Carbon Tool also assesses on-going maintenance associated with the default 60-year lifetime of the Proposed Development however the landfilling element of the Proposed Development will have a project lifespan of 17 years.

An emission factor is a coefficient which allows one to convert activity data into GHG emissions. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be

used over the entire construction / maintenance phase. The tool aligns with the specification (PAS) 2080: 2016 Carbon Management in Infrastructure.

Standard maintenance, as indicated through the TII Online Carbon Tool (TII 2022c), required over the Operational Phase has also been considered as part of the embodied construction emissions including consideration of the maintenance cycles for embodied carbon for road pavements. Given the extent of the Operational Phase, PE-ENV-01104 (TII 2022a) states that decommissioning can be scoped from the boundary of the climate assessment.

Table 9.4 Sources and Life Cycle Stages for a Project's GHG Emissions (reproduced from Table 6.2 PE-ENV-01104 (TII 2022a))

Lifecyle stage	Reporting Category	Description	Primary emissions sources
Before use	Embodied carbon	Raw material extraction, transportation (within the supply chain up to the point of final factory gate) and manufacturing of products required for the proposed project.	• Embodied carbon (GHG emissions) within the construction materials. Fuel consumed for material and plant transportation to construction site. •Clearance / demolition activities (including the area of land to be cleared, vegetation/sequestration loss and water use). •All advanced works for example archaeological works, fencing etc., should be included. •All ground works including earthworks material, laying and compaction etc.
	Transport	Transportation of products/materials and construction equipment from point of production/storage to construction site. • Transport to works site.	•GHG emissions from the excavation of material.
	Construction processes	Temporary works, ground works, and landscaping. •Excavation •On site energy use •On site water use.	•Grid electricity to power auxiliary facilities. Fuel consumed by construction vehicles and plant. •GHG emissions from the provision of water and treatment of wastewater.
	Material use	• Waste production, transportation, and waste management. • Carbon emitted or sequestered directly from the fabric of products and materials once they have been installed as part of infrastructure and it is in normal use.	•GHG emissions from the treatment of waste. • GHG emissions savings arising from planting of different vegetation types and/or rehabilitation activities e.g. peat restoration. For maturing vegetation such as trees, sequestration should be accounted for as the vegetation matures (e.g., <30 years) and once matured (e.g., >30 years).
Use	Maintenance	Maintenance and repair activities.	GHG emissions from energy and fuel use, maintenance vehicles, provision of water and treatment of wastewater during maintenance. • Embodied emissions associated with maintenance and repair e.g. rail/steel replacement and resurfacing materials.
	Operation	•Operational energy (B6)	GHG emissions resulting from the consumption of energy and fuel use for infrastructure operation e.g. lighting, signage.

Lifecyle stage	Reporting Category	Description	Primary emissions sources
		●Operational water (B7) ●Other operational processes (B8)	●GHG emissions resulting from the consumption of water. ●Other could include GHG emissions as a result of management of operational waste.
	User emissions	User's utilisation of infrastructure.	●GHG emissions from vehicles and fuel use for generators on site. ●GHG emissions from the fuel consumed for worker(s) commuting to and from the site. ●Activities associated with treatment and processing for recovery, reuse and recycling of waste materials arising from infrastructure.
End of Life	Deconstruction	Onsite activities involved in deconstructing, dismantling, and demolishing the infrastructure.	GHG emissions resulting from final disposal of demolition materials.
	Transport (C2)	Transport to and from disposal.	
	Waste processing for recovery and disposal (C4)	Reuse, recycling, and recovery of materials Disposal of materials.	
Supplementary information beyond the infrastructure lifecycle	Lifecycle benefits and loads beyond the system boundary	GHG emissions potential of reuse and recycling, Benefits and loads of additional infrastructure functions.	Offsetting carbon emissions of a scheme through credible offsite renewable, planting, rehabilitation, and regenerative schemes.

The details and results of the assessment are provided in Section 9.7.1 for the Construction Phase and Section 9.7.4 for the Operational Phase.

9.2.4.3 Construction Phase - Land Use Change

The land use change associated with the Construction Phase of the Proposed Development has also been quantified using the approach outlined in Table 9.4. Trees and peat are a natural carbon sink and absorb carbon dioxide (CO_2) from the atmosphere helping in the reduction of climate change; any felling of trees has the potential to result in a loss of this carbon sink thus increasing the levels of CO_2 in the atmosphere. In contrast, increased planting of trees on suitable lands or rewetting of peat, will over time, help to increase the carbon sink potential of the land and benefit climate. The change in land use associated with the Proposed Development has been calculated using the TII Carbon tool and based on methodology outlined in the Intergovernmental Panel on Climate Change (IPCC) 'Guidelines on National GHG Inventories – Chapter 4: Forest Land' (IPCC 2006). Consideration is also given to the 2010 European Commissions Guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive EU 2009/28/EC (European Union 2010). Operational land use change is also appropriately assessed.

9.2.4.4 Construction & Operational Phase - Traffic Related Emissions

The impact of the traffic related to the construction and operational phases of the development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the Proposed Development. The traffic associated with the construction phase of the Proposed Development was investigated using the methodology outlined in the TII publication *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022b).

Emissions related to the transportation of products/materials and construction equipment from point of production/storage to construction site are included within the online carbon tool as per PE-ENV-01104 (TII 2022a).

PE-ENV-01104 (TII 2022a) states that operational phase road traffic related emissions information should be obtained from an Air Quality Practitioner to show future user emissions during operation without the project in place.

TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022b), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the climate assessment:

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5 m or greater.

While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic. The maximum daily quantity of road traffic during the construction phase of the Proposed Development is below the assessment threshold and thus was screened out of further assessment.

The operational phase impacts due to traffic emissions have been scoped out of the assessment on the basis of no roads being classed as affected as per the TII PE-ENV-01106 screening criteria.

9.2.4.5 Operational Phase Waste Emissions

The Proposed Development comprises the phased extension of the existing landfill footprint through the construction of ten (10 no.) additional engineered landfill cells, including the 'Piggyback Cell'. A piggyback landfill cell is a waste cell built on top of a landfill to expand capacity vertically, reusing existing infrastructure and minimising land use. This extension will increase the landfill area by approximately 17.68 ha and provide approximately 4.12 million m^3 (3.32 million m^3 of additional constructed void space with further void space of 807,000 m^3 for the 'Piggyback Cell') for the continued disposal of non-hazardous waste and limited quantities of hazardous waste, thereby extending the operational lifespan of the facility. The total footprint of the Proposed Development landfill will be 109 ha.

There will be no increase in the permitted annual acceptance of up to 435,000 tonnes per annum of non-hazardous wastes which comprises up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables. In addition, there is a permitted acceptance of up to 5,000 tonnes per annum of stable non-reactive hazardous waste under EPA Licence W0146-04.

Overall, the waste acceptance profile under the Proposed Development reflects a continuation of current practices and does not introduce any new waste streams or significant changes to the facility's operational scope. The Proposed Development is intended to ensure ongoing national and regional capacity for the environmentally sound disposal of residual waste.

The waste types currently accepted are:

- Non-hazardous residual municipal solid wastes of household, commercial and industrial origin, which will have undergone various degree of pre-treatment from separate 'black bin' collection to biological treatment in the form of stabilised residual fines, as well as residual municipal solid waste (MSW) from other sources such as unauthorised landfill remediation and/or repatriated wastes;
- Non-hazardous incinerator bottom ash (which is currently accepted at the facility).
- Non-recyclable bulky wastes, where bulky wastes are broadly considered as larger wastes which do not fit in household/commercial bins e.g. mattresses, furniture etc.
- Non–hazardous soils and stones and other C&D wastes.

- Street sweepings and similar cleansing wastes.
- 'Individual' volumes of non-hazardous industrial wastes from various industries such as food preparation, chemical processes, thermal processes, metal treatments, health care (non-hazardous) and water/wastewater treatment industries, all of which are currently accepted at the facility.
- Stable non-reactive hazardous waste
- Baled recyclable waste (contingency storage)
- Baled MSW (contingency storage)

Landfill Gas utilisation is active at the site, there are currently 4 Landfill Gas engines, generating approximately 13,000 MWh (annual) of electricity for export to the national grid. Back-up flaring is carried out as necessary in response to outages of the engines, or in support of the engines should gas exceed the capacity of the engines, to reduce the potential for the nuisance effect of the landfill gas.

It is likely that the gas utilisation operation will continue for some years after landfilling ceases. The management and maintenance of the landfill gas utilisation plant will be on the basis of a specialist contract with an approved service provider, with additional engines or flaring capacity being provided as necessary in response to any increased gas generation.

Gas utilisation would continue until the quantity of combustible gas decreases, with engines and flares being decommissioned and removed from site as they are no longer required. When gas levels have declined to the extent that landfill gas utilisation is no longer appropriate, gas would be flared until such time that the gas no longer poses a risk to the environment.

The breakdown of organic material that occurs in landfills releases a combination of methane and carbon dioxide, a process that occurs on a timescale of 100 or more years. CH_4 emissions can be 'flared' to convert the CH_4 to CO_2 before being released into the atmosphere, this is done as CO_2 has a lower global warming potential than methane. The IPCC AR5 Synthesis Report: Climate Change 2014 of the Fifth Assessment Report (AR5) (IPCC 2015) sets out the global warming potential for a 100-year time period (GWP100) for CO_2 as the basic unit (GWP = 1) whereas CH_4 has a global warming potential equivalent to 28 units of CO_2 and N_2O has a GWP100 of 265. This approach is also maintained in the IPCC AR6 Technical Summary (IPCC 2023). Up to 50% of the organic biogenic carbon in the waste is sequestered (Eunomia 2020). Hence, landfills act as an 'carbon capture and storage' facility as some CH_4 remains sequestered within it.

Detailed guidelines have been published for the calculation of GHG emissions (IPCC 2019; USEPA 2002) from solid waste disposal sites (SWDSs) including municipal waste landfills. The main GHG emission from SWDSs is methane (CH_4). Even though the source of carbon is primarily biogenic, CH_4 would not be emitted were it not for the human activity of landfilling waste, which creates anaerobic conditions conducive to CH_4 formation. Although CO_2 is also produced in substantial amounts from landfills, the primary source of CO_2 is from the decomposition of organic material derived from biomass sources (crops, forests) and which are re-grown on an annual basis. Hence, these CO_2 emissions are not treated as net emissions from waste in the IPCC Methodology (IPCC 2019). The IPCC Waste Model (IPCC 2023) has been utilised to calculated emissions due to MSW from the landfill.

Incinerator bottom ash (IBA) is not considered to be a significant source of emissions as the material is considered to be inert (Eunomia 2010).

The renewable energy when exported to the National Grid will be used to displace energy currently generated via fossil fuels. In 2023, the primary energy mix within the national generation system was gas (44.3%), renewables (40.7%), imports (9.5%), coal (3.5%), biomass and waste (2%), peat (0.4%) and fuel oil (0.7%) (SEAI, 2025). The energy mix represents the relative contribution of different types of fuels or means of electricity generation supplying the national electricity distribution system.

Ireland has made good progress towards meeting renewable electricity targets. In 2023 the use of renewables in electricity generation avoided 7.15 $MtCO_2eq$. The profile of fuel type by 2030 will be significantly different from the current one due to greater penetration of renewable fuels. In order to

calculate the emissions displacement, an average grid intensity of 0.135 tonnes CO_2 / MWh has been used for 2030 with a 2024 value of 0.226 tonnes CO_2 / MWh (SEAI, 2025) used for the permitted development.

9.2.5 Climate Change Risk Assessment (CCRA)

The operational phase assessment involves determining the vulnerability of the Proposed Development to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability. PE-ENV-01104 (TII, 2022a) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents:

- EU (2021) Technical guidance on the climate proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021); and
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (ISEP, 2020).

The baseline environment information provided in Section 9.3, future climate change modelling and input from other experts working on the Proposed Development (i.e. hydrologists) should be used in order to assess the likelihood of a climate risk.

First an initial screening CCRA based on the operational phase is carried out, according to the TII guidance PE-ENV-01104. This is carried out by determining the sensitivity of proposed development assets (i.e. receptors) and their exposure to climate change hazards.

The project asset categories must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022a) provide the below list of asset categories and climate hazards to be considered. The asset categories will vary for project type and need to be determined on a project-by-project basis.

- **Asset categories** - Drainage; structures; utilities; landscaping; signs; light posts; buildings; and fences.
- **Climate hazards** - Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog.

The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.

- **High sensitivity:** The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium sensitivity:** It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2.
- **Low sensitivity:** It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

Once the sensitivities have been identified the exposure analysis is undertaken. The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type for example: flooding could be a risk if the project location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High exposure:** It is almost certain or likely this climate hazard will occur at the project location i.e. might arise once to several times per year. This is an exposure score of 3.
- **Medium exposure:** It is possible this climate hazard will occur at the project location i.e. might arise a number of times in a decade. This is an exposure score of 2.
- **Low exposure:** It is unlikely or rare this climate hazard will occur at the project location i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1.

Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability.

9.2.5.1 Significance Criteria for CCRA

The CCRA involves an initial screening assessment to determine the vulnerability of the Proposed Development to various climate hazards. The vulnerability is determined by combining the sensitivity and the exposure of the Proposed Development to various climate hazards.

Vulnerability = Sensitivity x Exposure

The vulnerability assessment takes any proposed mitigation into account. Table 9.5 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale.

TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. Where all vulnerabilities are ranked as low, it can be concluded that climate change vulnerability is not a risk for a project and therefore, the impact is not significant.

Where residual medium or high vulnerabilities exist, the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks.

Table 9.5 Vulnerability Matrix

		Exposure		
		High (3)	**Medium (2)**	**Low (1)**
Sensitivity	**High (3)**	9 - High	6 – High	3 - Medium
	Medium (2)	6 - High	4 - Medium	2 - Low
	Low (1)	3 - Medium	2 – Low	1 - Low

9.2.6 Decommissioning and Remediation Phase Methodology

The impact of the decommissioning and remediation phase of the development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating decommissioning and remediation activities associated with the Proposed Development.

9.2.7 Forecasting Methods and Difficulties Encountered

There were no difficulties encountered when completing this assessment.

9.3 Receiving Environment

Climate is defined by the IPCC (IPCC, 2023) as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in the industrial age human activities, through the release of GHGs, have impacted on the climate (EPA, 2025b). The release of anthropogenic GHGs is altering the Earth's atmosphere resulting in a 'Greenhouse Effect'. This effect is causing an increase in the atmosphere's heat trapping abilities resulting in increased average global temperatures over the past number of decades. The release of CO_2 as a result of burning fossil fuels, has been one of the leading factors in the increase of the 'Greenhouse Effect'. The most significant GHGs are CO_2, methane (CH_4) and nitrous oxide (N_2O).

For the purposes of this assessment, the definition outlined in Council Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (hereafter referred to as the Renewable Energy Directive) for GHGs has been used. In Annex V, C. Methodology Point 5 of the Renewable Energy Directive the relevant GHGs are defined as CO_2, CH_4 and N_2O. CO_2 accounted for 61.1% of total GHG emissions in Ireland in 2023 while CH_4 and N_2O accounted for 28.9% and 8.8% respectively. The main source of CH_4 and N_2O is from the agricultural sector.

GHGs have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The IPCC AR6 Synthesis Report: Climate Change 2021 (IPCC, 2023) sets out the global warming potential for a 100-year time period (GWP100) for CO_2 as the basic unit (GWP = 1) whereas CH_4 has a global warming potential equivalent to 29.8 units of CO_2 (for fossil sources) and N_2O has a GWP100 of 273. These values have been refined since the AR5 report.

9.3.1 Greenhouse Gas Emissions

TII guidance PE-ENV-01104 (TII, 2022a) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the project for both the current and future baseline (i.e. Do Minimum scenarios).

Given the circumstances of Ireland's declaration of a climate and biodiversity emergency in May 2019 and the November 2019 European Parliament approval of a resolution declaring a climate and environment emergency in Europe, in conjunction with Ireland's current failure to meet its EU binding targets under the GHG Regulation, changes in GHG emissions either beneficially or adversely are of more significance than previously viewed prior to these declarations. Thus, the baseline climatic environment should be considered a highly sensitive environment for the assessment of impacts.

9.3.1.1 Existing GHG Emissions Baseline

Anthropogenic emissions of greenhouse gases (GHGs) in Ireland included in the European Union's Effort Sharing Regulation (ESR) (EU 2018/842) are outlined in the most recent review by the EPA which details emissions up to 2024 (EPA, 2025a). The greenhouse gas emission inventory for 2024 is the fourth of ten years over which compliance with targets set in the ESR will be assessed. This Regulation sets 2030 targets for emissions outside of the Emissions Trading System (known as ESR emissions) and annual binding national limits for the period 2021-2030. Ireland's target is to reduce ESR emissions by 42% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this. Ireland's 2024 GHG ESR emissions are 42.42 Mt CO_2eq, this is 3.74 Mt CO_2eq more than the annual limit for 2024 (EPA, 2025a). Agriculture continues to be the largest contributor to overall emissions at 38% of the total. Transport, energy industries and the residential sector are the next largest contributors, at 21.7%, 13.3% and 10.4%, respectively. Others (including waste) accounted for 1.63 Mt CO_2eq in 2024.

National total emissions (including LULUCF) for 2024 are 57.64 Mt CO_2eq (see Table 9.6), thus 2021 to 2024 have used 82.5% of the 295 Mt CO_2eq Carbon Budget for the five-year period 2021-2025. This leaves 17.5% of the budget available for 2025, requiring an 10.3% average annual emissions reduction in 2025 to stay within budget.

Table 9.6 Trends in National GHG Emissions in 2021 – 2024

Sector [Note 1]	2021 Emissions (Mt CO_2e)	2022 Emissions (Mt CO_2e)	2023 Emissions (Mt CO_2e)	2024 Emissions (Mt CO_2e)	Total Budget (Mt CO_2e) (2021-2025)	% Budget 2021-2025 used	Annual change 2023 to 2024
Electricity	9.89	9.69	7.57	6.95	40	85.25%	-8.19%
Transport	11.09	11.76	11.8	11.65	54	85.74%	-1.27%
Buildings (Residential)	6.87	5.75	5.35	5.61	29	81.31%	4.86%
Buildings (Commercial and Public)	1.44	1.45	1.39	1.49	7	82.43%	7.19%
Industry	7.09	6.62	6.31	6.01	30	86.77%	-4.75%
Agriculture	21.94	21.78	20.72	20.41	106	80.05%	-1.50%
Other [Note 2]	1.86	1.93	1.81	1.63	9	80.33%	-9.94%
LULUCF	4.63	3.98	3.89	3.89	–	–	0
Total including LULUCF	**64.82**	**62.99**	**58.83**	**57.64**	**295**	**82.81%**	**-2.04%**

Note 1 Reproduced from latest emissions data on the EPA website July 2025 (EPA, 2025c).

Note 2 Other includes Petroleum refining, F-Gases and Waste (emissions from solid waste disposal on land (landfilling), solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste).

9.3.1.2 Future GHG Baseline

The EPA 2024 GHG Emissions Projections Report for 2024 – 2055 (EPA, 2025a) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the latest Government plans (such as CAP24/CAP25) which have a realistic pathway in place for implementation. Implementation of these is classed as a "*With Additional Measures"* scenario for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. However, over the period 2018 to 2030 Ireland is projected to reduce emissions by 22% (and 26% using available flexible mechanisms[5]) which is less than the 42% reduction target under the EU's Effort Sharing Regulations (Regulation (EU) 2018/842) 2030 targets for the "*With Additional Measures*" scenario.

[5] Ireland is projected to exceed its National and EU climate targets | Environmental Protection Agency

"These flexibilities are the use of EU Emissions Trading System allowances and credit from action undertaken in the Land use, Land use Change and Forestry (LULUCF) sector. Flexibilities under the Effort Sharing Regulation include the allowance by eligible Member States to achieve their national targets by covering some emissions with EU ETS allowances which would normally have been auctioned. EU-wide, this cannot be more than a combined total of 100 million tonnes CO_2 over the period 2021-2030. The ETS flexibility allows Ireland to transfer emissions of up to 4 per cent of 2005 levels per annum, or 19.1 Mt CO_2eq from the non-ETS to ETS sector, reducing the mitigation requirement in the non-ETS sector while cancelling the corresponding ETS allowances. Also, to stimulate additional action in the land use, land-use change and forestry (LULUCF) sector, Member States can use up to a combined (EU-wide) total of 262 million credits over the entire period 2021-2030 to comply with their national targets. The LULUCF flexibility allows for Ireland to account for greenhouse gas removals of up to 26.8 Mt CO_2eq over two compliance periods 2021-2025 and 2026-2030."

The future baseline with respect to the GHGA can be considered in relation to the future climate targets which the assessment results will be compared against. In line with TII (TII, 2022a) and ISEP Guidance (ISEP, 2022) the future baseline is a trajectory towards net zero by 2050, "*whether it* [the project] *contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

The recently published EPA report "Ireland's Greenhouse Gas Emissions Projections - 2024-2055" (EPA, 2025a) states that, based on the WEM scenario, that there will be a 25% reduction in waste associated GHG emissions between 2018 and 2030 (EPA, 2025a). The EPA Report (EPA, 2025a) also confirms that the Others (including waste) and electricity sectors are likely to achieve the first sectoral emission ceiling target:

"The sectoral ceilings projected to be achieved in the first budget period (2021-25) are in the Electricity, Buildings and 'Other' sectors" (EPA, 2025a (Section 3.2.2))

9.3.2 Vulnerability of the Project to Climate Change

The Proposed Development study area for assessing a project's vulnerability to climate change is based on the construction footprint / project boundary as this is where the facility will be located. Impacts as a result of climate change involve increases in global temperatures and increases in the number of rainfall days per year. Ireland has seen increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east (EPA, 2015). The EPA have compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the Proposed Development:

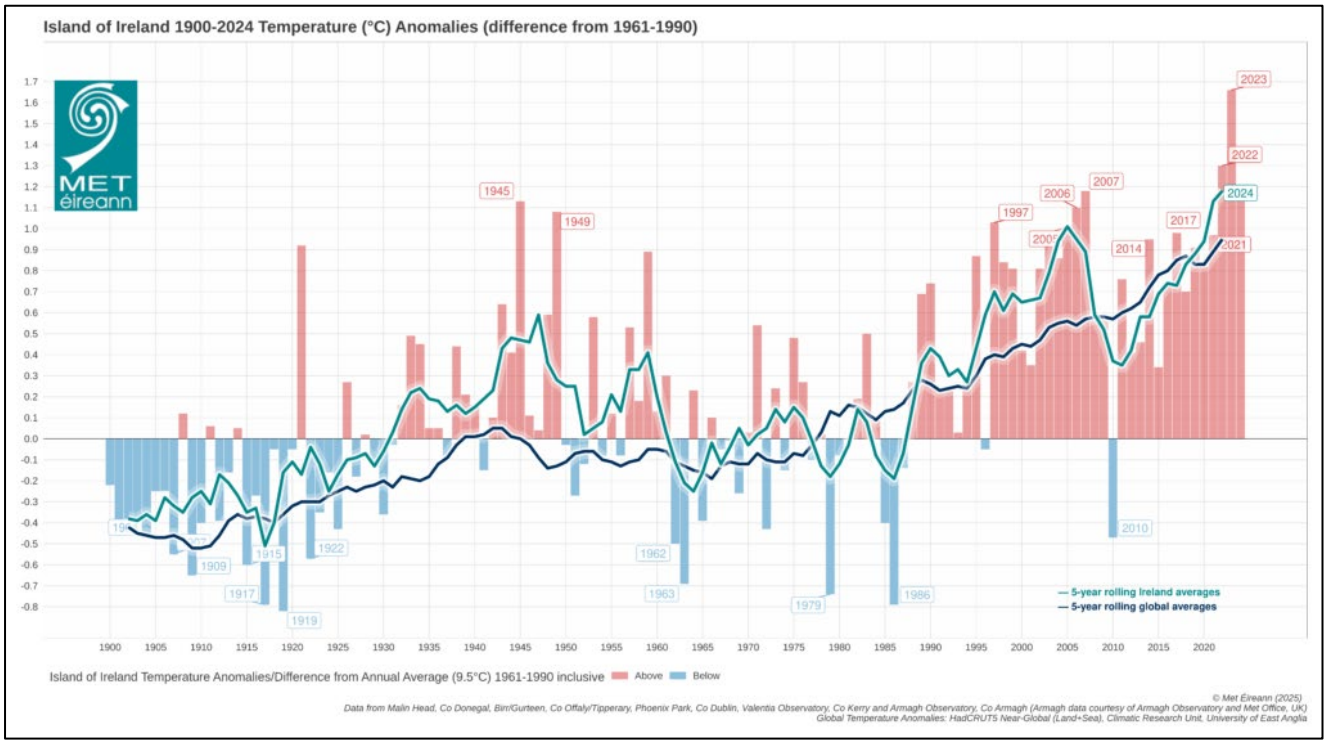
- More intense storms and rainfall events;
- Increased likelihood and magnitude of river flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality; and
- Changes in distribution of plant and animal species.

The region of the Proposed Development has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Dublin Airport is the nearest weather and climate monitoring station to the Proposed Development that has meteorological data recorded for the 30-year period from 1991 to 2020 (this is the most recent data available). Dublin Airport meteorological station is located approximately 28 km south-east of the Proposed Development at the closest point. Meteorological data recorded at Dublin Airport over the 30-year period from 1991 to 2020 (see Table 9.7) indicates that the wettest months were October and November, and the driest month on average was February. July was the warmest month with a mean temperature of 15.4°C.

The recent weather patterns and extreme weather events recorded by Met Éireann have been analysed to determine the potential for extreme weather impacting on the facility (Met Éireann, 2025b). A noticeable feature of the recent weather has been an increase in the frequency and severity of storms with notable events including Storm Darwin in February 2014, Storm Ellen in August 2020, Storm Barra in December 2021 and Storm Eunice in February 2022. The maximum wind gust for Dublin Airport for Storm Barra peaked at 102 km/hr with a 10-minute speed of 69 km/hr.

Met Éireann's 2024 Climate Statement (Met Éireann, 2025) states 2024's average shaded air temperature in Ireland is provisionally 10.72°C, which is 1.17°C above the 1961-1990 long-term average. 2023 was the warmest year on record; however, at 0.49°C warmer than 2024 (see Figure 9.1).

Figure 9.1 1900-2024 Temperature (°C) Temperature Anomalies (Differences from 1961-1990)



The year 2024 had near-average rainfall, with the east of the country experiencing the driest conditions. Sea surface temperatures (SST) were high with 2024 being the fourth warmest year on record.

Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed. Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters. This temperature change means the likelihood of extreme weather events occurring has increased. This will result in longer dry periods and heavy rainfall events. Storm surges and coastal flooding due to sea level rise. Compound events, where coastal surges and extreme rainfall events occur simultaneously will also increase. Met Éireann has high confidence in maximum rainfall rates increasing but not in how the frequency or intensity of storms will change with climate change.

The most recent future climate predictions undertaken by Met Éireann have been published in 'Ireland's Climate: the road ahead (Met Eireann, 2013) based on four scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5) which is named with reference to a range of radiative forcing values for the year 2100 (i.e. 2.6, 4.5, 6.0 and 8.5 W/m^2 (watts per square metre)) respectively with focus on RCP4.5 (medium-low) and RCP8.5 (high) scenarios. In terms of mean temperatures, it is predicted that increases of between 1°C to 3°C will occur under RCP4.5 rising to 2°C to 4°C under RCP8.5. Warm extremes are expected to rise by 2°C to 3°C (RCP4.5) but by up to 5°C under RCP8.5.

The EPA sponsored Report No.159 '*Ensemble of regional climate model projections for Ireland'* (EPA, 2015) which has projected significant decreases in mean annual, spring and summer precipitation amounts with extended dry periods. The decreases are largest for summer, with reductions ranging from 0% to 13% and from 3% to 20% for the medium-to-low and high emission scenarios, respectively. Conversely increases of heavy precipitation of up to 20% are projected to occur during the winter and autumn months. The number of extended dry periods is projected to increase substantially by mid-century during autumn and summer.

In relation to storms, '*Report No.159 – Ensemble of regional climate model projections for Ireland*' (EPA, 2015) indicates that the overall number of North Atlantic cyclones is projected to decrease by 10%

coinciding with a decrease in average mean sea-level pressure of 1.5 hectopascals (hPa) for all seasons by mid-century. Wind energy is also predicted to decrease for spring, summer and autumn with a projected increase in winter.

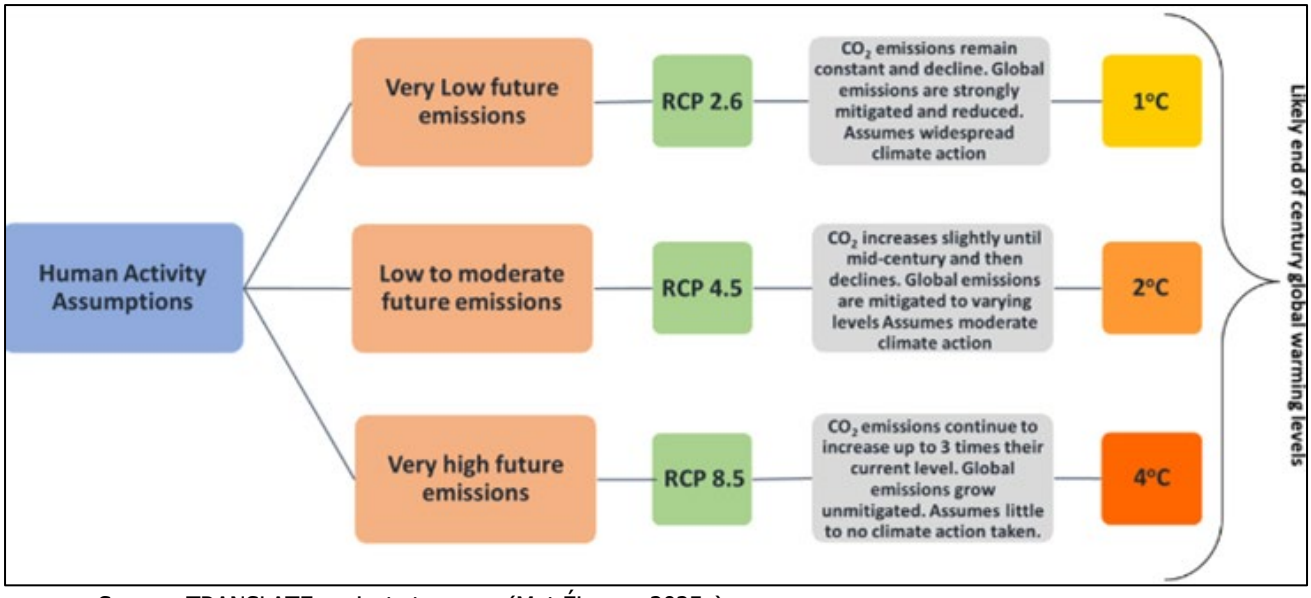
EPA's *State of the Irish Environment Report 2024 (Chapter 4: Climate Change)* (EPA, 2024) notes that projections show that full implementation of additional policies and measures, outlined in the 2025 Climate Action Plan, will result in a reduction in Ireland's total GHG emissions by up to 29 per cent by 2030 compared with 2018 levels. Climate change is not only a future issue in Ireland, as a warming of approximately 0.8°C since 1900 has already occurred. The report (EPA, 2024) underlines that the next decade needs to be one of major developments and advances in relation to Ireland's response to climate change in order to achieve these targets and that Ireland must accelerate the rate at which it implements GHG emission reductions. The report states that mid-century mean annual temperatures in Ireland are projected to increase by between 1.5°C – 2.0°C. In addition, Ireland needs to be invested in adaptation that can protect Ireland from future climatic impacts.

Future climate predictions undertaken by the EPA have been published in '*Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach*' (EPA, 2020). The future climate was simulated under both Representative Concentration Pathway 4.5 (RCP4.5) (medium-low) and RCP8.5 (high) scenarios. This study indicates that by the middle of this century (2041–2060). Mid-century mean annual temperatures are projected to increase by 1 to 1.2°C and 1.3 to 1.6°C for the RCP4.5 and RCP8.5 scenarios, respectively, with the largest increases in the east. Warming will be enhanced at the extremes (i.e. hot days and cold nights), with summer daytime and winter night-time temperatures projected to increase by 1 to 2.4°C. There will be a substantial decrease of approximately 50% which is projected for the number of frost and ice days. Summer heatwave events are expected to occur more frequently, with the largest increases in the south. In addition, precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events. Climate change also has the potential to impact future energy supply which will rely on renewables such as wind and hydroelectric. Wind turbines need a specific range of wind speeds to operate within and droughts or low ground water levels may impact hydroelectric energy generating sites. More frequent storms have the potential to damage the communication networks requiring additional investment to create resilience within the network.

Thus, in summary, the recent research into the changing climate as outlined above shows that the Proposed Development facility will need to incorporate into its design (as appropriate) the likely future increases in weather variability including increased frequency and intensity of storms and high winds, increased temperatures in summer, the potential for heat waves and flooding from heavy precipitation events.

The research project TRANSLATE (Met Éireann, 2023) has been led by climate researchers from University of Galway – Irish Centre for High End Computing (ICHEC), and University College Cork – SFI Research Centre for Energy, Climate and Marine (MaREI), supported by Met Éireann climatologists. TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted models from both CORDEX and CMIP5. Representative Concentration Pathways (RCPs) provide a broad range of possible futures based on assumptions of human activity. The modelled scenarios include for "least" (RCP2.6), "more" (RCP4.5) or "most" (RCP8.5) climate change, as shown in Figure 9.2.

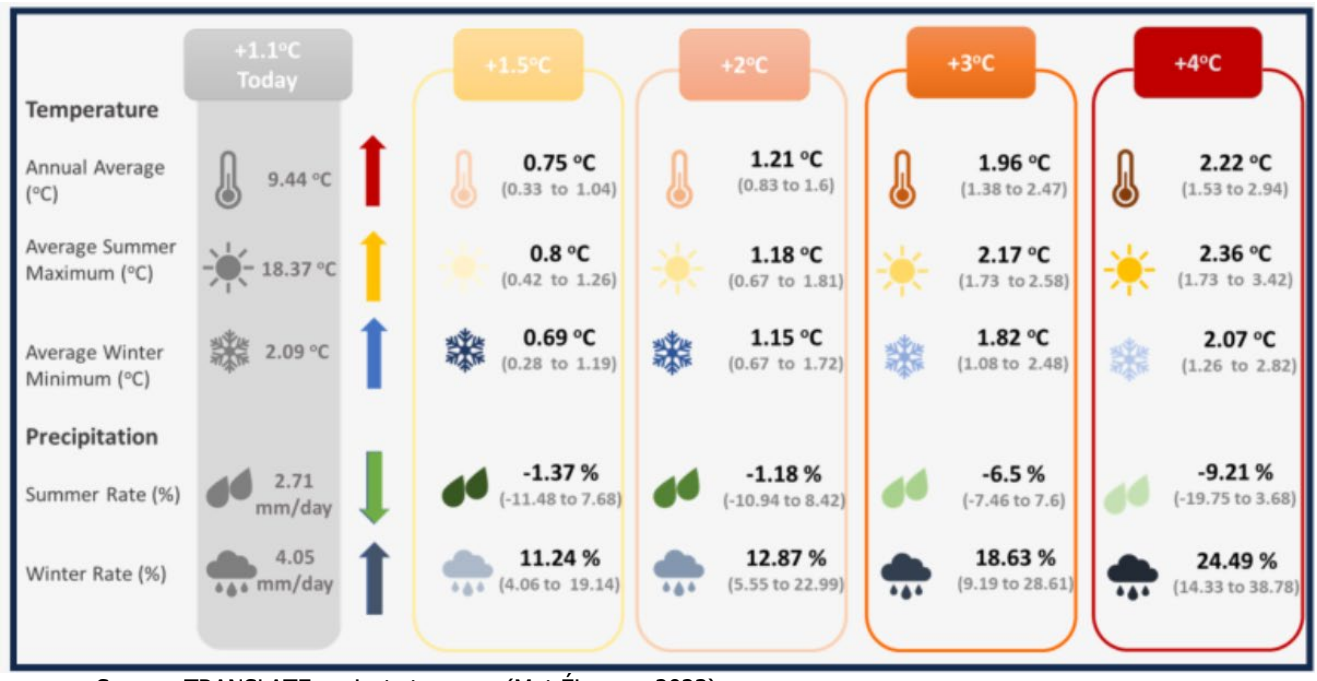
Figure 9.2 Representative Concentration Pathways associated emission levels



a. Source: TRANSLATE project storymap (Met Éireann 2025a)

The research project TRANSLATE (Met Éireann, 2025a) provides the first standardised and bias-corrected national climate projections for Ireland to aid climate risk decision making across multiple sectors (for example, transport, energy, water), by providing information on how Ireland's climate could change as global temperatures increase to 1.5˚C, 2˚C, 2.5˚C, 3˚C or 4˚C. Projections broadly agree with previous projections for Ireland. Ireland climate is dominated by the Atlantic Meridional Overturning Circulation (AMOC), a large system of ocean currents – including the Gulf Stream – characterised by a northward flow of warm water and a southward flow of cold water. Due to the AMOC, Ireland does not suffer from the extremes of temperature experienced by other countries at a similar latitude. Recent studies have projected that the AMOC could decline by 30% - 40% by 2100, resulting in cooler North Atlantic sea surface temperatures (SST) (Met Éireann, 2025a). Met Éireann projects that Ireland is nevertheless projected to continue to warm, although the influence of this cool influence may lead to reduced warming compared with continental Europe. AMOC weakening is expected to lead to additional sea level rise around Ireland. With climate change Ireland's temperature and rainfall will undergo more significant changes, for example on average summer temperature could increase by more than 2°C, summer rainfall could decrease by 9% while winter rainfall could increase by 24% as shown in Figure 9.3. Future projects also include a 10-fold increase in the frequency of summer nights (values >15°C) by the end of the century, a decrease in the frequency of cold winter nights and an increase in the number of heatwaves. A heatwave in Ireland is defined as a period of five consecutive days where the daily maximum temperature is greater than 25°C.

Figure 9.3 Change of climate variables for Ireland for different Global warming thresholds



a. Source: TRANSLATE project storymap (Met Éireann, 2023)

Table 9.7 Dublin Airport Historical Meteorological Data 1991-2020

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (°C)													
mean daily max	8	8.5	10.1	12.3	14.8	17.7	19.5	19.1	16.9	13.6	10.3	8.3	13.3
mean daily min	2.3	2.2	3	4	6.6	9	11.3	11.2	9.5	7.1	4.3	2.6	6.1
mean temperature	5.2	5.3	6.6	8.2	10.7	13.3	15.4	15.1	13.2	10.4	7.3	5.5	9.7
absolute max.	16.4	16.2	18.6	21.7	23.2	26.4	27.1	27.2	25	20.9	17.5	15.4	27.2
min. maximum	-3.2	-0.6	-0.6	4.2	6.3	10.3	11.8	13.8	9.6	5.2	-1.9	-4.8	-4.8
max. minimum	11.8	11.9	11.9	12.5	14.6	15.8	17.6	18.1	19.1	15.9	12.8	12.9	19.1
absolute min.	-9.5	-7.9	-7.9	-5.6	-3	0.7	3.9	2.4	0.4	-4.7	-8.4	-12.2	-12.2
Relative Humidity (%)													
mean at 0900UTC	87.9	87.9	84.7	79.8	77	76.2	78.6	81.1	84.1	86.5	89.4	88.8	83.5
mean at 1500UTC	81.6	76.9	71.6	68.7	67.8	67.7	69	69.8	71.9	75.8	81.6	83.9	73.9
Sunshine (hours)													
mean daily duration	1.9	2.9	3.7	5.4	6.4	6	5	5	4.4	3.4	2.4	1.7	4
Rainfall (mm)													
mean monthly total	61.8	52.4	51.4	55	57	64	61	73.4	63.3	78.4	82.7	72.1	772.5
greatest daily total	27.1	28.1	35.8	37	42.1	73.9	39.2	68.3	42.1	71.3	62.8	42.4	73.9
mean num. of days with >= 0.2mm	17.7	16.1	16.5	15.8	15.3	14.8	16.9	17.1	15.5	17	18.3	18.6	199.6
mean num. of days with >= 1.0mm	12.5	11	10.7	11.1	10.5	9.8	11.6	11.8	10.7	11.6	12.5	13.3	137.1
mean num. of days with >= 5.0mm	3.8	3.2	3.5	3.5	3.6	3.9	3.8	4.4	4.1	5	5.2	4.8	48.8
Wind (knots)													
mean monthly speed	12.3	12	11.4	10.3	9.9	9.2	9.1	9.2	9.6	10.5	11.2	11.7	10.5
max. gust	80	67	66	54	57	53	49	44	56	69	66	76	80
max. mean 10-minute speed	53	48	45	37	39	38	36	32	39	51	42	55	55
mean num. of days with gales	2.3	1.4	1	0.2	0.1	0.1	0.1	0	0.2	0.5	0.8	1.2	7.8

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Weather (mean no. of days with..)													
snow or sleet	3.2	3.2	2.4	0.7	0.1	0	0	0	0	0	0.6	2.3	12.5
snow lying at 0900UTC	0.7	0.4	0.3	0	0	0	0	0	0	0	0.1	0.7	2.2
hail	1.1	1.5	1.8	2	1	0.1	0.2	0.1	0.1	0.2	0.4	0.7	9.2
thunder	0.2	0.2	0.3	0.2	0.7	0.6	0.9	1	0.2	0.3	0.3	0.2	5
fog	2.4	2.4	3.4	2.6	2.4	2.2	2.3	2.8	3.4	2.6	2.3	3.4	32.3

9.4 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction phase and operational phase of the Proposed Development. The information presented in this section is informed by the project design, but it is not a complete description of the Proposed Development. Therefore, it should be read in conjunction with the full development package. For a more comprehensive understanding of the Proposed Development, please refer to Chapter 2 (Description of the Proposed Development) of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the Proposed Development.

9.4.1 Construction Phase

The proposed works will comprise construction of a landfill facility, and all ancillary site infrastructure. The key civil engineering works which will have a likely impact on air quality during construction are summarised below:

- Site preparation prior to landfill cell construction, which requires clearance of woodland and other vegetation and removal of material excavated in the construction of permitted landfill cells (currently stored on the proposed landfill cell area).
- During construction, an amount of soil will be generated as part of the site preparation works and during excavation for the proposed landfill cells. This excavated material will either be used to form berms or removed off site for appropriate reuse, recycling or disposal.
- Temporary storage of construction materials such as cement.
- Construction traffic accessing the site will emit GHGs, primarily carbon dioxide (CO_2) and nitrous oxide (N_2O) during transport.

In total, 1.81 million m^3 of soil and stone will need to be excavated to facilitate the proposed landfill expansion and all ancillary works. 1.44 million m^3 of material will be retained on site for the construction of embankments, berms, capping and use as clay liner. It is currently envisaged that the 10 no. landfill cells will be excavated on a phased basis over a 17 year period. There will be soil excavated to facilitate the proposed extension.

It is expected that a quantity of the excavated material will be used on site for the following purposes:

- 120,689 m^3 material will be used for establishing landfill embankments;
- 168,443 m^3 of clay material will be used as a clay liner in the construction of the landfill cells;
- 12,943 m^3 of clay material will be used as a clay liner in the construction of the southern attenuation pond;
- 627,682 m^3 will be used in the construction of the proposed berms on site; and
- 464,302m^3 will be used for final capping on site.

In total, 1,440,434 m^3 of the excavated material will be reused on site over the lifetime of the project. Therefore 367,065 m^3 of material will need to be removed from site for appropriate reuse, recovery and / or disposal.

9.4.2 Operational Phase

The key works which will have a likely impact on air quality during operation of the Proposed Development are summarised below:

- The extension of the landfill area to create additional void space for landfilling, which will release GHG emissions from new landfill cells. There will be no change in quantity of waste accepted per annum by the Proposed Development.
- Road traffic accessing the site will emit GHGs, primarily CO_2 and N_2O during transport. Again there will be no change in the traffic volume accessing the facility.
- The landfill gas engines and landfill flares will both convert methane into CO_2 by combustion. These CO_2 emissions are not treated as net emissions from waste in line with the IPCC Methodology (IPCC 2019).

The existing Knockharley Landfill facility has an existing IED Licence (W0146-04) issued by the EPA. The facility is required to comply with specific licence conditions, including monitoring and reporting on their emissions, to ensure that they do not pose a risk to human health or the environment.

In terms of land use change, a total of 12.9ha of forestry will be removed as part of the construction phase. There is not sufficient land within the Proposed Development to plant compensatory forest habitat, therefore c. 4.04 ha of land will be sourced offsite to ensure this can be met. It is planned for 8.86ha of woodland to be planted onsite to compensate for habitat loss during construction – this will consist of c. 6.63 ha of native woodland and 0.63 ha of native riparian woodland planted during the operational phase, and c. 1.6 ha of native woodland will be planted during the reinstatement phase. 33.1 ha grassland meadow will be established across the site during the operational phase and a further 32.3 ha of native grassland meadows established during the reinstatement phase.

9.4.3 Decommissioning and Remediation Phase

During the Decommissioning and Remediation Phase will include the following activities:

- Final landfill capping, undertaken in accordance with the CEMP;
- Ongoing post- landfilling site activities, carried out in accordance with the CRAMP.
- Planting of c. 1.6 ha of native woodland will be planted during the reinstatement phase along with 32.3 ha of native grassland meadows

The final landfill capping will be undertaken in accordance with the CEMP and the ongoing capture of landfill gas and flaring of landfill gas will continue during this period.

9.5 Potential Impacts of the Proposed Development

9.5.1 Do Nothing – Construction Phase

As outlined in the EIAR Guidelines (EPA, 2022), the 'do-nothing' alternative is a general description of the evolution of the key environmental factors of the site and environs if the Proposed Development did not proceed. The Do Nothing scenario includes the Permitted Development which has already been constructed. In the Do Nothing construction phase scenario, therefore, greenhouse gas emissions at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

9.5.2 Do Nothing – Operational Phase

Under the Do Nothing Scenario GHG emissions will take place from the Permitted Development up to the Year 2029. The main emissions will be associated with methane emissions from the current landfilling of waste.

Thus, the current operation of the facility in terms of waste types and tonnages accepted are shown below in Table 9.8. These waste types and tonnages will remain unchanged for the Do Something scenario also.

Table 9.8 Current Waste Acceptance IED Licence no. W0146-04 Schedule A2

Waste Type		Maximum (Tonnes Per Calendar Year)
Non-Hazardous Waste	Household, commercial, and industrial	285,000
	Bailed Recyclables, and Baled Municipal Solid Waste	
	Soil and Stone	
	Construction and Demolition	
	IBA (incinerator bottom ash)	150,000
Other Waste	Stable, non-reactive hazardous waste	5,000
Total		**440,000**

9.5.2.1 Existing Landfill Gas Extraction

As part of the Do Nothing scenario, landfill gas is extracted from all active and filled cells via vertical and horizontal gas wells. Gas extraction commences from each cell once sufficient waste has been placed above the leachate stone drainage layer to prevent air infiltration into the gas extraction system.

All capped cells to date, have a permanent gas collection system connected to the ring main. The landfill gas treatment infrastructure consisting of enclosed flares and landfill gas utilisation engines are in the landfill gas compound. Currently, there are four engines on site. Two engines are run continuously as lead engines, these have a capacity of 1,000 m^3/hr.

Two back up engines of 800 m^3/hr capacity each are installed on site. There are 3 no. enclosed flares in the landfill gas compound, two duty and one back up. The two duty flares provide flaring capacity of 2,500 m^3/hr and 1,500 m^3/hr. The back-up flare is 1,500 m^3/hr.

Landfill Gas utilisation is active at the site, there are currently 4 Landfill Gas engines, generating approximately 13,000 MWh (annual) of electricity for export to the national grid. Back-up flaring is carried out as necessary in response to outages of the engines, or in support of the engines should gas exceed the capacity of the engines, to reduce the potential for the nuisance effect of the landfill gas. The electricity generated from landfill gas collection will displace fossil-fuel derived electricity and thus reduce GHG emissions from the national grid.

9.5.2.2 Anthropogenic CO_{2eq} Emissions Due To The Landfilling

The IPCC Waste Model was updated in 2019 (IPCC, 2019) with the latest spreadsheet version dated 2023 (IPCC, 2023). The landfill gas composition and landfill gas capture rate, based on the UK DEFRA publication *"Review of Landfill Methane Emission Modelling" (DEFRA, 2014),* was used to calculate methane emissions from landfilling at the Permitted Development and based on the latest EPA municipal waste composition (EPA/RPS (2023), EPA/CTC (2023)).

For the Permitted Development, the facility emits an annualized 115,108 tonnes of CO_{2eq} as outlined in Table 9.9.

Table 9.9 Anthropogenic CO_{2eq} Emissions Due To The Landfilling Of 290,000 tonnes Of MSW (Tonnes CO_{2eq}) Over 5 Years

	CO_2	N_2O	CH_4
Total Emissions (tonnes CO_{2eq})(1,2) Over 5 Years	-	-	590,231
Greenhouse Gas Avoided Due To Gas Recovery and Power Generation (tonnes CO_{2eq})(3) Over 5 Years	14,690		
Total Net Emissions After Power Generation Over 5 Years	**575, 541 Tonnes** CO_{2eq}		
Total Net Emissions After Power Generation Annualised	**115, 108 Tonnes** CO_{2eq}		

(1) Total over a period of 80 years: peak generation will occur after 5 years

(2) Based on a methane : carbon dioxide ratio of 50:50, on an oxidation rate of 10% and a collection efficiency of 68% using IPCC Waste Model

(3) Based on the approximately 13,000 MWh (annual) of electricity for export to the national grid 2024 value of 0.226 tonnes CO_2 / MWh (SEAI, 2025).

Based on the projected CO_2eq emissions from Knockharley landfill this would equate to 0.42% in terms of Ireland's obligations under the EU ESR 2030 Target of 27.7 Mt CO_2 or 7.2% of Ireland's 2030 "Other" Sectorial Emission Limit ("other" includes waste emissions). Emissions from landfilling are calculated using the IPCC Spreadsheet for Estimating Methane Emissions from Solid Waste Disposal Sites (IPCC Waste Model) (IPCC 2023).

9.5.3 GHGA for the Construction Phase

Construction traffic would be expected to be a source of greenhouse gas emissions during this phase of the Proposed Development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development . The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2024) states that site traffic and plant is unlikely to make a significant impact on climate.

As noted above, construction phase emissions due to traffic and plant are a small fraction of operational emissions and will last for a defined period only. The maximum daily quantity of road traffic during the construction phase of the Proposed Development is below the PE-ENV-01106 assessment criteria and thus was screened out of further assessment (see Section 9.2.4.4). However, the assessment of material exported offsite for reuse and recycling has been included in Table 9.10 and Table 9.12.

9.5.3.1 Construction Embodied Carbon

The unmitigated embodied carbon within the construction materials has been calculated. This calculation was based on the updated TII Online Carbon Tool (TII 2024) (See Table 9.10) with the breakdown of the activities between the different phases of the Proposed Development assessed. As shown in Table 9.10, the assessment indicates that the key sources of GHG emissions are associated with the embodied carbon of the construction materials (materials include soil for coverage of the cells) and the transport of these materials. As calculated using the TII Online Carbon Tool (TII 2024) the Proposed Development will result in total Construction Phase GHG emissions of 4,152 tonnes CO_2eq over a 17-year period or 244 tonnes annually. This is equivalent to an annualised total of 0.0010% of Ireland's non-ETS 2030 target or 0.027% of the "Other" sectorial carbon budget which includes waste. The impact of the construction stage embodied carbon is a ***direct, medium-term, imperceptibly negative*** and ***not significant*** effect on climate.

Table 9.10 Construction Stage GHG Emissions

Activity	Tonnes CO_2eq
Pre-Construction	1514
Embodied Carbon	466
Construction Activities	1840
Construction Waste	678
Total (Tonnes CO_2)	**4499**
Total Annually (17 years) Tonnes CO_2	**265**
Annual Compared to EU ESR Targets 2030	0.0010%
Annual Compared to 2030 "other" Carbon Budget (which includes waste)	0.027%

9.5.4 Impact of Climate Change on the Construction Phase

Appropriate flood risk measures and extreme weather events have been considered as part of the construction planning, using the Methodology outlined in Table 9.5. The Site Specific Flood Risk Assessment identified that there is a medium risk from fluvial flooding on the Proposed Development site, given that the likelihood is 'possible' and the consequence is 'medium'. The risk from pluvial, coastal and groundwater flooding is considered to be low.

The potential for changes to long-term weather impacts as a result of climate change are not considered to be as significant in the context of the construction phase of the project which will take place over a medium-term period in the near future. Thus, in line with the methodology outlined in Table 9.5, the likelihood of extreme weather and flooding for the construction phase of the Proposed Development is assessed to be of low likelihood and with a low exposure leading to a finding of low vulnerability and thus a non-significant impact.

Examples of potential climate impacts are included in Annex D (Climate proofing and environmental impact assessment) of the *Technical Guidance on the Climate Proofing of Infrastructure* (European Commission, 2021a). Potential impacts to the Proposed Development as a result of climate change include:

- Flood risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding;
- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather;
- Reduced temperatures resulting in ice or snow;
- Geotechnical impacts; and
- Major Storm Damage – including wind damage.

During construction, the Contractor will be required to mitigate against the effects of extreme rainfall / flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind / storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction.

The Outline Construction Environmental Management Plan (CEMP) has been prepared by WSP and submitted with the planning application. This will be updated by the appointed construction contractor prior to the construction phase of the Proposed Development and will include all the mitigation measures set out within this EIAR. The construction contractor will update this CEMP on an on-going basis to include any additional mitigation required to ensure compliance with any subsequent planning conditions relevant to the Proposed Development. As part of the CEMP, during construction, the Contractor will be required

to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

9.5.5 GHGA for the Operational Phase

The IPCC Waste Model was updated in 2019 (IPCC, 2019) with the latest spreadsheet version dated 2023 (IPCC, 2023). The landfill gas composition and landfill gas capture rate, based on the UK DEFRA publication *"Review of Landfill Methane Emission Modelling" (DEFRA, 2014),* was used to calculate methane emissions from landfilling and based on the latest EPA municipal waste composition (EPA/RPS (2023), EPA/CTC (2023)). The calculation is based on an annualised 440,000 tonnes of material with 290,000 tonnes of material which will lead to methane release (150,000 tonnes of IBA is inert and have no methane release).

For the Proposed Development, the facility will emit an annualized 115,901 tonnes of CO_{2eq} as outlined in Table 9.11.

Table 9.11 Anthropogenic CO_{2eq} Emissions Due To The Landfilling Of 290,000 tonnes Of MSW (Tonnes CO_{2eq}) Over 17 Years

	CO_2	N_2O	CH_4
Total Emissions (tonnes CO_{2eq})(1,2) Over 17 Years	-	-	2,000,152
Greenhouse Gas Avoided Due To Gas Recovery and Power Generation (tonnes CO_{2eq})(3) Over 17 Years	29,835		
Total Net Emissions After Power Generation Over 17 Years	**1,970,317 Tonnes** CO_{2eq}		
Total Net Emissions After Power Generation Annualised	**115,901 Tonnes** CO_{2eq}		

(1) Total over a period of 80 years: peak generation will occur after 17 years

(2) Based on a methane : carbon dioxide ratio of 50:50, on an oxidation rate of 10% and a collection efficiency of 68% using IPCC Waste Model

(3) Based on the approximately 13,000 MWh (annual) of electricity for export to the national grid 2030 value of 0.135 tonnes CO_2 / MWh (EPA, 2025).

Based on the projected waste profile, CO_2eq emissions from the Proposed Development landfill this would equate to 0.42% in terms of Ireland's obligations under the EU ESR 2030 Target of 27.7 Mt CO_2 or 11.6% of Ireland's 2030 "Other" Sectorial Emission Limit ("other" includes waste emissions). Emissions from landfilling are calculated using the IPCC Spreadsheet for Estimating Methane Emissions from Solid Waste Disposal Sites (IPCC Waste Model) (IPCC 2024b).

There is an increase (from the currently permitted scenario) of 793 tonnes CO_2eq annually or 0.003% in terms of Ireland's obligations under the EU 2030 Target or 0.08% of Irelands 2030 "Other" Sectorial Emission Limit ("other" includes waste emissions). The difference in the Do Something scenario compared to the Do Nothing scenario is due to the annualised emissions from landfilling for 17 years for the Do Something scenario compared to the annualised emissions from landfilling for 5 years for the Do Nothing scenario.

The impact of the change in CO_2eq emissions due to the Proposed Development is shown in Table 9.12 taking into account the construction phase of the Proposed Development and any carbon sinks. There is an increase (from the currently permitted scenario) of 1,037 tonnes CO_2eq annually or 0.0037% in terms of Ireland's obligations under the EU 2030 Target or 0.10% of Irelands 2030 "Other" Sectorial Emission Limit ("other" includes waste emissions). In accordance with the ISEP (2022) significance criteria noted in

Section 9.2.3.1.1 , for compliance with the extent to which the trajectory of GHG emissions from the Proposed Development project aligns with Ireland's GHG trajectory to net zero by 2050 and the level of mitigation taking place it is considered that the GHG effects of the Proposed Development is ***direct, long-term, negative*** and ***minor adverse***.

Table 9.12 Summary CO_2e Emissions Impact

Type	Tonnes CO_2e
Annualised Embodied Energy - Construction Phase	265
Landfill (Tonnes CO_2e)	793
Annualised Operational Phase Fuel Usage	-
Operation Phase - (Annualised)	-20
Totals	**1,038**
Total as a percentage of EU ESD Targets 2030	**0.037%**
Total as a percentage of 2030 "Other" Sectorial Emission Limit	**0.10%**

9.5.6 Impact of Climate Change on the Operational Phase

In order to determine the vulnerability of the Proposed Development to climate change the sensitivity and exposure of the development to various climate hazards must first be determined. The following climate hazards have been considered in the context of the Proposed Development : flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning, hail, landslides and fog.

The sensitivity of the Proposed Development to the above climate hazards is assessed whilst the exposure of the Proposed Development is also taken into account separately. Table 9.13 details the sensitivity of the Proposed Development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the Proposed Development to each of the climate hazards is determined, this is the likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the Proposed Development to each of the climate hazards as per Table 9.5. The results of the vulnerability assessment are detailed in Table 9.13 below.

Table 9.13 Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (coastal, pluvial, fluvial)	1 (Low, with design mitigation)	2 (Medium)	2 (Low)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low)
Extreme Cold	1 (Low)	2 (Medium)	2 (Low)
Drought	1 (Low)	2 (Medium)	2 (Low)
Extreme Wind	1 (Low)	1 (Low)	1 (Low)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low)
Fog	1 (Low)	1 (Low)	1 (Low)

The sensitivity and exposure of the area was determined with reference to a number of online tools, including the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) (2025) and with input from the various discipline specialists on the project team as outlined in detail below in Section 9.5.6.1 – Section 9.5.6.5. It was concluded that Proposed Development does not have any significant vulnerabilities to the identified climate hazards as described in the below sections. All vulnerabilities are classified as low and thus a detailed CCRA is not required.

9.5.6.1 Flooding

There is the potential for flooding related impacts on site in future years due to climate changes as outlined in Section 9.3.2 in the absence of mitigation. Appropriate flood risk mitigation measures and mitigation of extreme weather events have been considered as part of the construction and operational phase. The Site Specific Flood Risk Assessment identified that FRA, there is a medium risk from fluvial flooding on the site, given that the likelihood is 'possible' and the consequence is 'medium'. The risk from pluvial, coastal and groundwater is considered to be low.

9.5.6.2 Extreme Wind, Fog, Lightning & Hail

In relation to extreme winds, the appropriate wind loadings are to be calculated for any on-site buildings. Hail and fog are not predicted to significantly affect the Proposed Development.

9.5.6.3 Wildfires

In relation to wildfires, the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) (2025), indicates that the wildfire hazard is classified as medium for the Meath area. This means that there is between a 10% to 50% chance of experiencing weather that could support a problematic wildfire in the project area that may cause some risk of life and property loss in any given year. Future climate modelling indicates that there could be an increase in the weather conditions which are favourable to fire conditions, these include increases in temperature and prolonged dry periods. However, due to the project location in an existing landfill with predominately wet grassland and a temperate, oceanic climate, resulting in mild winters and cool summers the risk of wildfire is significantly lessened and it can be concluded that the Proposed Development is of low vulnerability to wildfires.

9.5.6.4 Landslides

Landslide susceptibility mapping developed by GSI (GSI, 2016) indicates that the Proposed Development location is not within an area that is susceptible to landslides and there are no recorded historical landslide events at the project location. It can be concluded that landslides are not a risk to the Proposed Development site.

9.5.6.5 Extreme Temperatures (Heat & Cold)

At the detailed design stage chosen building materials will be high quality, durable and hard-wearing and chosen to withstand increased variations in temperature in the future as a result of climate change.

9.5.6.6 Summary

Overall, the Proposed Development has at most low vulnerabilities, as outlined in Table 9.13 and as outlined in detail above in Section 9.5.6.1 – Section 9.5.6.5, to the identified climate hazards and therefore no detailed risk assessment is required.

Thus, in line with the methodology outlined in Table 9.5, the likelihood of extreme weather and flooding was assessed to be of low likelihood and with a low or medium exposure leading to a finding of low vulnerability and thus a non-significant impact.

Under the 2021 Climate Act, the National Adaptation Framework, which aims to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts, remains in place as does the Carbon Action Plan, which will reduce GHG emissions in future years, with a number of other strategies currently being proposed.

9.5.7 GHGA for the Decommissioning and Remediation Phase

Traffic associated with the decommissioning and remediation phase would be expected to be a source of greenhouse gas emissions during this phase of the Proposed Development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development . The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2024) states that site traffic and plant is unlikely to make a significant impact on climate.

The maximum daily quantity of road traffic during the decommissioning and remediation phase of the Proposed Development is below the PE-ENV-01106 assessment criteria and thus was screened out of further assessment.

In terms of ongoing site activities post completion of landfilling following completion of decommissioning, potential impacts will be consistent with those identified for the Operational Phase. Ongoing site management and environmental monitoring including landfill gas utilisation and flaring will continue until final closure is agreed with the EPA.

9.6 Mitigation Measures

9.6.1 Construction Phase

The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimized wherever possible during the construction phase of the Proposed Development. The mitigation measures which are relevant to GHG emission reductions are outlined below:

- All vehicles will be required to switch off engines when stationary (no idling);
- All vehicles will be serviced and maintained to ensure emissions are minimised;
- Where practicable, materials will be reused within the extent of the Proposed Development ; and
- Where practicable, materials will be sourced locally (within 20-25km) to reduce the embodied emissions associated with transport.
- Construction Phase traffic will be monitored to ensure construction vehicles are using the designated haul routes;
- Construction vehicles should conform to the latest EU emissions standards and where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirement date for the new standard. This will ensure emissions on haul routes are minimised.

As a result of these mitigation measures, the GHG emissions will be reduced during the construction phase compared to the baseline scenario.

9.6.2 Operational Phase

The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimized wherever possible during the operational phase of the Proposed Development. The key mitigation measures which are relevant to GHG emission reductions are outlined below:

- The impact of the landfill emissions will be mitigated by the collection of the landfill gases emitted to produce electricity. A landfill gas collection system will be installed to safely collect and divert this gas from the new landfill to the existing landfill gas management compound which includes landfill gas flares and landfill gas utilisation plant (LGUP) which generates electricity. The amount generated will vary throughout the lifespan of the landfill as the waste decomposes although during the operation phase is likely to amount to approximately 13,000 MWh/year.

Vehicles, generators etc., will give rise to some GHG emissions, however the Proposed Development's impact on climate due to traffic can be minimised through mitigation measures. The following mitigation measures will be put in place to minimise emissions:

- Implement a policy which prevents idling of vehicles both on and off-site including HGV holding sites;
- All plant and machinery will be maintained and serviced regularly; and
- Efficient scheduling of deliveries will be undertaken to minimise emissions.

The majority of mitigation measures with respect to the Proposed Development's vulnerability to climate change are set out through the CEMP and discipline specific management plans, designing out potential issues. Operational Phase climate vulnerability should be reassessed on an annual basis in order to respond to new scientific data on potential climate change impacts.

9.6.3 Decommissioning and Remediation Phase

The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimized wherever possible during the decommissioning and remediation phase of the Proposed Development. The mitigation measures which are relevant to GHG emission reductions are outlined below:

- All vehicles will be required to switch off engines when stationary (no idling);
- All vehicles will be serviced and maintained to ensure emissions are minimised;
- Decommissioning and Remediation Phase traffic will be monitored to ensure construction vehicles are using the designated haul routes;
- Decommissioning and Remediation Phase vehicles should conform to the latest EU emissions standards and where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirement date for the new standard. This will ensure emissions on haul routes are minimised.

As a result of these mitigation measures, the GHG emissions will be reduced during the decommissioning and remediation phase compared to the baseline scenario.

The key mitigation measures which are relevant to GHG emission reductions during the decommissioning and remediation phase are outlined below:

- The impact of the landfill emissions will be mitigated by the collection of the landfill gases emitted to produce electricity. A landfill gas collection system will be installed to safely collect and divert this gas from the new landfill to the existing landfill gas management compound which includes landfill gas flares and LGUP which generates electricity.

9.7 Residual Effects of the Proposed Development

9.7.1 Impact of Climate Change on the Construction Phase

The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2024) states that site traffic and plant is unlikely to make a significant impact on climate. As outlined in Section 9.5.3, the quantity of road traffic during the construction phase of the Proposed Development is below the assessment threshold. Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the potential impact on climate change from the direct impact of the Proposed Development is deemed to be *medium-term, minor adverse* and *not significant* in relation to Ireland's obligations under the EU 2030 target. It can therefore be determined that the impact of climate change on the Construction Phase will be a residual ***direct, medium-term, imperceptibly negative*** and ***not significant*** effect.

9.7.2 Impact of the Construction Phase on Climate Change

As outlined in detail in Section 9.5.3, a detailed climate assessment of the construction stage traffic has been scoped out given the low level of construction traffic. It has also been confirmed that there is no significant traffic cumulative impact (Chapter 13 of the EIAR) and it can therefore be determined that the construction stage traffic will have a residual ***direct, medium-term, imperceptibly negative*** and ***not significant*** effect on climate.

9.7.3 Impact of Climate Change on the Operational Phase

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. A flood risk assessment has been undertaken on the site and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the impact will be *imperceptible,* which is not significant. It can therefore be determined that the impact of climate change on the Operational Phase will be a residual ***direct, long-term, imperceptibly negative*** and ***not significant*** effect.

9.7.4 Impact of the Operational Phase on Climate Change

Based on the projected waste breakdown CO_2eq emissions from Knockharley landfill this would equate to 0.42% in terms of Ireland's obligations under the EU ESR 2030 Target of 27.7 Mt CO_2 or 11.6% of Ireland's 2030 "Other" Sectorial Emission Limit ("other" includes waste emissions). Emissions from landfilling are calculated using the IPCC Spreadsheet for Estimating Methane Emissions from Solid Waste Disposal Sites (IPCC Waste Model) (IPCC 2024b). No operational traffic assessment has been undertaken as traffic levels will be unchanged from the baseline scenario.

There is an increase (from the currently permitted scenario) of 793 tonnes CO_2eq annually or 0.003% in terms of Ireland's obligations under the EU 2030 Target or 0.079% of Irelands 2030 "Other" Sectorial Emission Limit ("other" includes waste emissions).

9.7.4.1 Determination Of The Significance of the Operational Phase on Climate

The criteria for determining the significance of effects is a two-stage process that involves defining the magnitude of the impacts first followed by the sensitivity of the receptors as set out in Section 9.2.3. In relation to climate, as there are no project specific assessment criteria, the Proposed Development has been assessed against the recommended ISEP (ISEP, 2022) significance determination (see Section 9.2.3).

In reference to Principle 1 of ISEP Guidance (ISEP, 2022), the Proposed Development will be a continuation of the existing baseline activity with no increase in tonnage or traffic and thus GHG emissions are essentially unchanged from the baseline scenario.

In reference to Principle 2 of ISEP Guidance (ISEP, 2022), a range of measures will be employed which will reduce GHG emissions and are in line with "best practice" as outlined in the ISEP guidance (ISEP, 2022). The site specific mitigation which will be employed include:

- The impact of the landfill emissions is mitigated by the collection of the landfill gases emitted to produce electricity. A landfill gas collection system will be installed to safely collect and divert this gas from the new landfill to the existing landfill gas management compound which includes landfill gas flares and landfill gas utilisation plant (LGUP) which generates electricity. The amount generated will vary throughout the lifespan of the landfill as the waste decomposes although during the operation phase is likely to amount to approximately 13000 MWh/year.

In reference to Principle 3, as GHG emissions are essentially unchanged from the baseline scenario no compensation measures are deemed necessary in the ISEP guidance (ISEP, 2022).

Table 9.14 shows the significance of the Proposed Development when compared to the 'Other' (including waste) 2030 Sectoral Emission Ceiling based on the approach set out in ISEP guidance (ISEP, 2022). The assessment is presented both prior to and post mitigation. As shown in Table 9.14, the impact of the Proposed Development prior to mitigation would be deemed to be ***direct, long-term, negative and minor adverse*** .

Also presented in Table 9.14 is the Proposed Development impact post mitigation. As outlined above the Proposed Development will use "best practice" adaptive design measures including landfill gas capture and the generation of 13,000 MWh/year.

With the implementation of these measures, including electricity generation, the Proposed Development will have a small negative GHG emissions impact. The mitigation measures outlined in Section 9.6 to ensure that any residual GHG emissions are mitigated in line with the ISEP guidance. The ISEP guidance note on "*Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition*" (ISEP, 2022) states that:

"*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050".*

Table 9.14 GHG Emissions Associated With The Proposed Development Compared To Sectoral Emission Ceiling & ETS

Scenario	% Of Other (Including Waste) Emission 2030 Ceiling Note 2	Significance (Prior to mitigation)	Significance (After mitigation)
Impact Of Proposed Development	0.079%	Minor Adverse	Minor Adverse

Once the mitigation measures outlined in Section 9.6 are implemented, the residual impacts on climate from the Construction Phase of the Proposed Development will remain ***direct, medium-term*** and ***imperceptibly negative.***

Once the mitigation measures outlined in Section 9.6 are implemented, the residual impacts on climate from the Operational Phase of the Proposed Development will be ***direct, long-term, negative*** and ***minor adverse.***

Thus, in terms of the residual impacts on climate from both the construction phase and operational phase of the Proposed Development will be ***not significant***.

9.7.5 Decommissioning and Remediation Phase: Proposed Development

At the decommissioning and remediation phase of the Proposed Development, a decommissioning and remediation plan will be prepared to ensure recycling and reuse of materials is maximised.

The effect of the Proposed Development decommissioning and remediation phase in terms of climate will be ***direct, short-term, imperceptibly negative*** and ***not significant***.

9.8 Monitoring or Reinstatement Measures

9.8.1 Construction Phase

There is no proposed monitoring for GHG emissions during the construction phase as GHG emissions will be insignificant as outlined in Section 9.7.1.

9.8.2 Operational Phase

The Proposed Development will be governed by an Industrial Emissions (IE) licence which will be revised by the EPA prior to operations commencing on site. As part of this IE licence monitoring of the emission points will be required. The exact monitoring requirements will be stipulated as a condition within the granted licence.

There is no other proposed monitoring during the operational phase.

9.8.3 Decommissioning and Remediation Phase

The Proposed Development will be governed by an Industrial Emissions (IE) licence which will be revised by the EPA prior to operations commencing on site. As part of this IE licence monitoring of the emission points will be required. There is no other proposed monitoring during the decommissioning and remediation phase.

9.9 Cumulative Impacts of the Proposed Development

In relation to climate, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other (ISEP, 2022).

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Chapter 10 – Noise and Vibration

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The impacts assessed as during the proposed Phase 1 and Phase 2 set out above are therefore reflective of the highest noise emissions associated with Proposed Development and the future operational scenario across the remainder of the site.

The cumulative impacts associated with ongoing existing and permitted activities in addition to Phases 3 to 7 of the Proposed Development will therefore be below the daytime ELV of 55 dB $L_{Aeq,T}$, the evening ELV of 50 dB $L_{Aeq,T}$ and the night-time ELV of 45 dB $L_{Aeq,T}$.

10.5.2.2 Additional Traffic serving the Development

As there will be no change in the quantity of waste material or inclusion of additional waste streams at the site as part of the operational phase of the Proposed Development, the operational traffic will remain consistent with the current traffic which takes into account traffic for the existing Knockharley Landfill facility. There is no change to traffic noise impacts along the existing access road or along roads outside of the site.

10.5.3 Decommissioning and Remediation Phase

During decommissioning and the capping of the landfill, the primary noise sources relate to earthmoving, and handling of equipment and materials during restoration works. As the same type of mobile plant and activities will be required during this phase compared to the ongoing landfill cell construction, filling, capping associated with the ongoing operational phase, the associated noise levels during the decommissioning and remediation phase will be of similar magnitude to those anticipated during the operational phase or lower. The same mitigation measures implemented during the construction and operational phase will be applied during the decommissioning works and are also considered appropriate for the decommissioning demolition works. It can therefore be determined that the decommissioning phase will have a ***short-term, direct, negative*** and ***not significant*** effect on noise and vibration.

10.6 Mitigation Measures

10.6.1 Construction Phase

Construction phase noise and vibration impacts are determined to be between not significant to slight to moderate at the nearest off-site NLS. No specific mitigation measures are required to control noise or vibration during the construction phase given the distance between the site works and the nearest NSLs.

Notwithstanding, best practice noise and vibration control measures will be applied on site as standard during this phase.

It is anticipated that the construction of the Proposed Development will be completed during normal construction hours i.e. 8:00 to 18:30 Monday to Friday, and 8:00 to 14:00 on Saturdays. No construction activities shall be carried out on Sundays or Public Holidays. Deviation from these times shall only be permitted in exceptional circumstances where prior written approval has been received from the planning authority and the EPA.

With regard to construction activities, best practice control measures from BS5228 Parts 1 and 2 will be considered and applied where necessary. These include

- selection of quiet plant;
- noise control at source;
- screening;
- liaison with the public, and;
- monitoring.

These measures will ensure that during the Construction Phase, the works will be managed to comply with the limits detailed in Table 10-1 using methods outlined in BS 5228–1, and the best means practicable, including proper maintenance of plant and equipment, will be employed to minimise the noise produced by on site operations.

10.6.2 Operational Phase

The layout and design of the site incorporates inherent noise mitigation measures through the incorporation of screening berms around the site perimeters with noise sensitive properties, the location of fixed areas of site plant away from noise sensitive boundaries, and the hours of operation.

The results of this assessment have indicated that operational noise levels associated with normal day to day on-site activities are all below the facility's ELV over day, evening and night-time periods.

There is potential for temporary exceedances of the daytime ELV during activities associated with tree felling and berm construction along the north of the site at the closest NSLs along this boundary. Whilst these activities will only occur over limited periods of time in proximity to any NSL, the following mitigation measures are proposed to reduce noise impacts during these activities:

- Orientating plant to minimise the noise impact on nearby receptors where practicable;
- Erection of temporary localised mobile noise screens where practicable around activities during tree felling works;
- Ensuring that noisy plant and equipment are not used for long periods of time;
- Phasing of works and reduce percentage on-time to lower the noise impact;
- Development of Berms 1, 2 and 3 as the first sequence of berm construction during Phase 1
- Carrying out regular monitoring of noise levels as per requirements of the licence and undertaken additional monitoring during critical periods; and
- Investigate and record noise complaints and take action to mitigate where levels are above the licence limit as is the case as part of the current operations at Knockharley landfill.

The development of the screening berms once in place will assist in reducing overall operational noise levels from the existing and proposed development at the closest NSLs.

10.7 Monitoring or Reinstatement Measures

Compliance noise monitoring is undertaken on a quarterly basis at the facility as part of the existing EPA IE licence. This will continue with the Proposed Development in place. Given the majority of the activities associated with the Proposed Development form part of the operational licensed activities, these will be monitored as part of this regular monitoring at the site.

10.8 Residual Effects of the Proposed Development

10.8.1 Construction Phase

During the construction phase, the potential noise and vibration impacts are determined to be negative, not significant to moderate and temporary to short term.

10.8.2 Operational Phase

During the operational phase associated with normal day to day operations, noise levels and the noise character in the area associated with the proposed development will remain largely unchanged compared to the existing operational phase of facility due to the same items of external mobile plant being utilised as part of the proposed development across the site.

During the Phase 1 stage of the Proposed Development, operational noise levels will be highest and there is potential for temporary exceedances of the daytime ELV by up to 5 dB in exceptional cases at NSLs along the northern site boundary. With mitigation, this can be reduced to within the daytime ELV of 55 dB $L_{Aeq,T}$ through the employment of localized screening, siting of equipment and timing of activities. The residual impact is determined to be negative, moderate and temporary.

There is no calculated change in the evening or night-time operational noise levels during Phase 1 and operational noise levels remain comfortably below the relevant ELVs for this period. The residual impact is determined to be neutral, not significant and long-term.

During the operational of Phase 1, and Phases 2 to 7, when tree felling and berm construction activities are not occurring along the northern site boundary, the residual noise levels are below the daytime ELV 55 dB $L_{Aeq,T}$ at all NSLs surrounding the facility. The residual impact when combined with all existing and future permitted activities is negative, slight to moderate and long-term

During the operation of Phases 2 to 7, night-time noise levels have potential to increase at NSLs to the north of the facility with the operation of the proposed gas booster pump. The cumulative night-time noise levels from all operational fixed items of plant are however below the night-time ELV of 45 dB $L_{Aeq,T}$ at all NSLs. The residual impact is determined to be negative, slight to moderate and long-term.

10.9 Cumulative Impacts of the Proposed Development

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below. For details on the developments considered refer to Chapter 2, Section 2.9 of this EIA Report.

The following developments in Table 10-17 were identified to in proximity to the Proposed Development for consideration for potential cumulative construction or operational phase effects based.

Table 10-17. Summary of Committed Developments with Potential for Cumulative Effects

Planning Reference No.	Description
AA180145	A solar farm to be installed over reclaimed landfill with an export capacity of approximately 3MW comprising photovoltaic panels on ground mounted frames, connection to existing single-storey ESB Sub-Station / switch room.
2360296	Works associated with the proposed upgrade of the existing Louth - Woodland 220 kV overhead powerline (OHL).
23576	A ten year permission and 35 year operation life for a solar farm described herein. The total site area for the proposed development is 188.9 hectares consisting of the following: solar photovoltaic panels on ground mounted steel frames and associated
2460587	New upgraded synthetic grass pitch, with boundary fence around perimeter of pitch 4 No. of 12metre high floodlight poles with a max 250 lux lighting and associated site works. Upgraded & extended parking area with associated site works.
2460432	Construction of 1 No. standalone ESB substation (20kV) with adjoining customer switch room

These are discussed in the context of the two phases in the following sections.

10.9.1 Construction Phase

The construction phase in the context of this development involves minor works involving Knockharley Stream and culvert installation and relocation of overhead ESB power lines. During these construction activities impacts are determined to be Not Significant to slight to moderate at off-site NSLs.

In the event that construction works are occurring at the other permitted or proposed developments noted above, the noise contribution will depend on their proximity to individual NSLs. Under a highly worst case scenario, assuming the same construction noise level associated with the Proposed Development is also contributed from the developments above, an increase in 3 dB would be experienced at each NSLs. This highly unlikely scenario has the potential to result in a 1 dB exceedance of the construction noise significance threshold at NSLs to the north within 70m of the site. At all other locations there is no predicted exceedance of the construction noise threshold. On the basis of the above, cumulative construction noise impacts associated with the proposed development and other adjacent developments would be negative, slight to moderate and short-term.

10.9.2 Operational Phase

The operational assessment has considered the cumulative effect of the proposed development added to the existing and future permitted operational scenarios at the Knockharley facility. The assessment has determined that the operation of the proposed development in addition to the existing facility will be of negative and slight to moderate and long-term impact.

The above listed projects in Table 10-17 with operational fixed plant items (solar farms, substation) have the potential to generate noise levels that will add to the background noise environment, albeit at low levels. Due to the location and nature of the two solar farm developments listed above and sub station, the distance to the nearest NSLs are sufficiently set back such that the operations from the Proposed Development would remain the main contributor to daytime noise levels and the potential for cumulative noise levels are unlikely. For the other developments listed above, there are no potential significant cumulative noise impacts based on the nature of the developments and their proximity to NSLs in the vicinity. The overall potential for cumulative noise effects are negative, slight to moderate and long term.

10.10 References

- British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- British Standard BS 5228 (2008 +A1 2014): Code of Practice for Noise and Vibration Control on Construction and Open Sites. Part 1: Noise and Part 2 Vibration.
- Department of Transport Welsh Office, HMSO, (1988) Calculation of Road Traffic Noise,
- UK Highways Agency (UKHE) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2.
- Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Statements
- IEMA & IOA (2010) Guidelines for Noise Impact Assessment
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures (hereafter referred to as ISO 1996 – 1) (ISO 2016);
- International Organization for Standardization (ISO) 9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors (hereafter referred to as ISO 9613 – 2) (ISO 2024).
- Environmental Protection Agency (EPA): Guidance Note for Noise: Licence Application, Surveys and Assessment in Relation to Schedules Activities (NG4) (January 2016) (hereafter referred as EPA NG4 (2016)
- EIAR for the Proposed Development at Knockharley Landfill. Volume 2 – Main EIAR. Knockharley Landfill Ltd.

Chapter 11 – Archaeological, Architectural and Cultural Heritage

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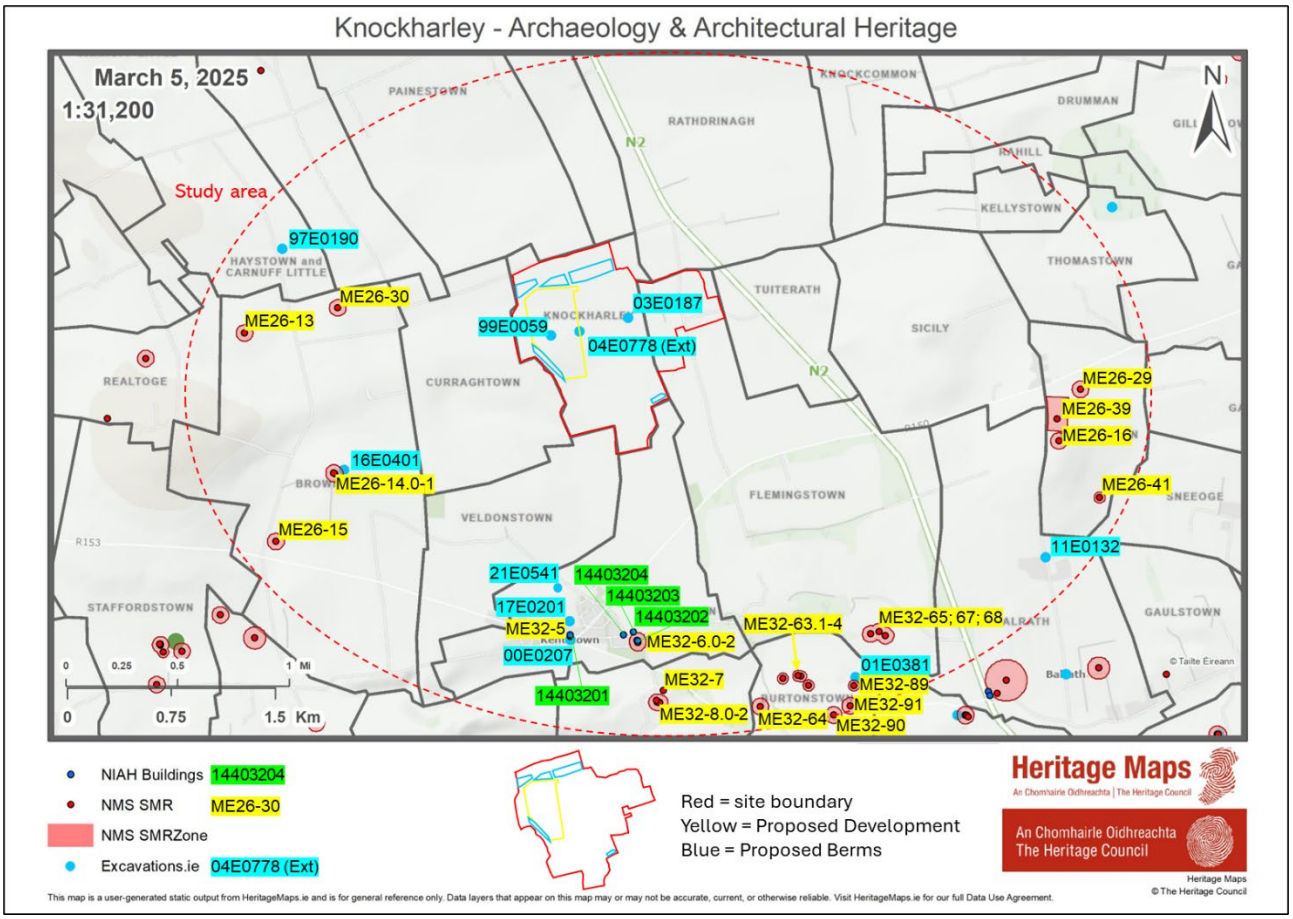
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11. ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

11.1 Introduction

The following chapter assesses the predicted impacts of the Proposed Development on archaeological, architectural and cultural heritage. The Proposed Development is located in the townland of Knockharley, Co. Meath (ITM E. 696978m, N. 767289m; see Figure 12-1).

Figure 11-1. Recorded archaeological and architectural heritage sites within the vicinity of the proposed development.



Archaeological heritage generally refers to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD1700 and usually recorded as archaeological sites within the Record of Monuments and Places. Archaeological heritage encompasses known archaeological monuments, areas of archaeological potential and underwater archaeology. The term architectural heritage applies to structures, buildings, their contents and setting of an (assumed) age, typically younger than 1700 CE. Architectural heritage includes designated architectural heritage and other significant architectural heritage. Cultural heritage is applied to other aspects of the landscape such as historical events, folklore and cultural associations and can accompany archaeological and architectural designation.

In order to inform the likely significant effects from an archaeological, architectural and cultural heritage perspective, a study area was established measuring approximately 1.5 km from the red line boundary, with reference to sites and historical events from farther afield where appropriate for context. While there is no professional standard for defining the extent of a study area when assessing the possible effects on archaeological, architectural, cultural or protected heritage remains the following was applied based on professional experience.

Where appropriate, mitigation measures to limit likely significant effects to the cultural heritage are documented and, thereafter, residual effects are identified and assessed.

11.2 Methodology

11.2.1 Forecasting Methods and Difficulties Encountered

11.2.1.1 Guidelines and Legislation

Archaeological, architectural and cultural heritage have been assessed in line with best practice at a National and EU level, in line with the following:

- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999;
- Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport Infrastructure Ireland, 2017;
- Council of Europe (1985). Convention for the Protection of the Architectural Heritage of Europe (ratified by Ireland 1997), 'Granada Convention';
- Council of Europe (1992). European Convention on the Protection of the Archaeological Heritage (ratified by Ireland 1992), 'Valetta Convention';
- Council of Europe (2005). Framework Convention on the Value of Cultural Heritage for Society, 'Faro Convention';
- Department of Arts, Heritage, Gaeltacht and the Islands (DAHG) (1999). Framework and Principles for the Protection of the Archaeological Heritage;
- Environmental Protection Agency (EPA) (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports, May 2022;
- Heritage Act, 1995 (as amended);
- ICOMOS (2011). Guidance on Heritage Impact Assessments for Cultural World Heritage
- National Monuments Act, 1930 (as amended);
- National Roads Authority (NRA) (2005). Guidelines for the Assessment of Archaeological Heritage;
- Planning and Development Act 2000 (as amended);
- The Heritage Council (2013). Historic Landscape Characterisation in Ireland: Best Practice;
- The UNESCO World Heritage Convention, 1972.

Archaeological monuments are protected through national and international policy designed to secure the protection of the cultural heritage resource. This is facilitated in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention), which was ratified by Ireland in 1997.

The National Monuments Act 1930 (as amended) and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as:

> *"a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto" (National Monuments Act 1930 Section 2)."*

A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

The Minister may acquire National Monuments by agreement or by compulsory order. The State or the Local Authority may assume guardianship of any National Monument (other than dwellings). The owners of National Monuments may also appoint the Minister or the Local Authority of that monument if the State or Local Authority agrees. Once the site is in ownership or guardianship of the State, it may not be interfered with without the written consent of the Minister.

Section 5 of the 1987 amendment to the National Monuments Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the Register are afforded statuary protection under the 1987 Act. Any interference with sites recorded on the Register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a Registered Monument. The Register also includes sites under preservation orders and temporary preservation orders with the written consent, and at the discretion of the Minister.

Section 12 (1) of the 1994 amendment to the National Monuments Act requires the Minister to establish and maintain a Record of Monuments and Places where the Minister believes that such monuments exist. The Record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statuary protection under the National Monuments Act 1994.

Section 12(3) of the 1994 Act provides that:

> *"Where the owner or occupier (other than the Minister) of a monument or place included in the Record, or any other person, proposed to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice to the Minister to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the works until two months after the giving of notice".*

The Council of Europe, in Article 2 of the 1985 Convention for the Protection of the Architectural Heritage of Europe (Granada Convention), states that 'for the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member State will undertake to maintain inventories of that architectural heritage'. The Granada Convention emphasises the importance of inventories in underpinning conservation policies.

The National Inventory of Architectural Heritage ("NIAH") was established in 1990 to fulfil Ireland's obligations under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architectural heritage of Ireland. Article 1 of the Granada Convention establishes the parameters of this work by defining 'architectural heritage' under three broad categories of Monument, Groups of Buildings, and Sites:

- Monument: all buildings and structures of conspicuous historical, archaeological, artistic, scientific, social or technical interest, including their fixtures and fittings;
- Group of buildings: homogeneous groups of urban or rural buildings conspicuous for their historical, archaeological, artistic, scientific, social or technical interest, which are sufficiently coherent to form topographically definable units;
- Sites: the combined works of man and nature, being areas which are partially built upon and sufficiently distinctive and homogenous to be topographically definable, and are of conspicuous historical, archaeological, artistic, scientific, social or technical interest.

The Architectural Heritage (National Inventory) and Historic Properties (Miscellaneous Provisions) Act 1999 and the Planning and Development Act of 2000 are the main built heritage legislation. The Architectural Heritage Act requires the Minister to establish a survey to identify, record and assess the architectural heritage of the country. The National Inventory of Architectural Heritage (NIAH) records all built heritage structures within specific counties in Ireland. The document is used to advise Local Authorities on the register of a Record of Protected Structures (RPS) as required by the Planning and Development Act, 2000.

The Planning and Development Act of 2000 requires Local Authorities to establish a Record of Protected Structures to be included in the County Development Plan (CDP). Buildings recorded in the RPS can include Recorded Monuments, structures listed in the NIAH or buildings deemed to of architectural, archaeological or artistic importance by the Minister. Once listed in the RPS, the sites/areas receive statuary protection from injury or demolition under the Act. Damage to or demolition of a site registered in the RPS is an offence. The detail of the list varies from County to County. If the Local Authority considers a building to be in need of a repair, it can order conservation and/or restoration works. The owner or developer must make a written application/request to the Local Authority to carry out any works on a protected Structure and its environs.

Structures which, on foot of the NIAH survey, have been attributed a rating value of international, national or regional importance in the inventory are recommended by the Minister of Culture, Heritage and the Gaeltacht to the relevant planning authority for inclusion on the Record of Protected Structures RPS. In accordance with Section 53 of the Planning and Development Act 2000, if a planning authority, after considering a recommendation made to it under this section, decides not to comply with the recommendation, it shall inform the Minister in writing of the reason for its decision.

11.2.2 Assessment Methodology

To set the Proposed Development within its wider archaeological, architectural and cultural heritage landscape, and to assess the potential of encountering such features on the site, a paper survey of archaeological, architectural heritage, historical and cartographic sources was undertaken. A study area of approximately 1.5km from the Proposed Development was assessed, with reference to important relevant findings farther afield.

11.2.2.1 Record of Monuments and Places

The Record of Monuments and Places (RMP), comprising the results of the Archaeological Survey of Ireland, is a statutory list of all recorded archaeological monuments known to the National Monuments Service (https://archaeology.ie). The relevant files for these sites contain details of documentary sources and aerial photographs, early maps, OS memoirs, the field notes of the Archaeological Survey of Ireland and other relevant publications. Sites recorded on the Record of Monuments and Places all receive statutory protection under the National Monuments Act 1994. The information contained within the RMP is derived from the earlier non-statutory Sites and Monuments Record (SMR); some entries, however, were not transferred to the statutory record as they refer to features that on inspection by the Archaeological Survey were found not to merit inclusion in that record or could not be located with sufficient accuracy to be included. Such sites however remain part of the SMR. The record is a dynamic one and is updated so as to take account of on-going research. The Record of Monuments and Places was consulted in the Archives of the Department of Arts, Heritage and the Gaeltacht.

11.2.2.2 Recorded Archaeological Objects

The National Museum of Ireland's topographical files are a national archive of all known archaeological finds from Ireland. They relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous excavations. The topographical files were consulted to determine if any archaeological artefacts had been recorded from the area. Other published catalogues of prehistoric material were also studied: Raftery (1983 - Iron Age antiquities), Eogan (1965; 1993; 1994 - bronze swords, Bronze Age hoards and goldwork), Harbison (1968; 1969a; 1969b - bronze axes, halberds and daggers).

11.2.2.3 Recorded Archaeological Excavations

The excavation bulletin website (https://excavations.ie) was consulted to identify previous excavations that have been carried out within the study area. This database contains summary accounts of excavations

carried out in Ireland from 1970 to 2023. There have been no previous licenced archaeological investigations within the study area as recorded on the excavation's website.

11.2.2.4 Cartographic Sources

Down Survey - Taken in the years 1656-1658, the Down Survey of Ireland is the first ever detailed land survey on a national scale anywhere in the world. The survey, led by William Petty, sought to measure all the land to be forfeited by the Catholic Irish in order to facilitate its redistribution to Merchant Adventurers and English soldiers (https://downsurvey.tchpc.tcd.ie/).

Ordnance Survey Early Editions - Reference to cartographic sources provides information on the development of the area. Manuscript maps consulted included the Ordnance Survey first edition 6" (1829-41) and second edition 25" (1897-1913) maps were also assessed (https://heritagemaps.ie).

11.2.2.5 Griffith's Valuation

Griffith's Valuation was the first full-scale valuation of property in Ireland, overseen by Richard Griffith and published between 1847 and 1864. It is one of the most important surviving 19th century genealogical sources (http://www.askaboutireland.ie/griffith-valuation/).

11.2.2.6 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a systematic programme of identification, classification and evaluation of the architectural heritage of the State (https://archaeology.ie; https://buildingsofireland.ie). The Minister for Housing, Local Government and Heritage is currently using the Inventory as the basis for making recommendations for the inclusion of structures in the Record of Protected Structures (RPS).

11.2.2.7 Aerial Photography

Available online sources for aerial photography were consulted, including the Ordnance Survey and National Monuments Service collections, and Google Maps.

11.2.2.8 Historical Research

The baseline historical research utilised sources including Lewis' Topographical Dictionary of Ireland (1837) and local journals.

11.2.2.9 County Development Plan

The Meath Development Plan 2021 – 2027 was consulted (https://www.meath.ie/council/council-services/planning-and-building/development-plans/meath-county-development-plan). The plan includes policy objectives for the protection of the county's architectural heritage through their inclusion in the Record of Protected Structures (RPS) or in Architectural Conservation Areas (ACA). The RPS is a list of every structure which is of special architectural, archaeological, artistic, cultural, scientific, social or technical interest within the council's functional area.

11.2.2.10 Site walkover survey

A site walkover survey was undertaken on 20 March 2025 in sunny dry weather.

11.2.3 Difficulties Encountered

No difficulties were encountered during the study.

Table 11-1. Recorded Archaeological Sites

SMR No	Townland	Monument Class	ITM
ME026-013----	Brownstown	Enclosure	E. 694660m, N. 767409m
ME026-014----	Brownstown	Church	E. 695311m, N. 766393m
ME026-014001-	Brownstown	Graveyard	E. 695305m, N. 766398m
ME026-015----	Brownstown	Moated site	E. 694886m, N. 765904m
ME026-016----	Mullaghfin	Souterrain	E. 700543m, N. 766631m
ME026-029----	Mullaghfin	Enclosure	E. 700698m, N. 767004m
ME026-030----	Realtoge	Ringfort - unclassified	E. 695333m, N. 767592m
ME026-039----	Mullaghfin	Field system	E. 700530m, N. 766790m
ME026-041----	Mullaghfin	Ring-ditch	E. 700837m, N. 766222m
ME032-005----	Kentstown	Font (present location)	E. 697012m, N. 765217m
ME032-006----	Kentstown	Church	E. 697500m, N. 765186m
ME032-006001-	Kentstown	Graveyard	E. 697501m, N. 765173m
ME032-006002-	Kentstown	Tomb - effigial	E. 697497m, N. 765188m
ME032-007----	Danestown	Ringfort - rath	E. 697686m, N. 764827m
ME032-008----	Danestown	Church	E. 697640m, N. 764742m
ME032-008001-	Danestown	Graveyard	E. 697659m, N. 764739m
ME032-008002-	Danestown	Font	E. 697636m, N. 764756m
ME032-063001-	Burtonstown	Ring-ditch	E. 698680m, N. 764930m
ME032-063002-	Burtonstown	Ring-ditch	E. 698659m, N. 764935m
ME032-063003-	Burtonstown	Ring-ditch	E. 698549m, N. 764914m
ME032-063004-	Burtonstown	Ring-ditch	E. 698734m, N. 764864m
ME032-064----	Burtonstown	Ringfort - rath	E. 698386m, N. 764711m
ME032-065----	Flemingstown	Enclosure	E. 699243m, N. 765252m
ME032-067----	Flemingstown	Enclosure	E. 699183m, N. 765236m
ME032-068----	Flemingstown	Enclosure	E. 699290m, N. 765224m
ME032-089----	Burtonstown	Ring-ditch	E. 699062m, N. 764862m
ME032-090----	Burtonstown	Enclosure	E. 698916m, N. 764650m
ME032-091----	Burtonstown	Ringfort - rath	E. 699036m, N. 764717m

Table 11-2. Recorded Archaeological Excavations

License #	Townland	Site type	Period/Dating	ITM
97E0190	Knockharley	No archaeology found	N/A	E 694930m, N 768019m
99E0059	Knockharley	Well and Enclosure	Undetermined	E 696875m, N 767391m
99E0356	-	No archaeology found	N/A	-
00E0207	Kentstown	No archaeology found	N/A	E 697013m, N 765191m
01E0381	Balgeen & Shallow	No archaeology found	N/A	E 699074m, N 764922m
03E0187	Knockharley	Pit and Fulacht fia	Prehistoric (12700 BC-AD 400)	E 697430m, N 767519m
04E0778 (Ext)	Knockharley	Pit features	Prehistoric (12700 BC-AD 400)	E 697080m, N 767420m
11E0132	Kentstown	No archaeology found	N/A	E 700449m, N 765789m
16E0401	Brownstown	No archaeology found	N/A	E 695379m, N 766419m
17E0201	Kentstown	Prehistoric activity	N/A	E 697009m, N 765327m
21E0541	Kentstown	Medieval bivallate ringfort & associated features	Early Medieval (AD 400 - AD 1200)	E 696924m, N 765573m

Table 11-3. Recorded Architectural Heritage Sites

NIAH #	Original Use	In Use As	Date	RPS No.
14403201	church/ chapel	church/ chapel	1835-1845	91156
14403202	church/ chapel	church/ chapel	1790-1800	91159
14403203	rectory/ glebe/ vicarage/ curate's house	rectory/ glebe/ vicarage/ curate's house	1800-1840	91158
14403204	house	house	1780-1820	91157

11.3 Receiving Environment

11.3.1.1 Introduction

Knockharley is in the Electoral Division of Kentstown, in the Civil Parish of Kentstown, in the Barony of Duleek Lower, in the County of Meath. The Irish name for Knockharley is *Cnoc Urthaile* (https://www.logainm.ie/en/38672).

Knockharley borders the following other townlands:

- Curraghtown to the west
- Flemingstown to the east
- Kentstown to the south
- Painestown to the north
- Rathdrinagh to the east
- Thurstianstown to the north
- Weldonstown to the south

The archaeological and architectural heritage of the study area, which comprises an area of approximately 1.5km radius from the site (incorporating the above townlands), is summarised in Tables 11-1 – 11-3 and Appendices 11.1 – 11.3 (see also Figure 11-1).

There are no archaeological monuments recorded from the townland of Knockharley. However, it is located in a rich archaeological landscape. The Boyne Valley lies c. 5km north of the site and contains numerous archaeological sites of international importance including the UNESCO World Heritage Site of Bru na Boinne (the megalithic tombs of Newgrange, Knowth and Dowth), and the ancient seat of the High Kings of Ireland, Hill of Tara is located c. 8km to the southwest.

11.3.1.2 Pre-history (12,700 BCE – 400 CE)

The earliest dateable evidence of human habitation in the study area dates to the Neolithic (new stone age; c. 4,000 BCE – 2,500 BCE) in the form of a 15.2cm long dolerite stone axehead recorded from Painestown (NMI 1978:139). Over 21,000 stone axeheads are known from Ireland (Sheridan et al. 1992, 391; Cooney and Mandal 1998, 4). They represent the 'single most numerous artefact type surviving from prehistory in Ireland' (Mandal 1997, 289; Mandal et al 2004, 116; Woodman 1978; 1987; Cooney and Grogan 1994), with their production and usage noted as commencing in the early Mesolithic and continuing well into the Bronze Age (c. 2,500 BCE – 500 BCE) (Cooney & Mandal 1998, 1; Sheridan et al 1992, 400; Cooney et al 2011, 432; Cooney 2000, 210). Since 1991 stone axeheads have been the focus of detailed research by the Irish Stone Axehead Project (ISAP). Stone axeheads were both a symbol of prestige and an ordinary working tool for people for thousands of years. They served a wide range of functions in early prehistoric Irish society, including use in woodworking, in burial and ceremonial contexts and as symbols of power.

There is abundant evidence of Bronze Age (c. 2,500 BCE – 500 BCE) activity in the study area. Five ring-ditches have been identified in Burtonstown townland (SMR Nos. ME032-063.1–4 and ME032-089) and a sixth in Mullaghfin townland (SMR No. ME026-041). The tradition of ring-barrows and ring-ditches has its origins in the Bronze Age, with sites such as Kilmahuddrick, Co. Dublin, emerging in the Early Bronze Age. Later Bronze Age ring-ditch sites are also known, for example at the Mound of the Hostages, Hill of Tara, Co. Meath, Navan Fort, Co. Armagh, Ballybeen, Co. Down, Beaghmore 10, Co. Tyrone, and Ballygroll, Co. Derry. The tradition continued into the Iron Age, however, with annular and penannular ring-ditches like the Early Iron Age Ballydavis 2, Co. Laois, Ballybranoge South, Co. Limerick, and Duntryleague, Co. Limerick. Multiple phases of use of a ring-barrow are also known from the Early Bronze Age to the Iron Age at Kilmahuddrick, Co. Dublin. The inclusion of grave-goods is a feature of Irish ring-barrows/ditches, from both the Bronze Age and the Iron Age. Ritual funerary monuments without burial—a form of early cenotaph—are also common throughout the later prehistoric period, for example in barrows at Curragh,

Co. Kildare, Mitchelstowndown West, Co. Limerick, and Duntryleague and Lissard–Ballynamona, Co. Limerick (see Stephens 2007). Further Bronze Age activity from the area is indicated by a bronze vessel (NMI 1944:871) recovered from a bog at Thomastown during peat cutting operations.

Archaeological investigations undertaken at the site in Knockharley between 2004 and 2022 comprising testing, monitoring and excavation revealed substantial Bronze Age activity. . In addition to flint arrowheads recovered from topsoil, within 15 areas of archaeological potential identified were numerous pits and burnt mounds. Burnt mounds or fulacht fiadh comprise mounds of charcoal rich soil, heat-fractured stones accompanied by a trough sometimes lined with wooden planks, stone slabs or even clay (Waddell 1998). They are generally located close to water sources including streams, rivers, lakes or marshy ground. The exact use of these sites is still somewhat ambiguous with their traditional interpretation as cooking places coming into question in recent years. They date predominantly to the Bronze Age but date ranges from the Mesolithic period to the medieval period have been returned. At Knockharley, the following dates were obtained:

- Area 2 - BC 2458-2419
- Area 3 - 3820+ 33 BP
- Area 8 - 3320+ 29 BP
- Area 9 - 3653 + 28 BP

Based on these findings, and on the absence of habitation evidence such as houses, Fitzpatrick (License No. 04E0778 (ext)) concluded a transient population of hunters were present in this area over a number of centuries in the Bronze Age.

An Ogham stone (NMI 1970:6) from Painestown townland indicates continued activity into the Iron Age (c. 500 BCE – 400 CE). Over 350 Ogham stones have been recorded in Ireland, with 70% of those occurring in Munster, notably Waterford, Cork and Kerry. They have been described as Ireland's oldest documents (O'Sullivan and Downey), and although they cannot be definitely dated, associated archaeological evidence points to them being in use from the end of the Iron Age (in the 4th and 5th centuries CE) to the Early Medieval Period (c. 7th century CE).

The Painssotwn Ogham stone consisted of a stone pillar with the inscription 'Maqi Caratini Avi Ineqaglas' in Ogham script.

11.3.1.3 The Early Medieval Period (400 CE – 1169 CE)

The spread of Christianity from the early fifth century AD marks the transition from the prehistoric to the medieval period. Ireland at this time was predominantly a rural society, with dispersed settlement (Charles-Edwards 2000). The cluster of archaeological sites in Brownstown, comprising an enclosure, church and graveyard (SMR Nos. ME032-013, 014 and 014.1) are a strong indicator of Early Christian monastic settlement in the area.

Secular life during this period is attested to by defensive enclosures known as ringforts were constructed to protect farmsteads. These are one of the most frequently recorded archaeological site types and c. 50,000 examples are recorded in the Irish landscape. Ringforts are regarded as defended family homesteads and the dating evidence to date suggests they were primarily built between the seventh and ninth centuries AD (Stout 1997, 22–31). Four ringforts are recorded from the study area, raths (earthen ringforts) at Burtonstown(SMR Nos. ME032-064 & 091) and Danestown (SMR No. ME032-007), and an unclassified ringfort at Realtoge (SMR No. ME026-030).

There is also a souterrain (or underground passage) recorded in the study area, at Mullaghfin (SMR No. ME026-016). Quite often souterrains are found in association with ringforts and a detailed study of ringforts in Louth indicates that the majority lie beyond the boundary of the Pale. Souterrains are generally regarded as having had a defensive or protective function, as evidenced by the complex construction of many of the sites, with narrow winding passages, deliberate obstructions and small chambers. Raiding was endemic

during the early medieval period and souterrains may have served to house portable valuables and non-combatants during a raid (Clinton 2001).

Many ringforts have been partially or completely destroyed since the 1960s and often the only indication of the former presence of a ringfort is preserved in townland name elements such as Dún, Rath, Cashel or Lios. However, monuments which have experienced above-ground disturbance continue to be of archaeological interest due to the potential for subsurface remains to exist at their locations. The term 'enclosure' is applied to monuments that cannot be classified more accurately without archaeological assessment but were identified as enclosures during fieldwork or through the study of aerial photography or other sources. Five enclosures have been recorded in the study area, three in Fleimgstown (SMR No. ME032-065, 067 & 068), and one each at Mullaghfin (SMR No. ME026-019) and Burtonstown (SMR No. ME032-090).

11.3.1.4 High Medieval Period (1169 CE – 1600 CE)

The Anglo-Norman's arrived in Ireland in 1169, to support the deposed king of Leinster, Diarmuid MacMurchadha. By the end of the twelfth century the Anglo-Normans had succeeded in gaining control over much of the country (Stout & Stout 1997, 53). The Anglo- Norman tenurial system more or less appropriated the older established land units known as túath in the early medieval period but described the territories as manors (MacCotter 2008).

The townlands of Knockharley, Tuiterath and Flemingstown traditionally formed the border of the lordships of Duleek and Skreen. Knockharly townland is located within the parish of Kentstown, in county Meath. Hugh de Lacey occupied the Lordship of Meath in the 1170s and granted lands, which became known as Kentstown to Stephen de Kent. De Kent granted lands within Kentstown to his own followers and Flemingstown and Tuiterath retain the names of two such grantees. The centre of Kentstown parish is marked by the site of the parish church (SMR No. ME26-006). The residence of Kent was presumably in this area. A tomb effigy of Thomas de Tuite dated to 1363 lies in the churchyard at Kentstown. He wears a tight-fitting jupon, while a dagger hangs on his right hip. An inscription on the tomb reads: 'Here lies Thomas de Tuite, Knight, once Lord of Kentstown, who died on 2nd June 1363'.

11.3.1.5 The Post Medieval & Modern Period (1600 CE –)

In the mid-seventeenth century, the armies of the English Commonwealth, commanded by Oliver Cromwell, emerged victorious over the royalists, and immediately undertook an ambitious project of social engineering, underpinned by a massive transfer in landownership from Irish Catholics to English Protestants. For this to happen, the land had to be accurately surveyed and mapped, a task overseen by the surgeon-general of the English army, William Petty.

Taken in the years 1656-1658, the Down Survey of Ireland is the first ever detailed land survey on a national scale anywhere in the world. The survey sought to measure all the land to be forfeited by the Catholic Irish in order to facilitate its redistribution to Merchant Adventurers and English soldiers. Copies of these maps have survived in dozens of libraries and archives throughout Ireland and Britain, as well as in the National Library of France (see http://downsurvey.tcd.ie/). The Civil Survey (1654-6) for the county of Meath recorded a castle and church at Kentstown (see Figure 12-2).

The Catholic church at Kentstown was constructed in 1841, £200 donated by Sir William Somerville. The new chapel was first used on the 10th July 1845. The Church was dedicated to Our Lady of the Assumption by Dr. Cantwell on 19th October 1854. St. Mary's Protestant Church was founded by Christopher Plunket and built by Sir James Quayle Somerville Bart (who died in 1797). A possible holy well was recorded by the folklore commission from the area of the proposed development. The well is believed to be located in the townland of Knockharley and dedicated to St. Patrick. A feature that may have corresponded to this possible holy well site was investigated by archaeological test trenching in 1999 (License No. 99E0059) and subsequent excavation in 2011 (License No. 04E0778, Area 6). No evidence for a well feature was uncovered.

The first edition Ordnance Survey map of the townland of Knockharley and surrounding townlands, dating to the 1830s, depicts the lands on which the Proposed Development is planned as a series of large and small rectangular fields. A cluster of buildings within an enclosed garden area, led to by a north-south running access is depicted in the centre of the townland, but it is unlabelled (see Figure 12-4).

Lewis's topographical dictionary entry for the Parish of Kentstown (1837) states:

> **KENTSTOWN**, a parish, in the barony of LOWER DULEEK, county of MEATH, and province of LEINSTER, 5 miles (S.) from Slane, on the road from Dublin to Londonderry; containing 500 inhabitants. It comprises 2455 statute acres, as applotted under the tithe act: the soil is good, and there is no waste land or bog. Somerville, the seat of Sir William Meredyth Somerville, Bart., a fine mansion in an extensive demesne, has been recently enlarged and improved, and a handsome entrance lodge erected: the grounds are embellished with an expansion of the Nanny water. At Somerville is a constabulary police station. The living is a rectory, in the diocese of Meath, united, by act of council in 1751, to the rectory and vicarage of Danistown and the vicarage of Ballymagarvey, forming the union of Kentstown, in the patronage of the Crown and Lord Dunsany. The tithes amount to £200, and the entire tithes of the benefice to £330. The church is a neat edifice with a tower, erected about 80 years since, for the repairs of which the Ecclesiastical Commissioners lately granted £134. The glebe-house, which is near the church, was built by aid of a gift of £100 and a loan of £625 from the late Board of First Fruits, The glebes of the union comprise 13 ¾ acres, valued at £39. 3. 11. per annum. In the R. C. divisions this parish forms part of the union or district of Blacklyon, or Ballymagarvey. A school, in which about 12 girls are educated, was founded and is supported by Lady Maria Somerville.

The Griffith's Valuation of 1847 to 1864 depicts the townland of Knockharley as being in the ownership of five lessors and inhabited by eight households, divided into 4 landholdings. The total value of the land is given as £197 and 15s and of buildings is given as £15 and 10s (see Figure 12-4).

Little has changed by the time of the second edition Ordnance Survey, dating to the 1910s, save that some of the larger fields have been subdivided into a series of smaller fields (see Figure 12-5).

Aerial photography images from 1995 (Figure 12-6) and 2000 (Figure 12-7) suggests there were little or no changes to the landscape in the twentieth century, with the land remaining in agricultural use with a mixture of tillage and open pasture. By 2005, a significant portion of the townland had been developed (see Figure 12-8), and this pattern of extended development has continued to the present day (see Figures 12-9 – 10).

11.3.1.6 Site walkover survey

A site walkover survey was undertaken on 20 March 2025 in sunny dry weather. The site has been substantially developed in the past two decades (see Figure 12-11 for photograph locations and directions and Figures 12-12 – 12-19 for photographs).

11.3.1.7 Previous archaeological excavations

The Proposed Development has been substantially developed, with topsoil stripping archaeologically monitored under license to the National Monuments Service between 2004 and 2022 (Fitzpatrick 2022; License No. 04E0778 (and extensions)). The majority of the Proposed Development was subjected to topsoil stripping and archaeological monitoring, with the exception of the northern and western portions (see Figure 12-12).

In the course of monitoring topsoil stripping a total of fifteen areas of archaeological potential were uncovered (see Figure 12-12). Area 14 was not of archaeological significance with the features uncovered relating to relatively recent agricultural activity and previous geotechnical test excavations at the site. In Area 13 a sub-rectangular pit feature contained the skeleton remains of a number of sheep that had been buried here in recent years while a natural spring was recorded in Area 6.

The remainder of the features identified in the course of archaeological monitoring of topsoil stripping were archaeological in nature. Seventeen sherds of medieval pottery were recovered from Area 4, four of which were recovered from the fill (C4) of a large pit. The four pottery fragments recovered from the fill were all of Dublin-Type wares suggesting a thirteenth century date for this feature. One fragment of Saintonge green-glaze was recovered from the topsoil in this area while the remainder were Dublin-Type wares. This is the only secure medieval date from the site as the 14 remaining medieval pottery sherds from the site were founds in the topsoil.

A total of 123 post-medieval sherds were recovered from topsoil clearing at the site. The assemblage consists of a minimum of ten different ware types of seventeenth to nineteenth century date and included North Devon gravel-free ware, Glazed red earthenware, Black glazed/Buckley type earthenware, Pearlware, Shell-edged Pearlware, Spongeware, Transfer Printed Ware, Porcelain and Stoneware.

The remainder of the archaeological features were generally concentrated to the north of a burnt spread (Area 2) and to the south of a second burnt spread in Area 9. Both of these areas presented as mounds of heat fractured stones with associated pits. A radiocarbon date of charcoal in Area 2 yielded a date of BC 2458-2419 while a date of 3653 + 28 BP was recorded from charcoal in Area 9.

The vast majority of features throughout the site comprised of isolated or group of pits that generally presented as sub-circular or circular in shape and were filled with heat shattered stones with occasional charcoal inclusions. Radiocarbon dating of charcoal from one of these pits in Area 3 indicated a date of 3820+ 33 BP and in Area 8 a date of 3320+ 29 BP indicating human activity in these areas over a number of centuries.

Few if any finds were recorded from the pits with the exception of Area 7. This area, located in the west of the site presented as a large irregular shaped pit (F4, C7/9) surrounded by smaller pits. A radiocarbon date from the fill (C22) of one of the surrounding pits yielded a date of 4045+33 BP. The heat shattered stone fill of C7/C9 included a number of burnt animal bone fragments and animal teeth. Six flint pieces were recovered from the fill (C7) while a total of 14 lithics were recovered from Area 7. The lithic analysis suggests that two flint pieces (04E0778:154 and 04E0778:156) recovered were very fresh, suggesting that knapping took place nearby this feature, and that it was open at the time the lithic was struck and discarded. The other lithics (04E0778:153, 04E0778:155, 04E0778:157, 04E0778:158) recovered from this pit are likely to have entered the pit at the same time. It is suggested these pieces may have been reduced in the same knapping episode, or in a series of closely-timed ones. These represent a dump of waste debitage from knapping.

No definite prehistoric habitation evidence was recorded at the site. A curved slot feature (C58) partially enclosing an area 2.5m x 2.8m in Area 8 may have functioned as a hut site however no dating evidence was recorded from the feature.

The archaeological evidence indicates that while no monuments are recorded from the townland of Knockharley there was a significant prehistoric human presence in the area. This is reflected in the numerous features recorded throughout the site and the relatively few but significant artefacts. These include three flint arrowheads recorded from topsoil levels. Two of these are hollow-based arrowheads (04E0778:168 & 04E0778:187). The third arrowhead (04E0778:210) is a triangular form with a concave base and is among the smallest of this type recorded. The excavations at Knockharley indicate a transient population of hunters concentrated in this area over a number of centuries in the Bronze Age.

11.3.1.8 Archaeological discoveries not excavated

Area 12, at the time located below a row of electric wires supported by large pylons, was not subjected to archaeological resolution as this area was not being developed at the time. The features identified in this area were recorded and covered over with a buffer zone established around the area of archaeology (see Figure 12-13).

Two burnt stone concentrations were identified during topsoil stripping and were subsequently manually cleaned back to reveal spreads of burnt stone and clay with a number of associated pit features. As this area was located immediately below overhead electricity wires, it was not subject to development. The main features were recorded and the area covered over with topsoil. A barbed and tanged arrowhead (04E0778:164) was recovered during archaeological monitoring of topsoil stripping topsoil to the west of Area 12.

The main feature was a roughly horseshoe-shaped area of fragmented burnt stone and clay covering an area measuring 16.5m N-S and c. 13.5m E-W. A second area of burnt clay was located to the immediate E and was cut by a field drain. The main area of burnt material opens to the west and while no trough feature was immediately apparent a sub-circular pit 1.15m in length and 0.95m wide, filled with burnt stone located in the centre. At least one furrow feature (F13) runs E-W through the burnt stone feature while machine tracks (F14 & F15) were also recorded running E-W through the area. A sub rectangular pit (F12) located 4m from the burnt spread appears to represent the location of a water spring. The feature measures 1.45m x 0.8m and is currently filled with fire cracked stone and clay. Water continually rises from this location and an attempt to drain this water is evident in the stone drain (F11) that runs north from the northern edge of the spring. A second area of concentrated fire cracked stone and burnt clay is located to the immediate east of F5. The exact extent of this feature was not determined, and it may simply be material from the burnt mound that has spread here during subsequent agricultural activities at the site. A number of small pit features were identified in the area surrounding F5. Two pits (F7 & F8) are located 9m east of the main burnt spread (F5), while a third (F9) is located 1.3m south of the southern terminal (Fig. 53). Feature 7 is 0.6m in diameter and filled with mixed clay and stone while Feature 8 is oval in shape with the long axis orientated E-W and extending for a length of 1m and is 0.6m wide. Feature 9 is circular in shape and 0.65m in diameter. Cut into the yellow/brown silty subsoil it is filled with fire cracked stones and clay.

Given the results of the excavation of other burnt features on site, coupled with the morphology and content of the above findings, it is likely that these features represent the remains of a fulacht fiadh or brunt mound (a Bronze Age cooking site).

Figure 11-2. Extract from Down Survey Map of Co. Meath.

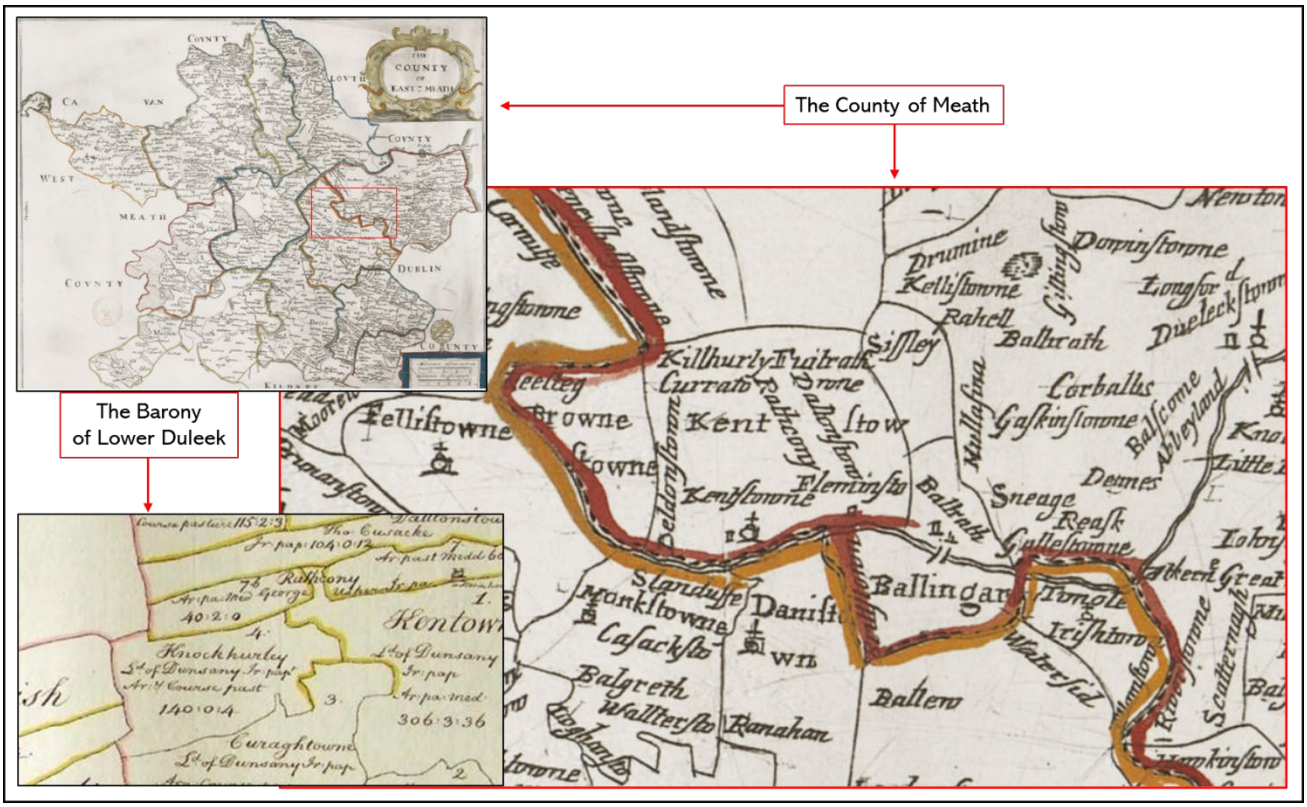


Figure 11-3. Extract from first edition Ordnance Survey Map.

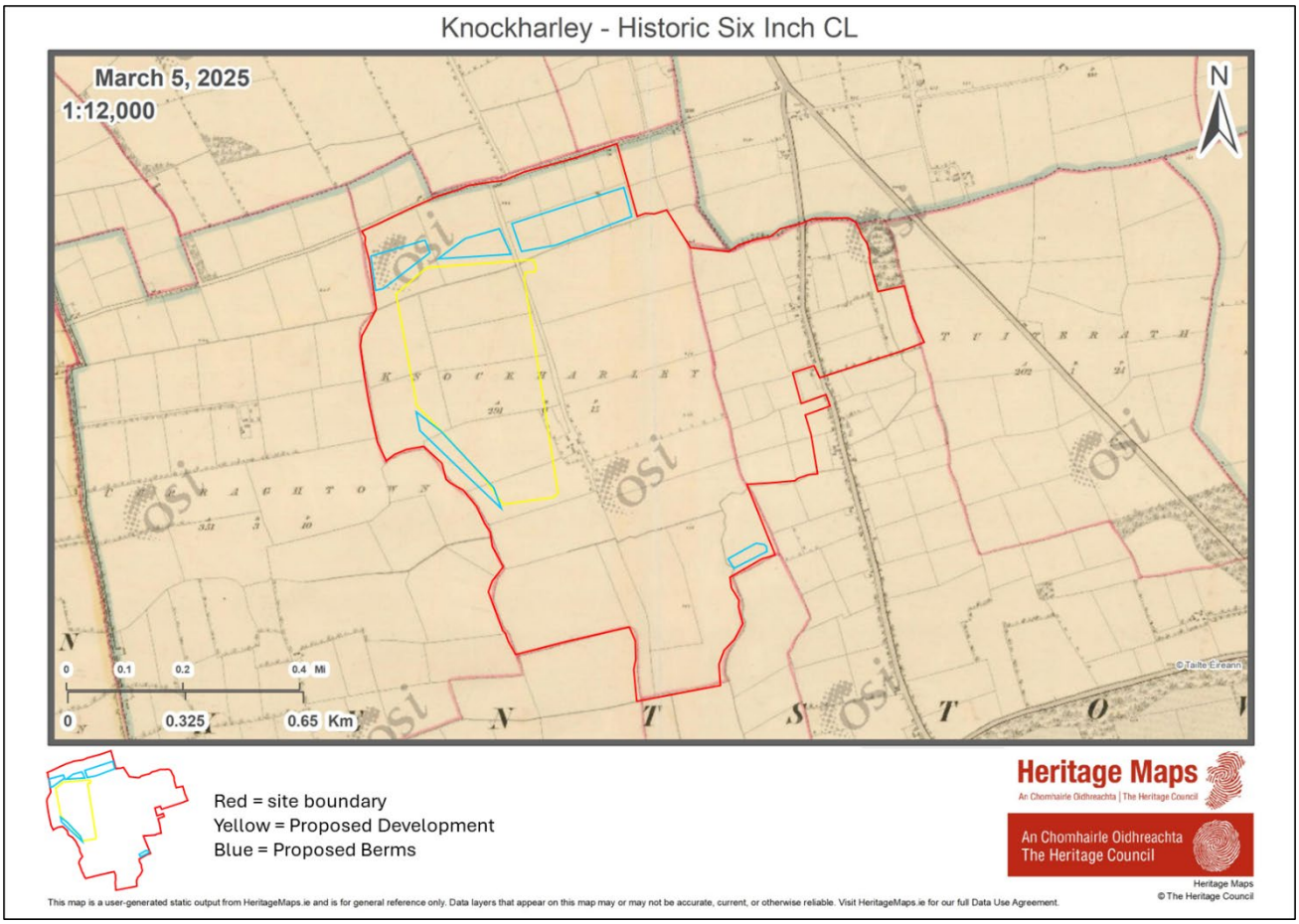
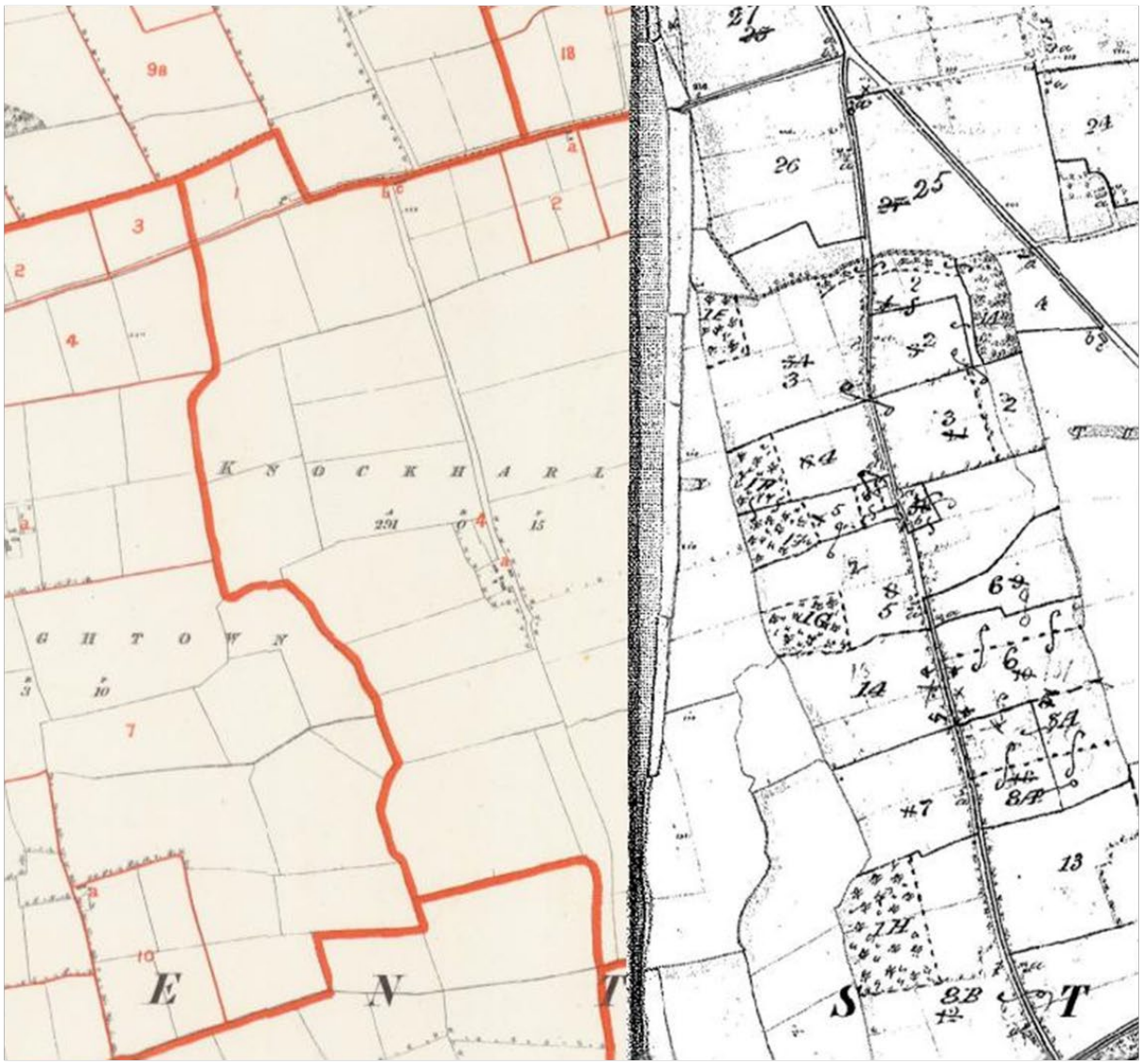


Figure 11-4. Extract from Griffith Valuation for Knockharley.



VALUATION OF TENEMENTS. 49

No. and Letters of Reference to Map.	Names. Townlands and Occupiers.	Names. Immediate Lessors.	Description of Tenement.	Area.	Rateable Annual Valuation. Land.	Rateable Annual Valuation. Buildings.	Total Annual Valuation of Rateable Property.
				a. r. p.	£ s. d.	£ s. d.	£ s. d.
	KNOCKHARLEY. (*Ord. S.* 26.)						
1	Thomas Carpenter, .	Arthur Murray, . .	Land, . . .	7 0 19	4 5 0	—	4 5 0
— *a*	Charles Martin, .	Thomas Carpenter. .	House, . . .	—	—	0 5 0	0 5 0
2 *a*	Margaret O'Brien. .	William A. Shaw, .	House and land, .	8 0 20	5 0 0	0 10 0	5 10 0
3 *a*	Mary Levinge, . .	Same. . .	House, office, and land.	12 2 9	7 10 0	0 10 0	8 0 0
— *b*	Alice Phillips, . .	Mary Levinge, . .	House. . . .	—	—	0 5 0	0 5 0
4 *a*	Laurence Kinshella, .	William A. Shaw, .	House, offices, and land.	263 1 7	181 0 0	13 0 0	191 0 0
— *b*	George M'Loughlin, .	Laurence Kinshella, .	House, . . .	—	—	0 10 0	0 10 0
— *c*	Francis Phew, . .	Same, . .	House, . . .	—	—	0 10 0	0 10 0
			Total, . .	291 0 15	197 15 0	15 10 0	213 5 0

Figure 11-5. Extract from second edition Ordnance Survey Map.

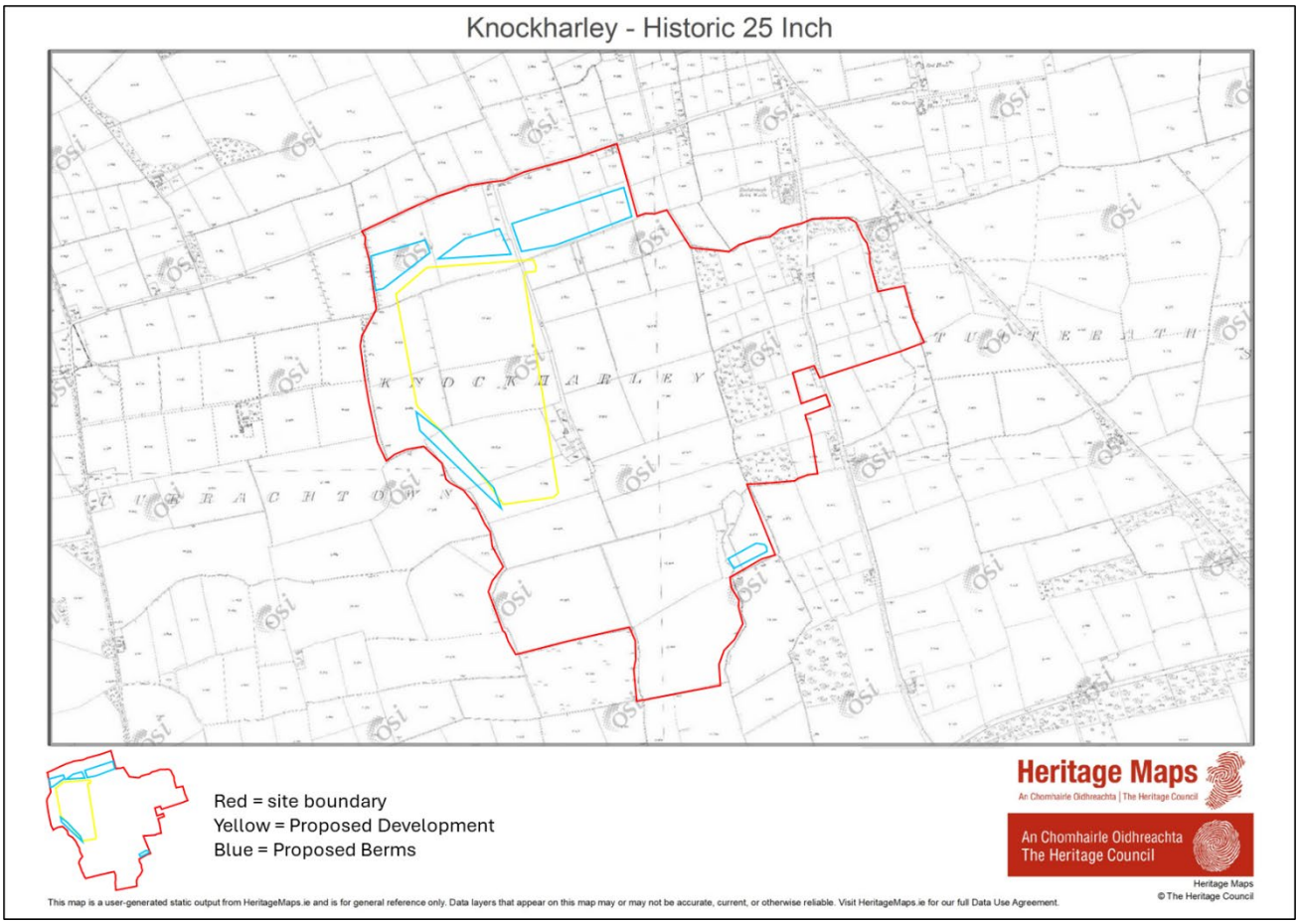


Figure 11-6. Aerial photograph of Knockharley (1995).

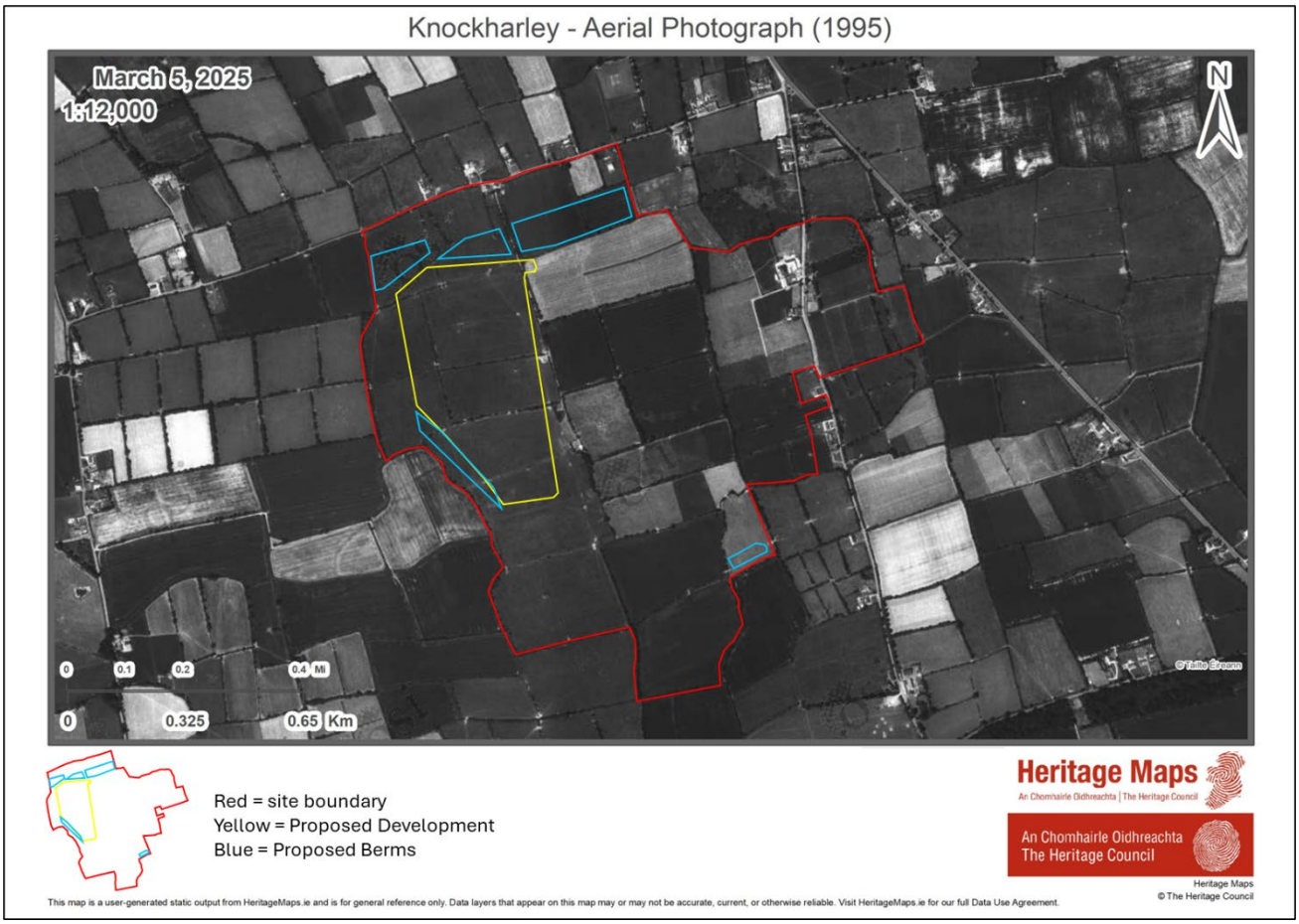


Figure 11-7. Aerial photograph of Knockharley (2000).

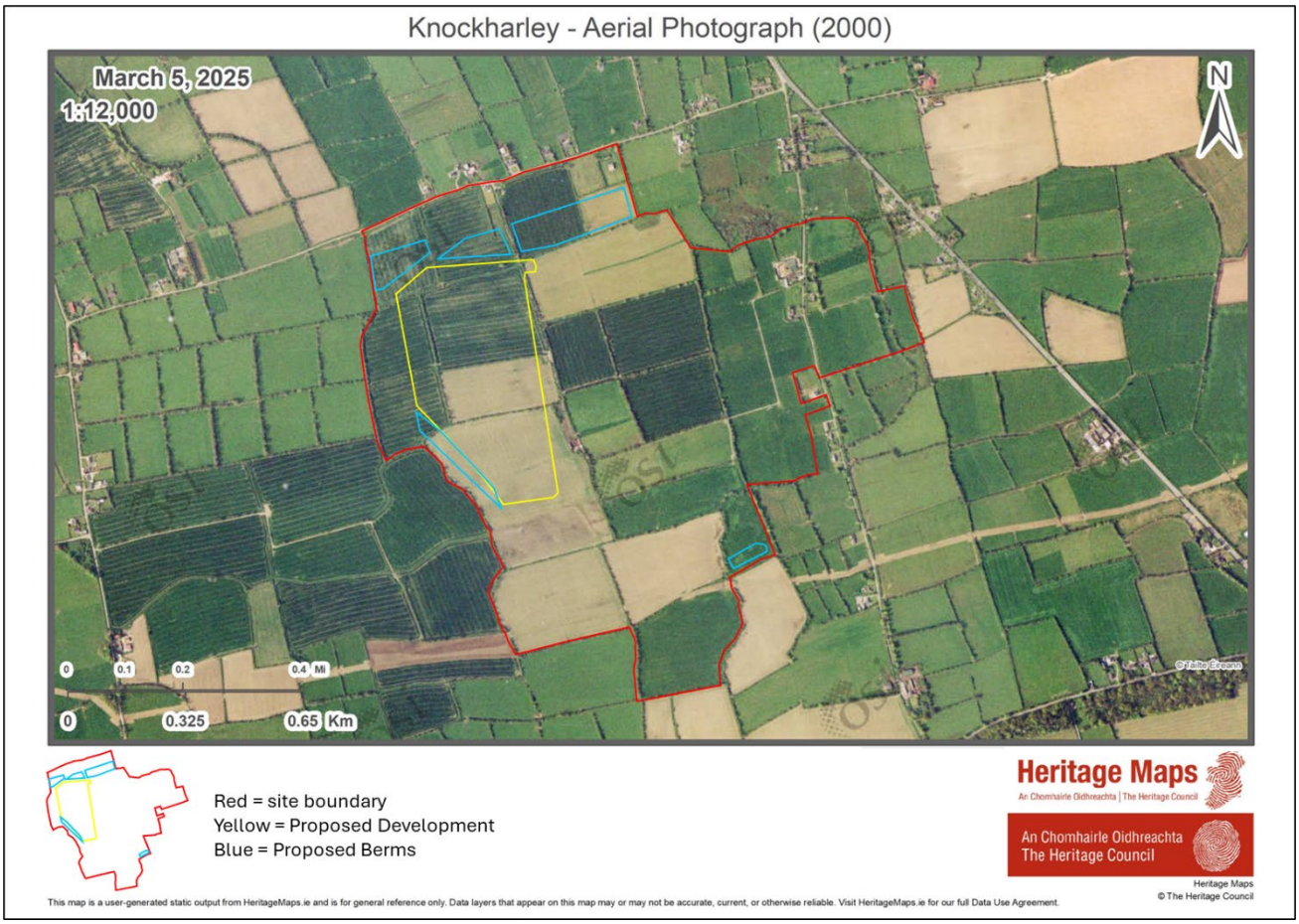


Figure 11-8. Aerial photograph of Knockharley (2005).

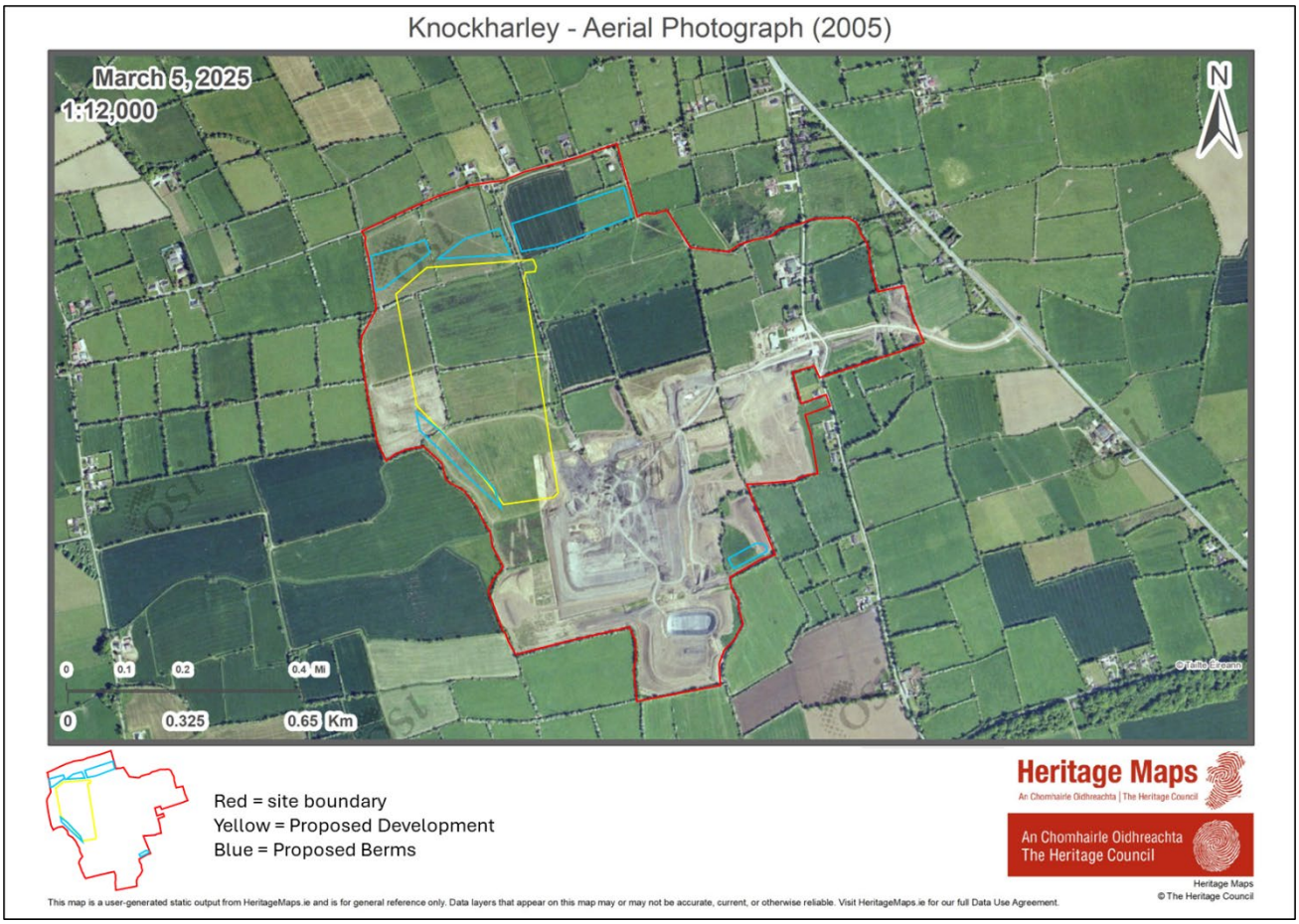


Figure 11-9. Aerial photograph of Knockharley (Digital Globe).

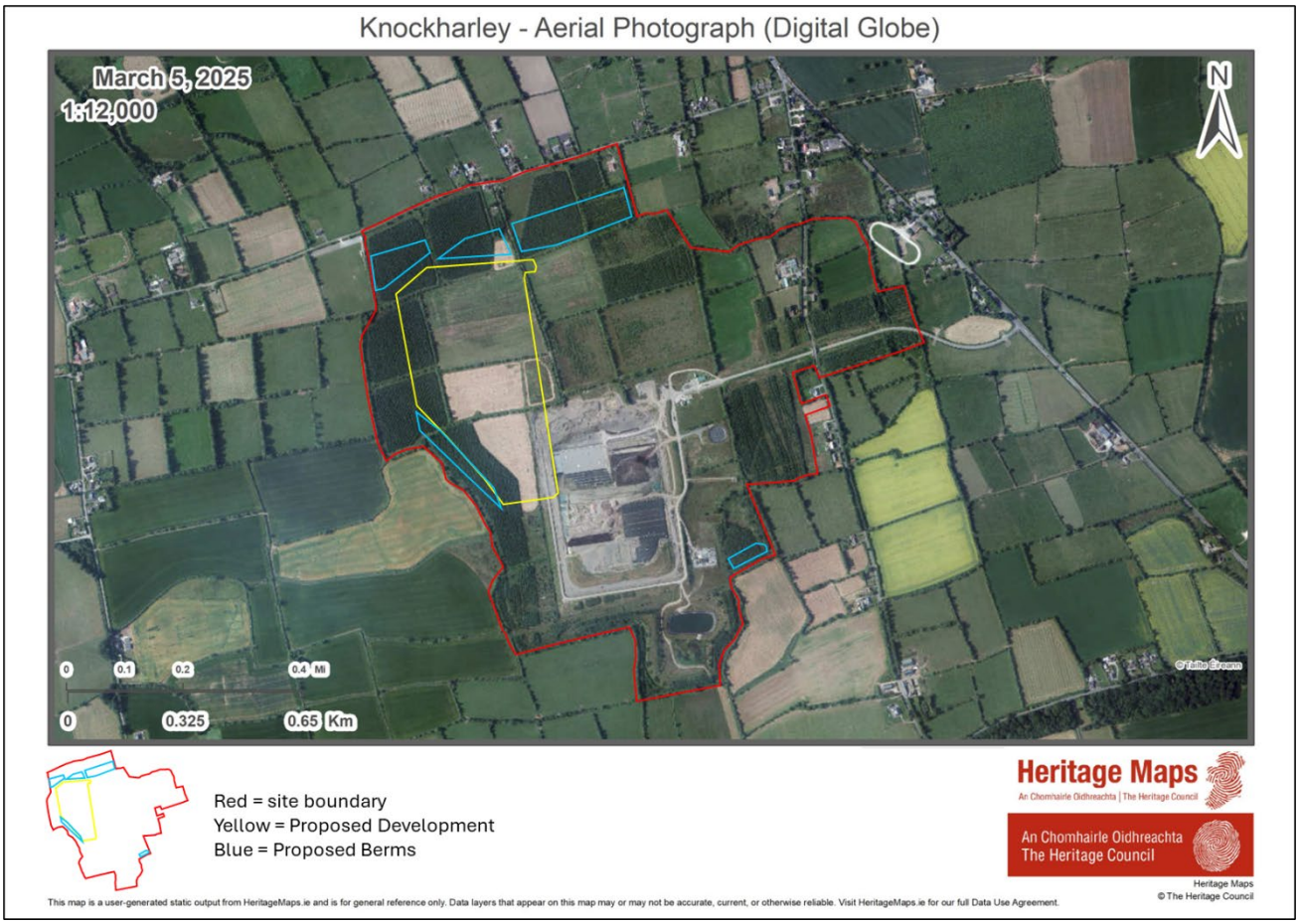


Figure 11-10. Aerial photograph of Knockharley (Google Maps).

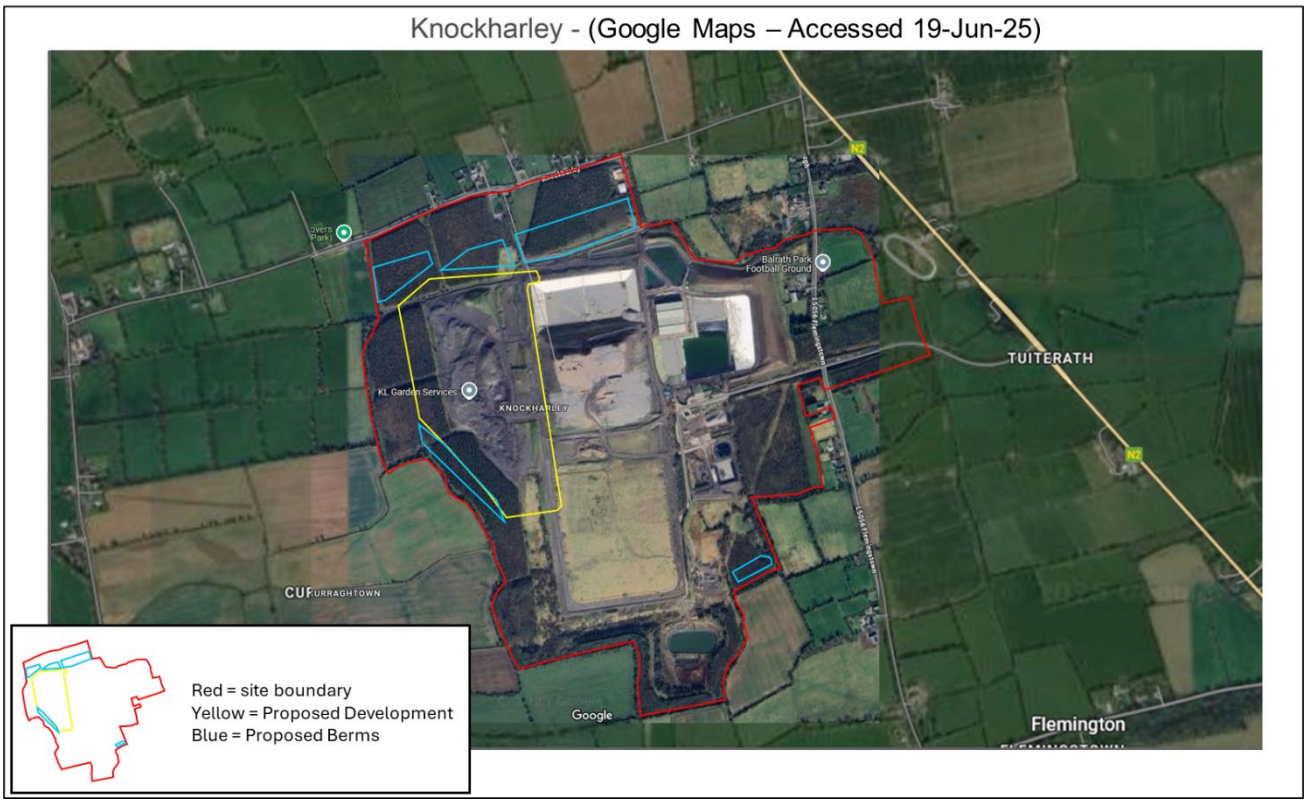


Figure 11-11. Aerial photograph of Knockharley (Google Maps), showing location and orientation of photographs taken during site walkover.

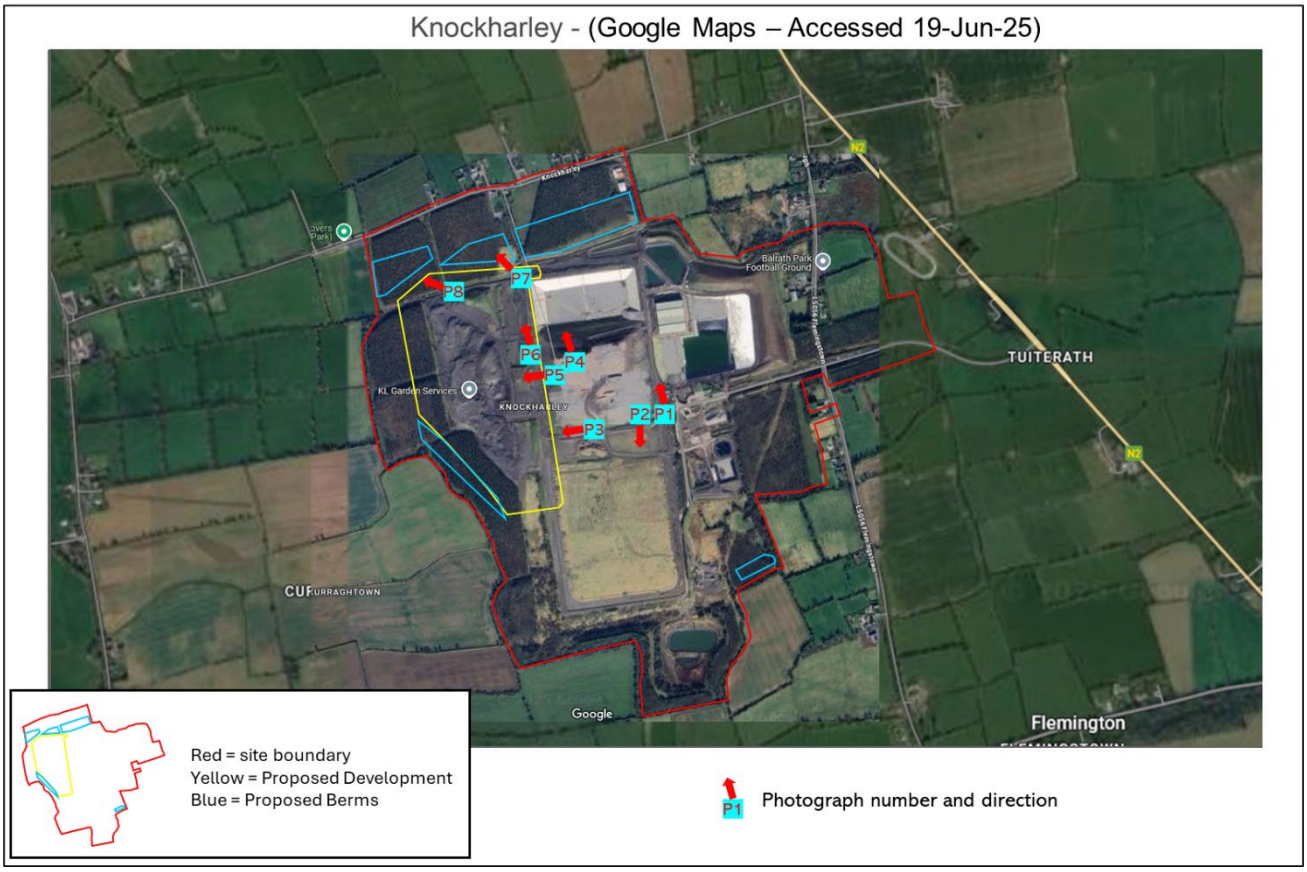


Figure 11-12. Photograph of site (P1), facing north.



Figure 11-13. Photograph of site (P2), facing south.



Figure 11-14. Photograph of site (P3), facing west.



Figure 11-15. Photograph of site (P4), facing north.



Figure 11-16. Photograph of site (P5), facing west.



Figure 11-17. Photograph of site (P6), facing north.



Figure 11-18. Photograph of site (P7), facing northwest.



Figure 11-19. Photograph of site (P8), facing northwest.



Figure 11-20. Previous archaeological monitoring and archaeological features identified (after Fitzpatrick 2022).

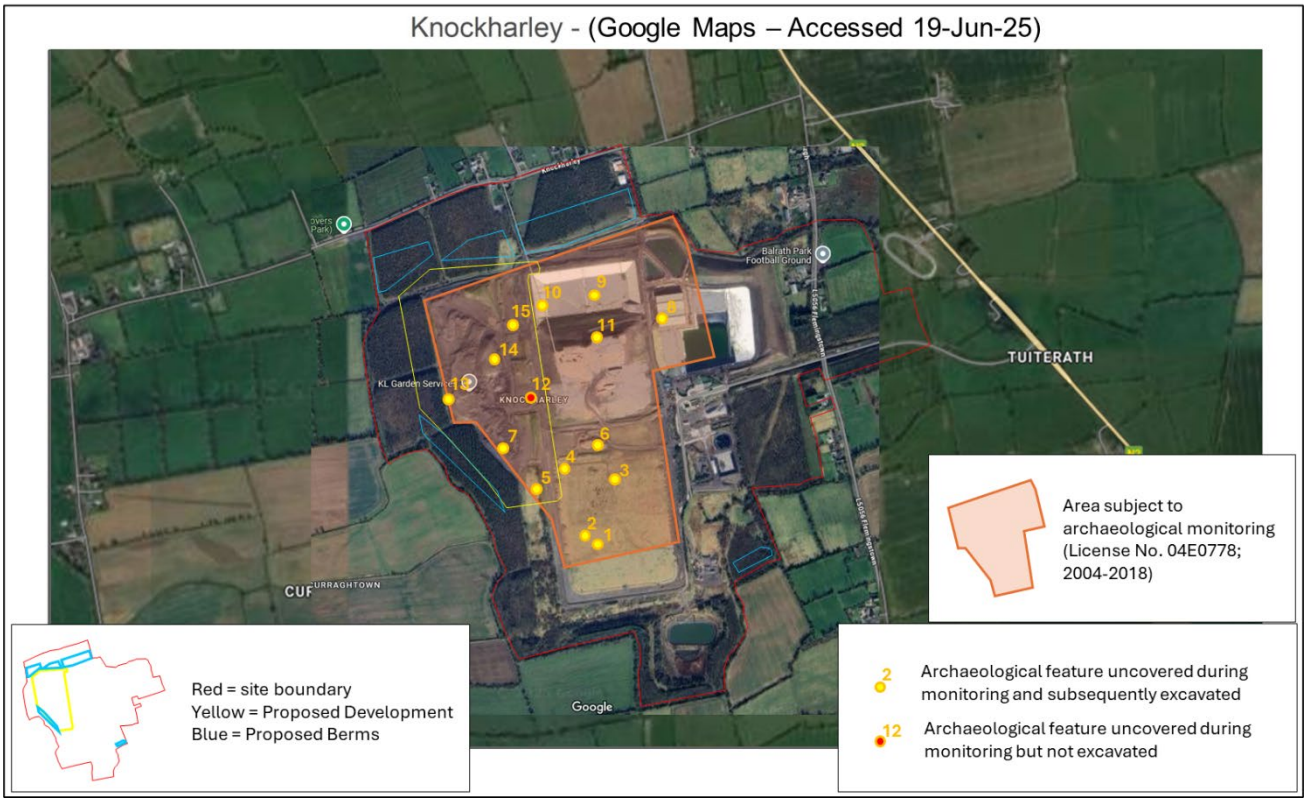
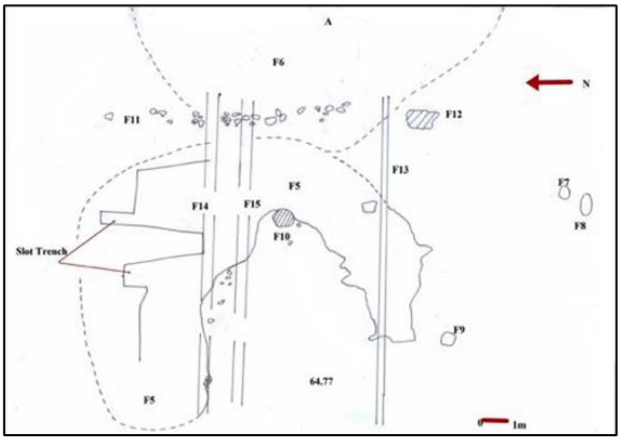


Figure 11-21. Previous archaeological monitoring and archaeological features identified (after Fitzpatrick 2022).



Location of Area 12



Plan of Area 12

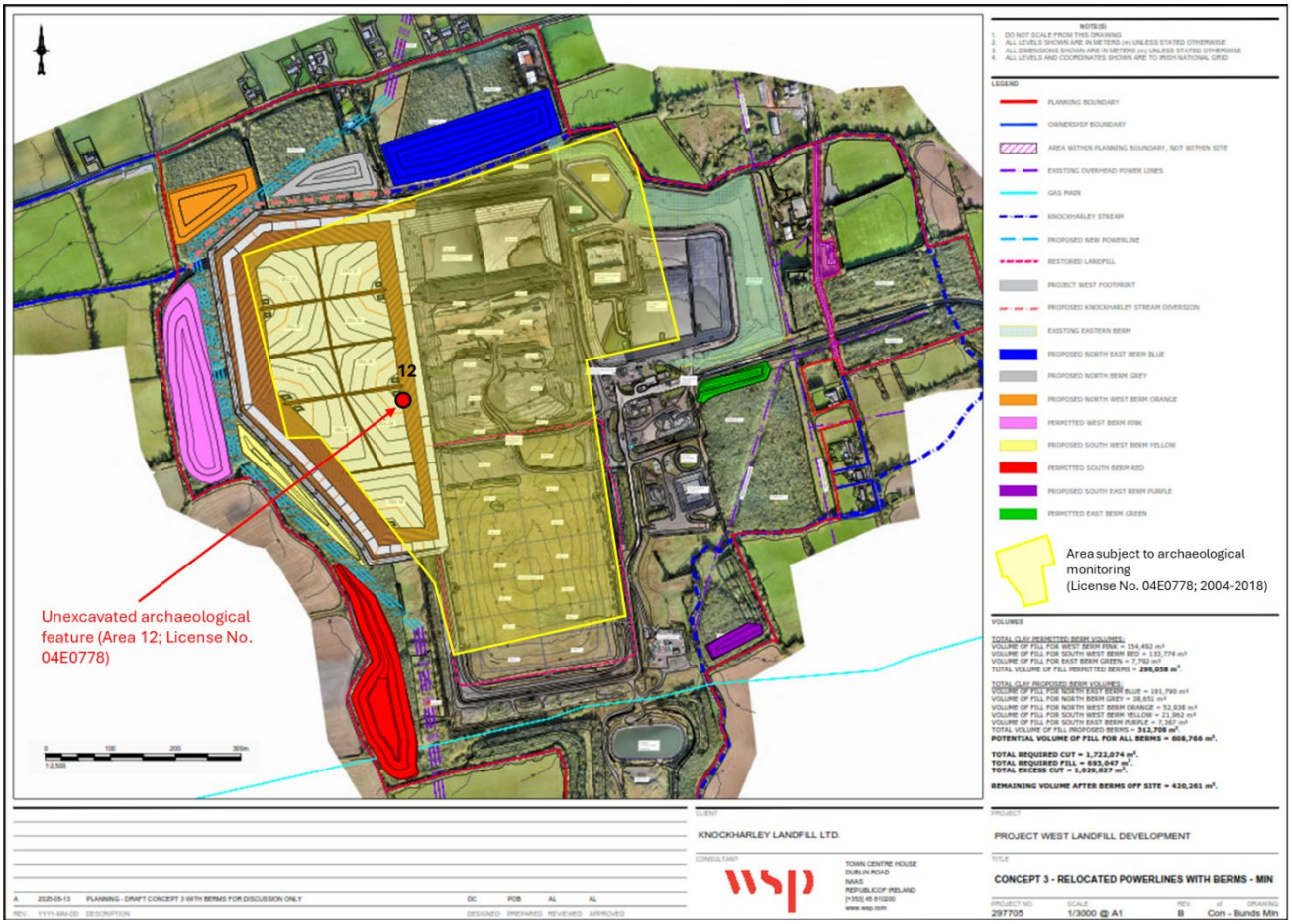


Area of archaeological activity exposed in Area 12



Detail of F10 in Area 12

Figure 11-22. Previous archaeological monitoring and unexcavated archaeological features overlain on Proposed Development plan.



11.4 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction phase and operational phase of the proposed development. The information presented in this section is informed by the project design, but it is not a complete description of the Proposed Development. Therefore, it should be read in conjunction with the full development package. For a more comprehensive understanding of the Proposed Development, please refer to Chapter 2 (Description of the Proposed Development) of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the proposed development.

11.4.1 Construction Phase

In relation to archaeology, architectural and cultural heritage, the Proposed Development will comprise substantial ground disturbance for the excavation of the extension to the landfill (see Figure 12-22). The majority of the area has been stripped of topsoil in the past (under archaeological supervision). There will be further ground disturbance during the construction phase to facilitate the construction programme and methodology. Ground disturbance that could potentially impact on previously unrecorded sub-surface archaeological remains include top-soil stripping and the excavation of trenches.

11.4.2 Operational Phase

There will be no ground disturbance during the operational phase of the Proposed Development.

11.5 Potential Impacts of the Proposed Development

11.5.1 Construction Phase

The potential impacts of the Proposed Development on archaeological and architectural heritage can be summarised as follows:

There are no archaeological sites as recorded in the Record of Monuments and Places within the site boundary.

Archaeological features were identified during archaeological monitoring of a previous phase of development. One of these features (Area 12) was not excavated at the time as it was close to overhead power lines and was not being developed. These will be excavated (preserved by record) in advance of construction.

There are 28 recorded archaeological sites within c. 1.5km of the Proposed Development lands. None of these sites will be impacted, either directly or indirectly, by the Proposed Development works.

There have been eleven licenced archaeological excavations in the study area in advance of development works.

A desk-top survey of the lands proposed for development, did not highlight any additional, previously unrecorded, archaeological features.

The archaeological sites in the study area, coupled with the results of archaeological excavation, and with stray archaeological finds in the vicinity are indicative of the landscape having been populated since early prehistory and throughout the medieval and post-medieval periods.

The majority of the Proposed Development lands has been developed in the past (since 2004), and subject to the archaeological monitoring (License No. 04E0778 (and extensions)). In the eighteen years of archaeological supervision, fifteen areas of archaeological potential were identified, of which fourteen were

excavated. Twelve of the fourteen were determined to be archaeological. These excavations indicate a transient population of hunters concentrated in this area over a number of centuries in the Bronze Age. Artefactual evidence in the form of poetry also indicates human activity in the medieval and post-medieval periods.

One of the archaeological features identified (Area 12, comprising a series of burnt spreads) was not excavated and remains in-situ beneath the re-deposited topsoil. Given the results of the excavation of other burnt features on site, coupled with the morphology and content of the findings in Area 12, it is likely that these features represent the remains of a fulacht fiadh or burnt mound (a Bronze Age cooking site). This will be directly impacted by the Proposed Development.

There are areas of the Proposed Development lands that have not been archaeologically monitored and / or stripped of topsoil in the past, notably the northern and western portions of the proposed landfill extension. Should ground disturbance be required in these areas, there is the potential for previously unrecorded archaeological material to be uncovered during the course of construction works.

There are no recorded architectural heritage sites within the Proposed Development lands, as listed in the National Inventory of Architectural Heritage and the Record of Protected Structures. There are four recorded NIAH sites within c. 1.5km of the Proposed Development lands, all listed in the RPS. None of these will be impacted, directly or indirectly, by the Proposed Development.

The potential impact of the Proposed Development on the archaeological, architectural and cultural heritage is deemed to be ***negative***, ***not significant*** and ***permanent***.

11.5.2 Operational Phase

No impacts on archaeological, architectural and cultural heritage are expected as a result of the operational phase of the Proposed Development.

11.6 Mitigation Measures

11.6.1 Construction Phase

In order to mitigate against the potential impacts of the Proposed Development on archaeological heritage, the following will be required:

A suitably qualified archaeological consultant should be retained to oversee the archaeological and mitigation strategy for the Proposed Development prior to and during the construction phase.

The location and extent of the identified but unexcavated archaeological features in Area 12 will be required to be re-established, cordoned off and archaeologically excavated (preserved by record) under license to the National Monuments Service in advance of construction commencing in this area.

Archaeological monitoring under license to the National Monuments Service will be required to be undertaken in areas where topsoil stripping is required of lands that have not previously been stripped of topsoil by previous phases of development.

In addition to Area 12, any potential archaeological features identified by monitoring that cannot be avoided (preserved in-situ), will require permission from National Monuments for the excavation (preservation by record) of these remains.

Provision will be required to be made for the post-excavation analysis and reporting of archaeological findings, in accordance with the licensing requirements of the National Monuments Service.

With these mitigation measures implemented, the potential impact of the Proposed Development on the archaeological, architectural and cultural heritage is deemed to be ***neutral***, ***slight*** and ***permanent***.

Please note that the recommendations given here are subject to the approval of the National Monuments Service, Department of Housing, Local Government and Heritage.

11.6.2 Operational Phase

No mitigation measures are required for archaeological, architectural and cultural heritage during the operational phase of the Proposed Development.

11.7 Monitoring or Reinstatement Measures

11.7.1 Construction Phase

As noted above, archaeological monitoring under license to the National Monuments Service should be undertaken in areas where topsoil stripping is required of lands that have not previously been stripped of topsoil by previous phases of development.

11.7.2 Operational Phase

There are no ongoing monitoring or reinstatement requirements during the operational phase relating to archaeological, architectural and cultural heritage.

11.8 Residual Effects of the Proposed Development

11.8.1 Construction Phase

There are no identified residual effects during the construction phase relating to archaeological, architectural and cultural heritage. Should previously unknown sub-surface archaeological features be encountered during the course of the implementation of mitigation measures, the excavation of these will add to the academic knowledge and therefore be a ***positive, long term*** and ***moderate*** effect.

11.8.2 Operational Phase

There are no identified residual effects during the operational phase relating to archaeological, architectural and cultural heritage.

11.9 Cumulative Impacts of the Proposed Development

11.9.1 Construction Phase

Archaeological investigations undertaken during previous development works at the site since 2004 have identified fifteen areas of archaeological potential, of which thirteen are archaeological in nature. These sites, for which only sub-surface remains survived, would not have been known had the development not been undertaken. The excavation of the one remining identified archaeological area, coupled with the excavation of the above sites identified during previous development works, and any further archaeological features identified during monitoring of construction works, will add knowledge to the academic record.

The academic knowledge gained from the excavation of these features, has resulted in a net cumulative ***permanent***, ***significant***, ***positive*** impact.

11.9.2 Operational Phase

During operation there is no potential for cumulative impact as there will be no disturbance to ground.

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Chapter 12 – Landscape and Visual

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12. LANDSCAPE AND VISUAL

12.1 Introduction

This Landscape and Visual Assessment (LVIA) has been prepared to accompany a planning application for an extension to the existing Knockharley landfill at Knockharley, County Meath.

This LVIA describes the landscape context of the proposed development and assesses the likely landscape and visual impacts of the scheme on the receiving environment. 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).

12.1.1 Approach and Statement of Authority

This LVIA adopts an approach that is founded in the following best practice guidance documents:

- Landscape Institute and the Institute of Environmental Management and Assessment (IEMA) publication entitled Guidelines for Landscape and Visual Impact Assessment, 2013 (GLVIA3);
- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (2022); and
- 'Photography and Photomontage in Landscape and Visual Impact Assessment', Landscape Institute Technical Guidance Note 06/2019.

12.2 Methodology

This document uses methodology as prescribed in the previously mentioned GLVIA3, which follows the European Landscape Convention (ELC) definition of landscape:

'Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000). Thus, GLVIA-2013 covers all landscapes from "high mountains and wild countryside to urban and fringe farmland (rural landscapes), marine and coastal landscapes (seascapes) and the landscapes of villages towns and cities (townscapes)" - whether protected or degraded.

12.2.1 Scope of the Assessment

GLVIA3 establishes guidelines and not a specific methodology. The preface recognises that:

'This edition concentrates on principles and processes. It does not provide a detailed or formulaic 'recipe' that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand.'

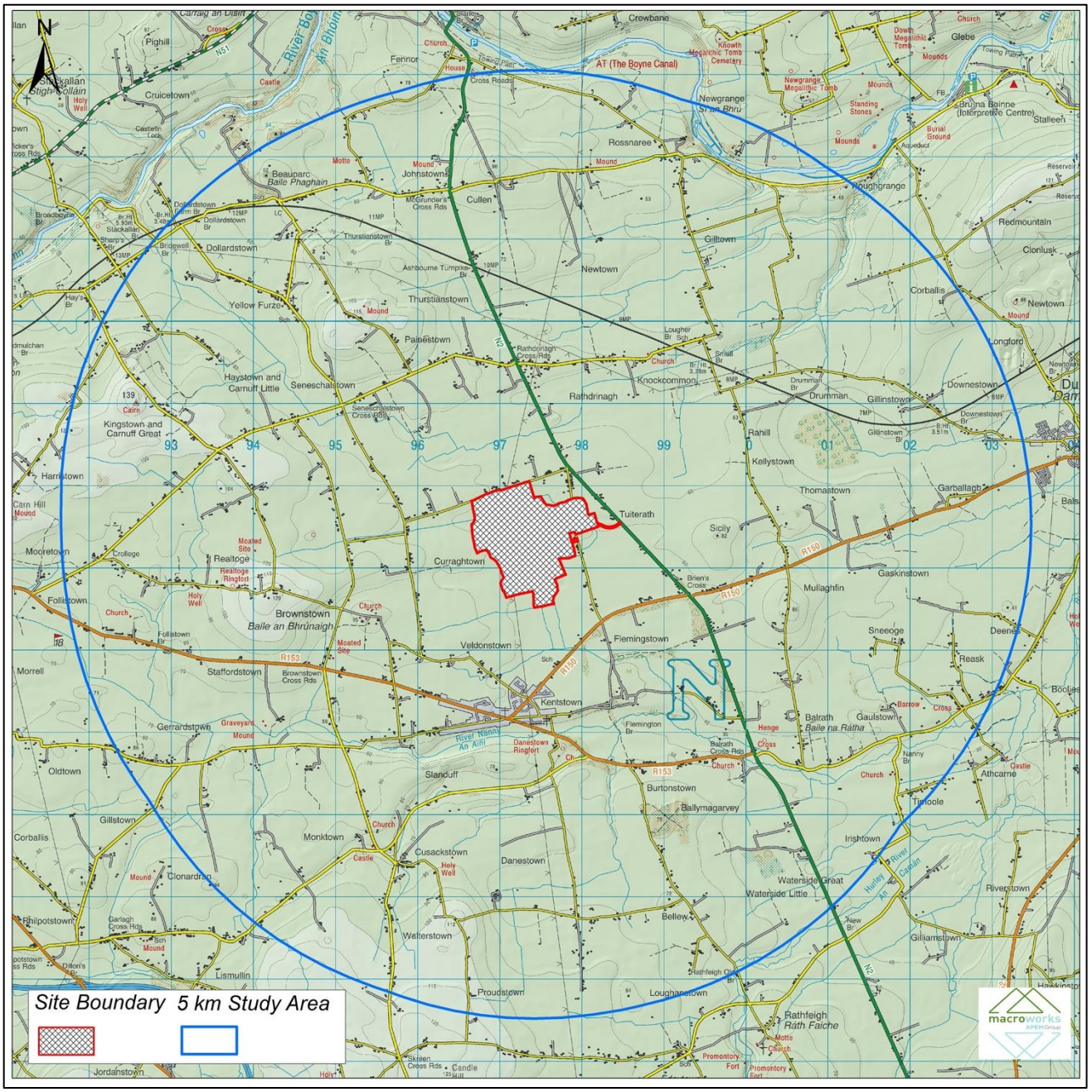
The methodology for this assessment has therefore been developed specifically for this assessment to ensure that it is appropriate and fit for purpose. The LVIA Methodology can be summarised as undertaking the following key tasks:

- Desk study and site visits in April 2025;
- Defining the Baseline Landscape setting and conditions;
- Identification and Evaluation of key components of the proposed development;
- Consideration of Mitigation Measures;
- Assessment of Landscape Effects;
- Assessment of Visual Effects; and
- Summary Statement of Significance.

12.2.2 Study Area

From similar studies, it is anticipated that the proposed development is likely to be difficult to discern beyond approximately 5km and is not likely to give rise to significant landscape or visual impacts beyond approximately 1-2km as much of the proposed works relate to development below the existing ground plain. In the interests of a comprehensive appraisal, a 5km radius study area is used in this instance. However, there will be a particular focus on receptors contained within 2km, except where iconic or designated scenic viewpoints exist at greater distances out to 5km (refer to Figure 12-1).

Figure 12-1 5km Extent of the Study Area



12.2.3 Landscape Impact Assessment Criteria

This part of the LVIA provides an assessment of how the introduction of the proposed development will affect the physical features and fabric of the landscape, and then how the proposals influence landscape character with reference to published descriptions of character and an understanding of the contemporary character of the landscape as informed through desktop and site studies.

When assessing the potential landscape effects of the development, the value and sensitivity of the landscape receptor is weighed against the magnitude of impact to determine the significance of the landscape effect. Criteria outlined below are used to guide these judgements.

12.2.3.1 Landscape Sensitivity

The sensitivity of the landscape to change is the degree to which a particular setting can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. In accordance with GLVIA3, the sensitivity of a landscape receptor (Landscape Character Area or feature) is derived from combining judgements in relation to its susceptibility to change and its value. The judgement reflects such factors as its quality, value, contribution to landscape character and the degree to which the particular element or characteristic can be replaced or substituted. Landscape Sensitivity is classified using the following criteria set out in Table 12-1.

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.

12.2.3.2 Magnitude of Change – Landscape

The magnitude of change is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed development and to a lesser extent the duration and reversibility of that effect. 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 immediate setting that may have an effect on the landscape character. Table 12-2 outlines criteria used to inform this judgement.

Table 12-2 Magnitude of Change - Landscape

Criteria	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.

Criteria	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.

12.2.4 Visual Impact Assessment Criteria

This part of the LVIA provides an assessment of how the introduction of the proposed development will affect views within the landscape. It therefore needs to consider:

- Direct impacts of the proposed development upon views through intrusion or obstruction;
- The reaction of viewers who may be affected, e.g. residents, walkers, road users; and
- The overall impact on visual amenity.

It has been deemed appropriate to structure the assessment around a series of representative viewpoint locations. All viewpoints are located within the public domain and are representative of views available from main thoroughfares and pedestrian areas within the vicinity of the proposed development. The selected viewpoints are considered to be comprehensive in communicating the variable nature of the visual effects.

When assessing the potential visual effects of the development, the sensitivity of the visual receptor is weighed against the magnitude of the visual impact to determine the significance of the visual effect. Criteria outlined below are used to guide these judgements.

12.2.4.1 Sensitivity of Visual Receptors

As with landscape sensitivity, the sensitivity of a visual receptor is categorised as Very High, High, Medium, Low, and Negligible. Unlike landscape sensitivity however, the sensitivity of visual receptors has an anthropocentric (human) basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity the viewer is engaged in and whether this heightens their awareness of the surrounding environment.

A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below to establish visual receptor sensitivity at each viewpoint location.

12.2.4.2 Susceptibility of Visual Receptors to Change

In accordance with GLVIA3, 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;
- Visitors 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;
- 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;
- 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".

12.2.4.3 Value attached to Views

The value attached to a view is determined by considering the following:

- Recognised scenic value of the view (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. These are likely to be in the form of Architectural Conservation Areas, which are incorporated within the Development Plan and 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 residential receptors. Even within a dynamic city context, views from residential properties are an important consideration in respect of residential amenity;
- 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 a national or regional scale;
- Provision of vast, 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 / townscape feature such as a cathedral 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;
- 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, and no relative importance is inferred by the order of listing.

It is recognised that a viewer's interpretation and experience of the landscape can have preferential and subjective components. Where relevant, judgements are made on those elements of the landscape that are considered to contribute more prominently and positively to the visual landscape resource as well as those elements that contribute negatively. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

12.2.4.4 Magnitude of Change - Visual

The magnitude of change is again a product of the scale, extent, or degree of change that is likely to be experienced as a result of the proposed development. This is directly influenced by its 'visual presence / prominence', as experienced by visual receptors in the landscape. These terms are somewhat quantitative in nature, and essentially relate to how noticeable or 'dominant' the proposal is within a particular view. Aside from the obvious influence of scale and distance, a development's visual presence is influenced by the extent and complexity of the view, contextual movement in the landscape, the nature of its backdrop, and its relationship with other focal points or prominent features within the view. It is often, though not always, expressed using one of the following terms: Minimal; Sub-dominant; Co-dominant; Dominant; Highly dominant. Criteria used to inform judgements are provided in Table 12-3.

Table 12-3 Magnitude of Change - Visual

Criteria	Description
Very High	Complete or very substantial change in view, dominant, involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements.
High	A major change in the view that is highly prominent and has a strong influence on the overall view. This may involve the substantial obstruction of existing views or a complete change in character and composition of baseline, e.g. through removal of key elements or the introduction of new features that would heavily influence key elements.
Medium	Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant.
Low	Minor change in baseline, i.e. pre-development view - change would be distinguishable from the surroundings whilst composition and character would be similar to the pre change circumstances.
Negligible	Very slight change in baseline, i.e. pre-development view - change would be barely discernible. Composition and character of view substantially unaltered.

12.2.5 Significance of Effect

The significance of a landscape or visual effect is based on a balance between the sensitivity of the receptor and the magnitude of change, and is categorised as Profound, Substantial, Moderate, Slight, or Imperceptible. Intermediate judgements are also provided to enable an effect to be more accurately described where relevant. 'No Effect' may also be recorded as appropriate where the effect is so negligible it is not noteworthy.

The significance category judgement is arrived at using the Significance Matrix at Table 12-4 as a guide. This applies the principle of significance being a function of magnitude weighed against sensitivity, but employs slightly different terminology that avoids the potentially confusing use of the term 'significant' (as recommended by GLVIA3 Statement of Clarification 1/13 (Landscape institute, 10th June 2013)).

Indicative criteria descriptions used in relation to the significance of effect category are presented at Table 12-5.

Table 12-4 Significance Matrix

	Sensitivity of Receptor				
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

Table 12-5 Indicative Significance of effect criteria descriptions

	Landscape	Visual
Profound	There are notable changes in landscape characteristics over an extensive area or a very intensive change over a more limited area.	The view is entirely altered, obscured or affected.
Substantial	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the landscape. There are notable changes in landscape characteristics over a substantial area or an intensive change over a more limited area.	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the visual environment. The proposal affects a large proportion of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. There are minor changes over some of the area or moderate changes in a localised area.	An effect that alters the character of the visual environment in a manner that is consistent with existing and emerging trends. The proposal affects an appreciable segment of the overall visual composition, or there is an intrusion in the foreground of a view.

	Landscape	Visual
Slight	An effect which causes noticeable changes in the character of the landscape without affecting its sensitivities. There are minor changes over a small proportion of the area or moderate changes in a localised area or changes that are reparable over time.	An effect which causes noticeable changes in the character of the visual environment without affecting its sensitivities. The affected view forms only a small element in the overall visual composition or changes the view in a marginal manner.
Imperceptible	An effect capable of measurement but without noticeable consequences. There are no noticeable changes to landscape context, character or features.	An effect capable of measurement but without noticeable consequences. Although the development may be visible, it would be difficult to discern resulting in minimal change to views.

It is important that the likely effects of the proposals are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making a planning decision.

As such, whilst the significance matrix and criteria provide a useful guide, the significance of an effect is ultimately determined by the landscape specialist using professional judgement, and also in the context of occasionally using hybrid judgements to account for nuance.

Effects assessed as 'Substantial' or greater (shaded cells) are considered to be the most notable in landscape and visual terms, and may be regarded as 'Significant', albeit it is important to note that this is not a reflection on their acceptability in planning terms.

12.2.6 Quality of Effects

In addition to assessing the significance of landscape and visual effects, the quality of the effects is also determined. Within this LVIA, effects are described as negative/adverse, neutral, or positive/beneficial, and the following criteria has been used to guide these judgements.

- Positive/beneficial - A change which improves the quality of the environment, enhancing the existing view/landscape;
- Neutral - No effects or effects that are imperceptible, within normal bounds of variation e.g. will neither detract from nor enhance the existing view/landscape;
- Negative/adverse - A change which reduces the quality of the environment, detracting from the existing view/landscape.

In the case of new energy / infrastructure 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. Effects in these contexts are generally considered to be adverse in nature, or neutral, where the effect has little influence on the landscape/views.

12.3 Receiving Environment

12.3.1 Landscape and Visual Policy Context and Designations

12.3.1.1 Meath County Development Plan 2021-2027

The site is located within the administrative area of Meath County Council (MCC) and is therefore subject to the land use policies and objectives of the Meath County Development Plan (MCDP) 2021-2027. The

MCDP provides a framework to guide future development within the county, and accordingly contains many policy objectives that deal with the strategic planning issues.

Whilst it is acknowledged that the MCDP contains policy objectives that deal with many design and environmental considerations, those that are considered to be of particular relevance to landscape and visual issues are contained in Chapter 8 (Cultural and Natural heritage Strategy) of the plan and more specifically subsection 8.17 Landscape, which references the county landscape character assessment, which was carried out in 2007.

A landscape character assessment was carried out in 2007 and has been incorporated within the MCDP, which divides the county into four main Landscape Character Types (LCT). These are then sub-divided into a further 20 geographically distinct Landscape Character Areas (LCAs).

The proposed development is located within the "Lowland Landscapes" LCT (Figure 12-2 refers) described as:

'The Lowland LCT covers the largest proportion of Meath and, due to the high quality of the land, is primarily agricultural. In the south of the County, there is an abundance of 18th-century demesnes with extensive areas of mixed woodland and parkland bounded by original stonewalls, creating an attractive landscape setting for the numerous estate houses'.

In terms of more-localised scale LCAs, the site is situated within LCA 6 - 'Central Lowlands'. LCA 6 - 'Central Lowlands', is identified as having; 'High' Landscape Value; 'Medium' Landscape Sensitivity, and; 'Regional' Landscape Importance. It is described as:

"Large lowland landscape area composed of rolling drumlins interspersed with numerous large estates and associated parkland. Thick wooded hedgerows, with some conifer plantations, and shelterbelts of ash and larch, separate medium to large fields. Deep roadside drainage ditches and banked hedgerows are a common feature of the landscape in the enclosed rural road corridors."

Map 4 of the Landscape Character Assessment, indicates potential capacity for various development types. This is then discussed in the context of 'Likely Indicative Types of Development', albeit none specifically relate to land fill development.

LCA 6 has been defined as having a medium capacity for all types of development outlined in the assessment, which includes overhead cables, substations and masts, roads and railways, underground services, wind turbines (for single turbines), and biomass and forestry. Whilst none of these forms of development are directly comparable, the classifications indicate a reasonable robustness for this LCA to accommodate various forms of development, and particularly tall features and developments of scale.

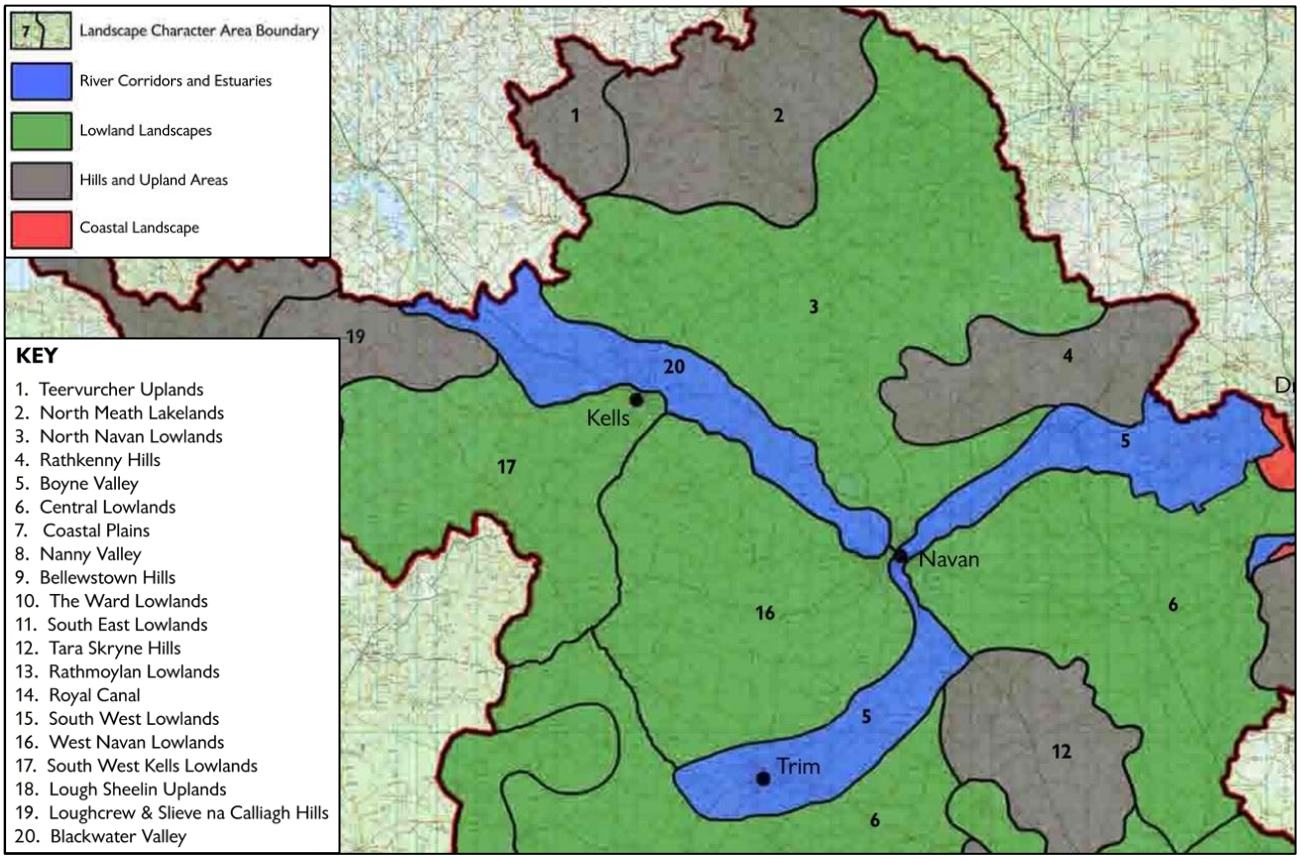
LCA 6 designated as having a medium capacity for 'overhead cables, substations and masts' and 'biomass and forestry'. In the description of LCA 6, it states:

"Medium potential capacity to accommodate overhead cables, substations and communication masts due to the complexity of the area, which has a variety of land uses and a robust landscape structure."

"Medium potential capacity to accommodate biomass and forestry due to the variety of land uses and strong landscape structure. Commercial forestry is already a feature of the landscape although overprovision for such development needs to be avoided as it will erode the structure of the landscape."

Lying at distances of over 4km to the north of the site is LCA 5 – 'Boyne Valley' covers the landscape to the north, whilst just over 5km to the south is LCA 12 'Tara Skryne Hills'. Both of the aforementioned landscape areas are identified as landscapes of 'Exceptional' value, 'High' sensitivity, and 'International ' Landscape Importance.

Figure 12-2 Meath LCA Map 1 showing approximate site location relative to landscape character areas and Landscape character types.



Policies in the Natural Heritage section of the Development Plan relate to the management of existing hedgerows and the provision of new ones. These are of relevance to the proposals in light of potential impacts to the hedgerow along the nearby road to facilitate access, and the proposals being put forward in terms of replacement. The relevant policies include;

HER POL 37

"To encourage the retention of hedgerows and other distinctive boundary treatments in rural areas and prevent loss and fragmentation, where practically possible. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, mitigation by provision of the same type of boundary will be required."

HER POL 38

"To promote and encourage planting of native hedgerow species in new developments and as part of the Council's own landscaping works."

HER POL 52

"To protect and enhance the quality, character, and distinctiveness of the landscapes of the County in accordance with national policy and guidelines and the recommendations of Meath Landscape Character Assessment (2007) in Appendix 5, to ensure that new development meets high standards of siting and design."

HER POL 53

"To discourage proposals necessitating the removal of extensive amount of trees, hedgerows and historic walls or other distinctive boundary treatments".

HER OBJ 49

"To ensure that the management of development will have regard to the value of the landscape, its character, importance, sensitivity and capacity to absorb change as outlined in Appendix 5 Meath Landscape Character Assessment and its recommendations."

12.3.1.2 Views of Recognised Scenic Value

Views of recognised scenic value are primarily indicated within Development Plans in the context of scenic views/routes designations, but they might also be indicated on touring maps, guide books, websites, road side rest stops or on post cards that represent the area.

Meath County Development Plan 2021-2027

Protected Views and prospects presented in the MCDP are scenic views that are of a recognised amenity and tourism value, and which contribute to quality of life. The designation is described as follows:

"It is not envisaged that the designation of a protected view would prohibit all development within the view, rather that any development proposed within the view should be designed and located so as not to obstruct the view or be unduly intrusive in the landscape as seen from these vantage points."

The study area encompasses several scenic views within County Meath although many of these are oriented away from the proposed development, and thus are not deemed relevant. A review of all scenic designations within the study area is provided in the table below along with their relevance to the assessment of the proposed development.

Table 12-6 Relevance of scenic designations within the study area

Scenic View Reference & Description	Relevance to the assessment of the proposed development
Scenic View 34 (Northeast): View of Boyne Valley with open view of Knowth and Newgrange. Mixed composition of working landscape. Slane visible on left (west). Roads, power lines and housing visible.	**Not Relevant:** View oriented in the opposite direction to the proposed development.
Scenic View 35 (Northwest): View to northwest across settled landscape with settlements and infra- structure (powerline, windfarm, roads visible). Many large woodland lots.	**Not Relevant:** View oriented in the opposite direction to the proposed development.
Scenic View 36 (Northwest): View to north west across working landscape with visual agricultural structures	**Not Relevant:** View oriented in the opposite direction to the proposed development.
Scenic View 37 (Southeast): View to south east across working landscape with visual agricultural structures	**Relevant:** Potential views of the development in a similar orientation to the scenic designation.
Scenic View 93a-c (East): View towards the Core Area of the World Heritage Site.	**Not Relevant:** View oriented in the opposite direction to the proposed development.

It should also be noted that some heritage features of national and international significance are also located within the wider landscape. As a result, it is considered important to assess the potential impact of the development on these locations due to their elevated nature and national/international significance. Those locations deemed of most relevant are outlined below:

- Scenic View 44 (Panorama): Hill of Tara
- Scenic View 47 (Panorama): Skryne Church
- Scenic View 87b & 87d (South and West): Newgrange Passage Tomb

Those views deemed relevant to the assessment will be visited during fieldwork investigations. Where there is potential for visibility of the proposed development, a representative viewpoint will be included for assessment within the visual impact appraisal below. It should be noted that where multiple receptors occur in the vicinity of each other, one representative viewpoint will be include to represent both or multiple receptors.

12.3.2 Landscape Baseline

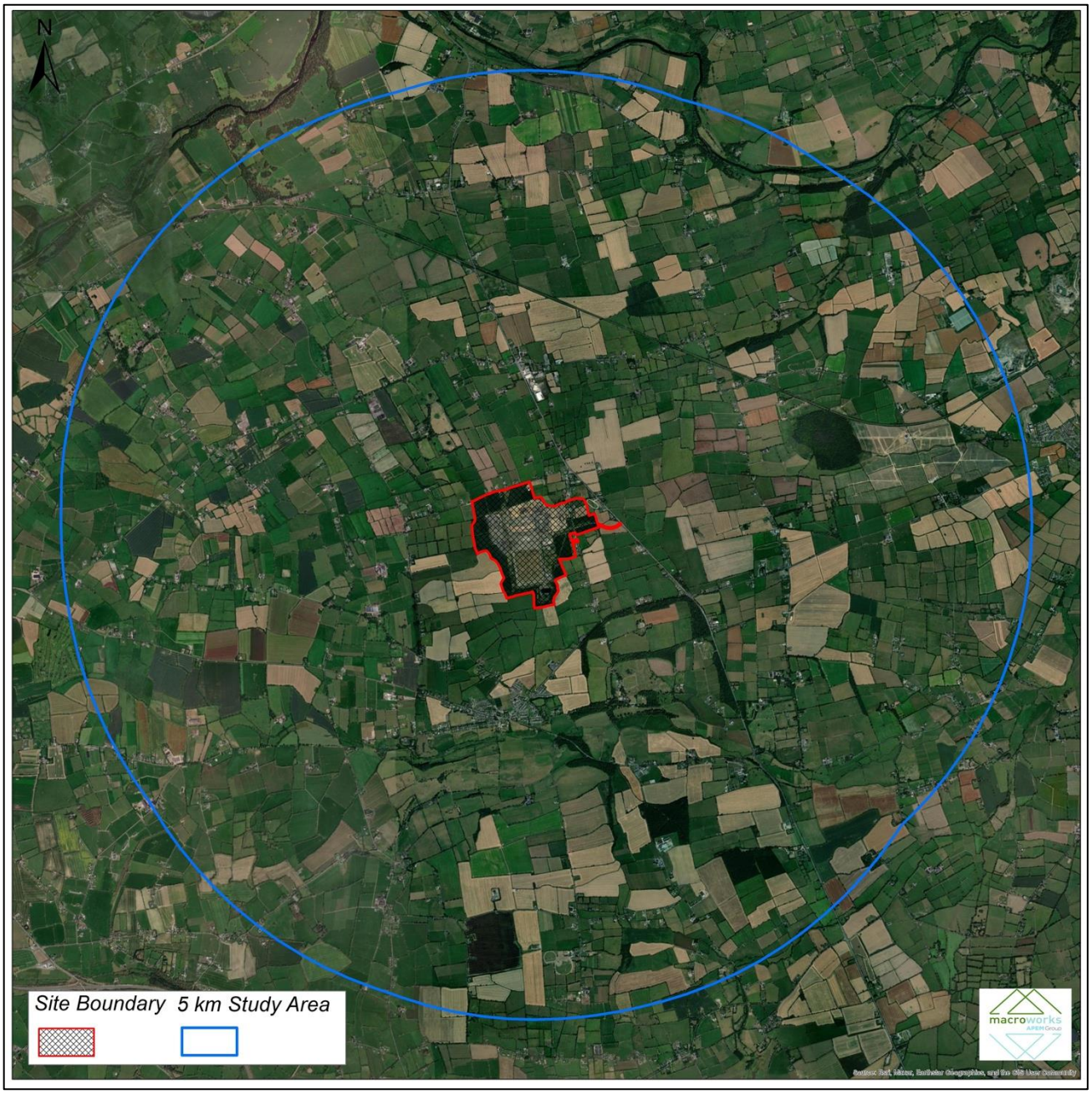
The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape brought about by the proposed development will be assessed. A description of the landscape context of the proposed application site and wider study area is provided below under the headings of landform and drainage, vegetation and land use, centres of population and houses, transport routes and public amenities and facilities. Although this description forms part of the landscape baseline, many of the landscape elements identified also relate to visual receptors i.e. places and transport routes from which viewers can potentially see the proposed development. The visual resource will be described in greater detail in 12.3.3.

12.3.2.1 Landform and Drainage

The study area is composed of a broad undulating terrain, with low rolling terrain and meandering river valleys. Topography varies between 60-70 m AOD in the locality of the site with low, broad hills rising to around 120m AOD. In the wider surrounding landscape, these high points become more pronounced, with landform rising to the Hill of Slane, and Hill of Tara, to the north and south of the site respectively which reach elevations of 160m AOD. At the site scale, the existing land fill and its capping represent the most distinctive land forms, albeit of a highly anthropogenic nature.

The Knockharley Stream is the nearest watercourse to the proposed development traversing the sites northern extent. The River Nanny traverses the study areas southern extent passing through the settlement of Kentstown located some 1.3km from the site boundary. Whilst not the nearest, the River Boyne is the most prominent watercourse within the study area situated just over 4km northeast of the site at its nearest point where it meanders in a easterly direction towards the coastline.

Figure 12-3 Landscape context and land use patterns of the study area



12.3.2.2 Vegetation and Land Use

The principal land use within the local landscape is the existing landfill, which occupies a notable area of land and is bounded by a mix of dense conifer woodland, earthen berms, hedgerow vegetation, and areas of pastoral land. Indeed, pastoral land use is the predominant land cover beyond the immediate context of the site, with much of the surrounding landscape comprising pastoral fields of varying sizes, enclosed by networks of mixed hedgerow vegetation.

The settlement of Kentstown is the most notable area of urban land use within the study area, situated to the south of the site, whilst the N2 National Primary Route and the National Railway Line are notable linear land uses located at the eastern extent of the study area. An existing solar farm development also occupies a notable area of land in the wider eastern extent of the study area, while several small industrial and commercial developments are located along the N2 corridor.

12.3.2.3 Centre of Population and Housing

As noted above, the principal centre of population in relation to the proposed development is the settlement of Kentstown, located just over 1 km to the south of the site boundary. The only other settlement within the study area is the village of Yellow Furze, situated approximately 3 km to the northwest, at the intersection of two local roads. Beyond these defined settlements, the study area is characterised by a modest rural population, typically comprising linear clusters of dwellings and small crossroads communities. The nearest residential receptors to the proposed development are located along the local roads immediately to the north and east of the site.

12.3.2.4 Transport Routes

The main transport route within the study area is the N2 National Primary Route, which traverses the eastern half of the study area and is located approximately 350 metres from the site at its nearest point. The R150 regional road is the closest regional road to the proposed development, situated approximately 500 metres to the southeast of the site boundary, whilst the R153 regional road lies around 1.3 kilometres southwest of the site boundary as it extends west from the settlement of Kentstown.

Otherwise, the study area encompasses a network of local roads, some of which pass immediately adjacent to the site, including those to the north and east. A section of the national railway line also traverses the study area in its north-eastern extent, located approximately 2.2 kilometres northeast of the site at its nearest point.

12.3.2.5 Tourism, Heritage and Public Amenities

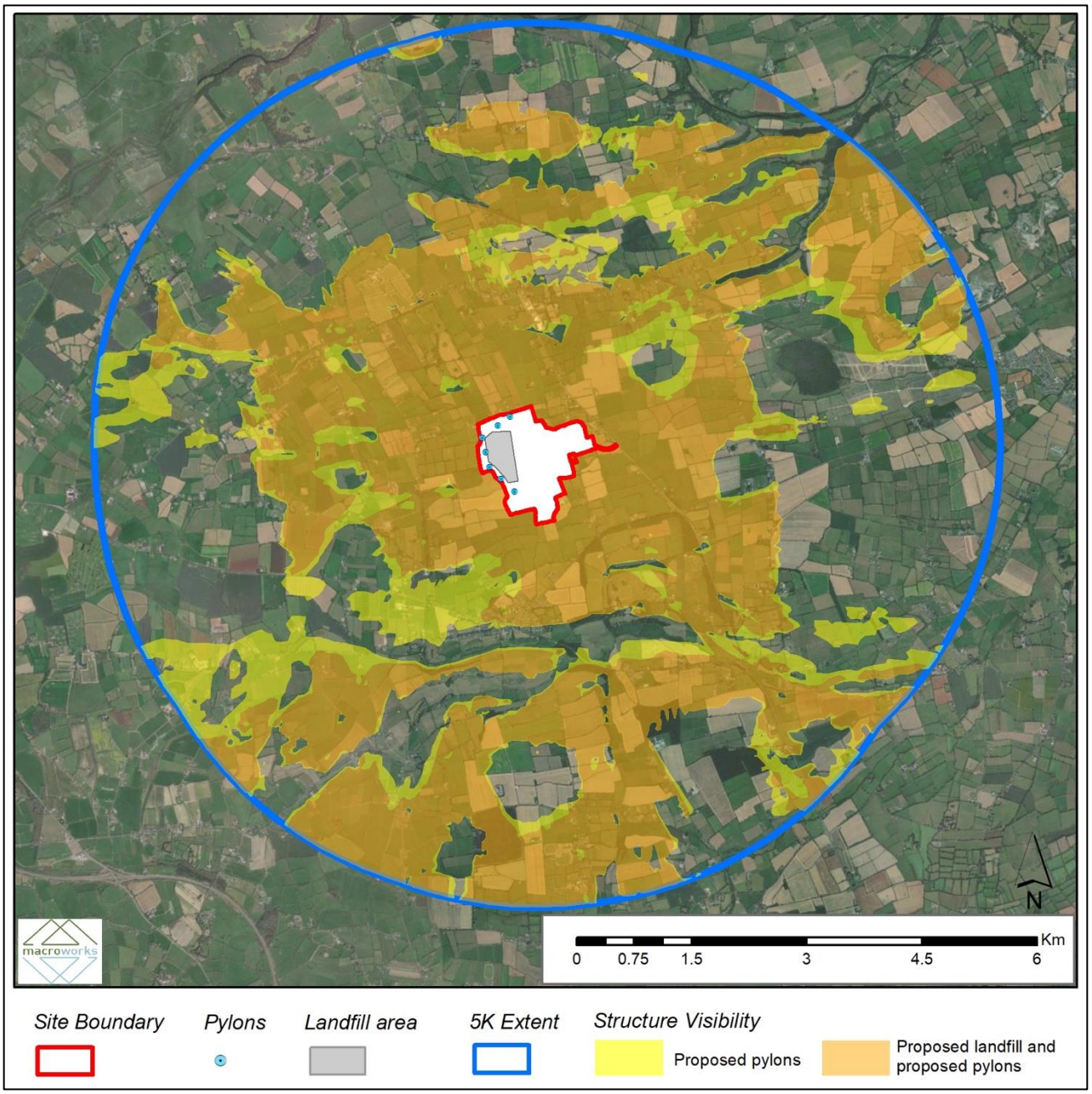
The local surroundings of the site are not strongly associated with outdoor recreation, as several highly anthropogenic land uses influence the character of the local landscape. Nonetheless, the wider surrounding landscape possesses a distinctive sense of heritage, with the Boyne Valley situated to the north and containing several notable heritage assets along its course, including Slane Castle and the Brú Na Bóinne complex, which is recognised as one of the world's most important neolithic landscapes and is designated a World Heritage Site. Similarly, the wider landscape to the southwest includes heritage assets of national and international importance, such as the Hill of Tara and the Hill of Skryne.

12.3.3 Visual Baseline

12.3.3.1 Analysis of ZTV (Zone of Theoretic Visibility) Mapping

Only those parts of the receiving environment that potentially afford views of the proposed development are of concern to this section of the assessment. A computer-generated Zone of Theoretical Visibility (ZTV) map has been prepared to illustrate where the proposed development is potentially visible from. The ZTV map is based solely on terrain data (bare ground visibility), and ignores features such as trees, hedges or buildings, which may screen views. Given the complex vegetation patterns within this landscape, the main value of this form of ZTV mapping is to determine those parts of the landscape from which the proposed development will definitely not be visible, due to terrain screening within the 5km study area.

Figure 12-4 Standard (bare-ground) ZTV map (Refer to Appendix 12.1 for larger scale version)



The following key points are illustrated by the 'bare-ground' ZTV map (see Figure 12-4 above):

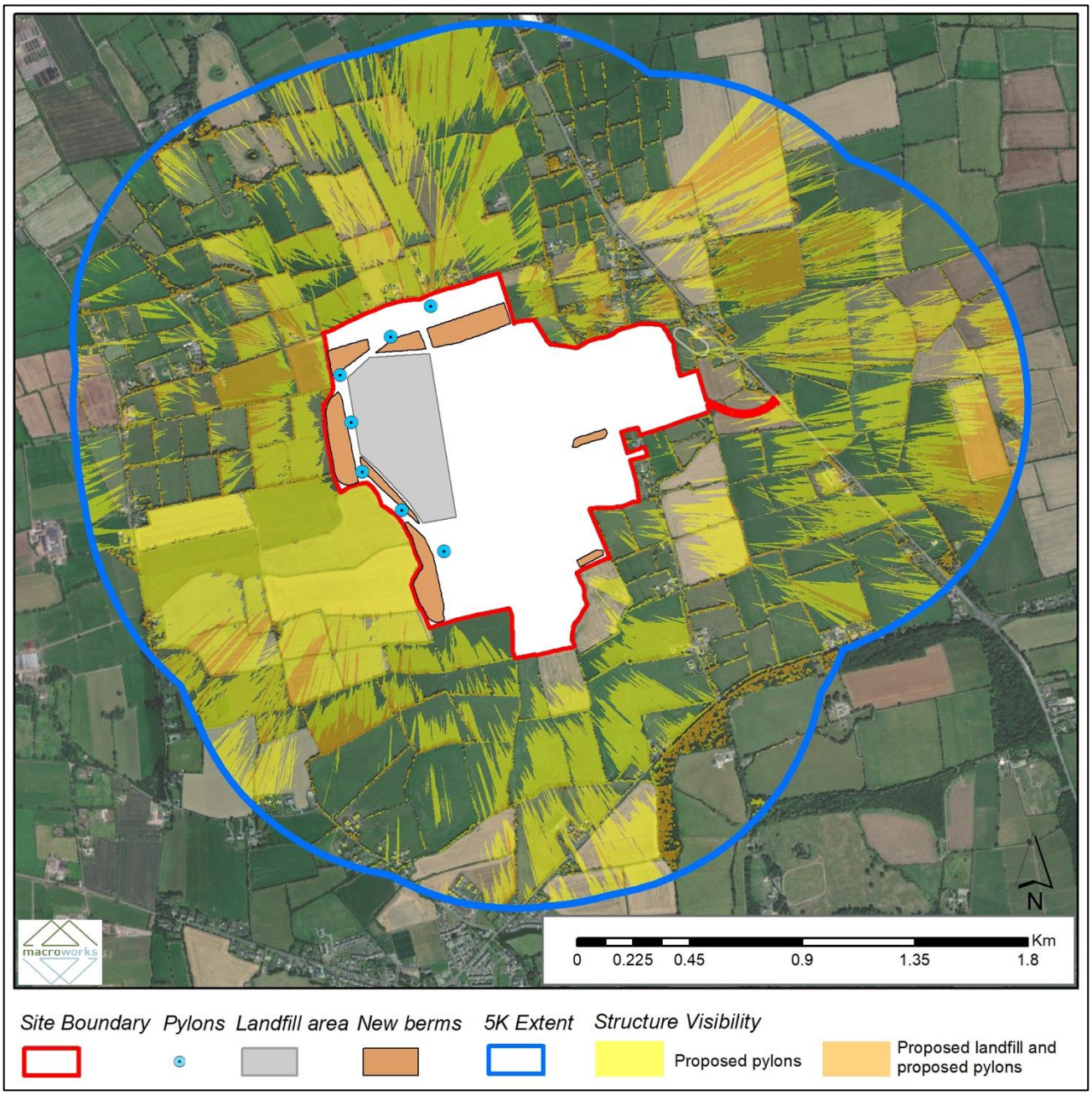
- The proposed development has the potential to be visible in its immediate surroundings up to approximately 1 km in all directions. Beyond this, theoretical visibility tends to become sporadic due to the broad, rolling landform that characterises the study area. The proposed pylon structures will be visible across a comparatively larger proportion of the study area, often marginally extending the pattern of visibility.
- Some 2.5–3 km east and west of the site, visibility of the proposed development is entirely eliminated. To the south, visibility is also eliminated in the vicinity of the River Nanny; however, the visibility pattern re-emerges on the southern side of the river corridor and sporadically across the wider southern extent of the study area.

- To the north, the visibility pattern tends to become sporadic approximately 3 km from the site, with visibility almost entirely eliminated in the wider north-west quadrant of the study area. To the north-east, visibility extends further towards the River Boyne corridor; however, the visibility pattern is eliminated just south of the Boyne Valley.

The most important point to make in respect of this 'bare-ground' ZTV map is that it is theoretical. In this regard, the various forms of built development, along with dense layers of intervening mature vegetation and conifer forest located around the perimeter and in the immediate surroundings of the site, will result in a considerably reduced degree of visibility. Whilst the proposed pylon structures have the potential to rise above the surrounding vegetation, it is likely that much of the landfill operations will be fully screened, in line with the current scenario.

The second form of ZTV mapping relies on a Digital Surface Model ("DSM"), which also accounts for terrestrial land cover elements, such as woodland, hedgerows and existing buildings and other built forms. This is of far more value in determining the likely visibility of the proposed development. For this finer grain of visibility analysis, a more consolidated area incorporating the surrounding network of roads and dwellings within approximately 1km of the application site boundary is used.

Figure 12-5 Digital Surface Model (DSM) based ZTV map accounting for screening by surface elements such as hedgerows, trees lines and forestry.



As can be seen from the comparison of the 'bare-ground' ZTV map (Figure 12-4) and the Digital Surface Model based ZTV map (Figure 12-5):

- There is a considerable reduction in the visibility of the proposed development once the existing screening is taken into account. It should be noted that the DSM-based visibility mapping also accounts for the removal of existing conifer woodland to accommodate the proposed screening berms located around the perimeter — which are also modelled into the DSM map.
- Most notably, the proposed landfill will be heavily screened, with the only potential visibility limited to brief glimpses from neighbouring lands, the vast majority of which comprise pastoral farmland.
- Similarly, much of the visibility of the proposed pylon structures is contained within 1 km of the site, with the visibility pattern beyond this distance limited to brief and fleeting views of the proposed built structures.

12.3.3.2 Identification of Viewshed Reference Points as a Basis for Assessment

Viewshed Reference Points (VRP's) are the locations used to study the visual impacts of a proposed development in detail. 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 visual impact of a proposed development is assessed by Macro Works using up to 6 no. categories of receptor type as listed below:

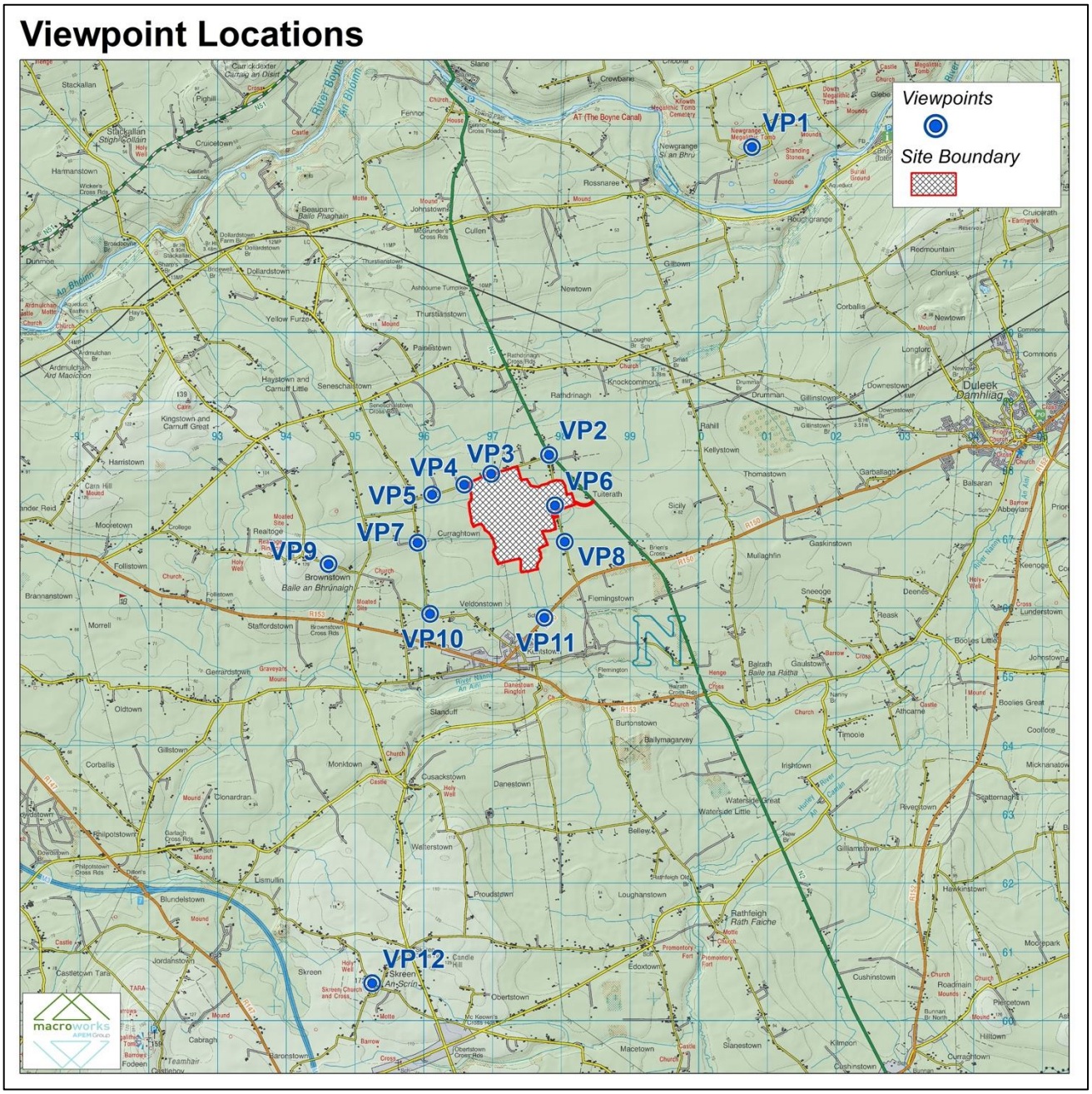
- Key Views (from features of national or international importance) (KV);
- Designated Scenic Routes and Views (SR/SV);
- Local Community views (LCV);
- Centres of Population (CP);
- Major Routes (MR);
- Amenity and heritage features (AH).

VRP's might be relevant to more than one category and this makes them even more valid for inclusion in the assessment. The receptors that are intended to be represented by a particular VRP are listed at the beginning of each viewpoint appraisal. The Viewshed Reference Points selected in this instance are set out in the Table 12-7 and Figure 12-6 below.

Table 12-7 Outline Description of Selected Viewshed Reference Points (VPs)

VP No.	Location	Representative of	Direction of view
VP1	Newgrange Passage Tomb	AH, SV, KV	SW
VP2	N2 and Local road intersection at Rathdrinagh	MR, LCV	SW
VP3	Local road at Knockharley	LCV	S
VP4	Local road at Curraghtown	LCV	SE
VP5	Local road at Seneschalstown	LCV	SE
VP6	L5056 at Flemingstown (1)	LCV	W
VP7	Local road at Brownstown (1)	LCV	E
VP8	L5056 at Flemingstown (2)	LCV	W
VP9	Local road at Brownstown (2)	LCV, SV	E
VP10	Local road at Veldonstown	LCV	NE
VP11	R150 at Kentstown	LCV, MR	N
VP12	Hill of Skryne	AH, SV	

Figure 12-6 Viewpoint location map



12.4 Characteristics of the Proposed Development

A detailed description of the proposed development is set out in Chapter 2 of this EIAR (Description of the Proposed Development). The details of the construction and operation of the development in terms of landscape and visual impact are detailed below.

12.4.1 Construction Phase

Site clearance – clearance of vegetation and regarding of the site for incoming earthen berms. A total of c. 12.9ha of forestry will be removed as part of the construction phase.

- Setting up temporary facilities such as construction offices and storage areas, and establishment of construction fencing and lighting. Large machinery and tower cranes that may rise above intervening vegetation to construct new pylon structures.
- Temporary construction infrastructure – Installation of temporary site fencing, lighting, access and welfare facilities.
- Construction traffic – Increase movement of HGV along the immediate surrounding road network. Additional movement, noise and dust on lands immediately adjacent to the site.
- It should be noted that much of the construction stage works will be contained to the immediate site context, which is not readily visible which limits its potential to be noticed by surrounding receptors or have any impact on the surrounding character.

12.4.2 Operational Phase

- The expansion of the existing landfill by construction of an additional active void space of 4.12 million m^3 for landfilling.
- Modification of landform - The proposed expanded landfill body will have a final post settlement contour height of 85 mOD (aligning with the existing permitted post settlement contour height of the active landfill.
- Modification of natural watercourses – Diversion of the existing Knockharley Stream to the outer extent of the expanded landfill void. The diverted stream will be unculverted with the exception of existing access road crossings.
- Relocation of an existing 220kV overhead ESB powerline that traverses the site to the western boundary of the site so to accommodate development of the expanded landfill void.
- It is planned for c. 6.63 ha of native woodland and 0.63 ha of native riparian woodland to be planted to compensate for habitat loss during the operational phase and a further c. 1.6 ha will be planted during the reinstatement phase, all at the lower half of the proposed earthen berms.
- 33.1 ha grassland meadow will be established across the site during the operational phase and a further 32.3 ha of native grassland meadows established during the reinstatement phase.

12.5 Potential Impacts of the Proposed Development

12.5.1 Assessment of Receptor Sensitivity – Landscape

Landscape value and sensitivity are considered in relation to a number of factors highlighted in the GLVIA3, which are set out below and discussed relative to the proposed development site and wider study area.

The site and its immediate context have long been home to Knockharley Landfill, established in the early 2000s, and it has become a defining land use within the surrounding landscape. Whilst not readily visible from the wider local area, it remains one of the most prominent single land uses in its immediate vicinity. A block of conifer woodland frames the Knockharley landscape, most notably along the northern and western boundaries of the site. It is also important to note that the physical landform within the existing Knockharley site has been heavily modified, with large excavations accommodating the landfill. In addition, berms have been constructed along the site's perimeter, and disused parts of the landfill have been capped well above the original ground levels.

Beyond the immediate site context, the surrounding local landscape represents a relatively typical pastoral landscape that comprising broad rolling terrain cloaked in a mix of pastoral fields of varying sizes often bound by mixed hedgerow vegetation. It is a settled landscape located in the vicinity of one of the principal transport corridors to Dublin – the N2 National Primary Route corridor. The robust nature of this landscape is further reinforced by the varying forms of development within the study area, including major routes (road and rail), industrial and commercial land uses, in addition to a large-scale solar development situated in the wider eastern extent of the study area. Whilst the study area presents as a modified landscape that has been heavily shaped by human intervention, there are some localised areas that display greater landscape sensitivity than the more typical pastoral lands in the immediate surroundings of the site. To

the south, the study area includes the River Nanny, bordered by small areas of riparian vegetation. The River Nanny also flows through Somerville House and its demesne, although the historic demesne landscape has been notably altered over time, with pastoral fields now occupying much of its former parkland setting. Of most note is the River Boyne corridor, which briefly enters the study area in its northeastern corner. The River Boyne is a highly sensitive landscape feature, with strong cultural heritage value and heritage assets of national and international importance located along its course, although all of these lie outside the 5km study area. The wider surrounding landscape also contains a strong sense of cultural heritage, with the Brú na Bóinne complex situated to the northeast, and the Hill of Skryne and the Hill of Tara, two further heritage landmarks, located to the southwest, also beyond the 5km study area.

In terms of landscape designations, the relatively robust and non-distinctive character of the study area is reflected in the MCDP Landscape Character Assessment, with the site contained in the LCA 6 – Central Lowlands, which is classified with a 'High' Landscape Value; 'Medium' Landscape Sensitivity, and; 'Regional' Landscape Importance. Indeed, the fairly typical nature of the study area is further defined by its capacity to absorb certain forms of development, which is outlined in the landscape character area. LCA 6 is defined as having a medium capacity for all types of development outlined in the landscape character assessment, which includes overhead cables, substations and masts, roads and railways, underground services, wind turbines (for single turbines), and biomass and forestry. In terms of visual designations, several scenic view designations are contained within the study area, however, the majority of these are oriented away from the central parts of the study area highlighting that much of visual amenity stems from the wider surrounding landscape and not the immediate landscape context, which tends to influenced by varying forms of development.

Overall, the study area tends to be typical of a robust rural setting that has been heavily influenced by human intervention over time, with large scale anthropogenic land uses characterising notable parts of the study area. Therefore, on balance of these factors and in accordance with the criteria outlined in Table 12-1, the landscape sensitivity is deemed at the site scale is deemed **Low** due to the heavily modified nature of the existing land fill site, rising to Medium-low outside of the site. It should also be noted that the study area also encompasses localised areas of higher sensitivity in the surrounds of some of the natural landscape features such as the River Nanny and River Boyne. Whilst a strong sense of cultural heritage is also evident, this relates to the wider surrounding landscape outside of the 5km study area.

12.5.2 Assessment of Receptor Sensitivity – Visual

The central portion of the study area generally presents as a relatively typical settled pastoral landscape, with views extending across farmland and stacked hedgerow vegetation. Some areas, however, are more visually contained due to dense roadside hedgerows, mature tree lines, and blocks of conifer forestry. In terms of scenic designations, several occur within the study area, though these are mostly located at its outer edges. Such views are typically found along more open and locally elevated sections of surrounding local roads, providing visibility across the intervening landscape. Indeed, many of these are oriented away from the central parts of the study area, further emphasising the non-distinctive character. To the northeast, several scenic designations are associated with the wider River Boyne Valley and the Brú na Bóinne complex. However, as noted above, these are also oriented away from the central study area. Overall, scenic views within the study area range between Medium and High in classification, with those linked to the wider heritage landscapes falling under the High receptor sensitivity category.

Views of the working agricultural landscape are generally pleasant in terms of its rolling pastoral aesthetic and 'green', settled working character. The network of hedgerows and vegetation throughout it contributes to some sense of naturalness and, combined with its undulating topography, generates a sense of containment in many locations. However, whilst a pleasant pastoral aesthetic is noted throughout some parts of the study area, as noted above, the surrounding local and wider landscape is also influenced by an array of anthropogenic features such as major transport routes, urban settlements, and industrial development. Overall, the sensitivity of visual receptors within the more typical working landscape context

tends to range between Medium and Medium-low, with those of a Medium sensitivity representing more open expansive views across the wider landscape.

The study area also encompasses localised areas that are influenced by a higher degree of anthropogenic developments such as the major route corridors and areas of the landscape defined by industrial and commercial developments. Nonetheless, these areas still tend to be framed by surrounding pastoral landscape and despite their influence from built form, the receptor sensitivity is still deemed no lower than Medium-low.

Key differentials in terms of visual receptor sensitivity relate to the occupation of the visual receptor and whether views of the surrounding landscape are an inherent part of the experience. Static residential receptors are considered generally more susceptible to changes in views over those where views are experienced transiently by those travelling through the landscape, particularly on major transport routes where road infrastructure and traffic volume draw from visual amenity. Likewise, receptors located in closer proximity to the site are considered more susceptible to changes in views over those where views are experienced at a distance.

On the basis of the site-specific factors outlined above and in accordance with the general visual receptor sensitivity considerations contained in the methodology (Section 12.2.4), visual receptor sensitivity judgement are provided for each representative viewpoint in the table below in Section 12.5.6 below.

12.5.3 Magnitude of Landscape Effects - Construction Phase

During the construction phase there will be a far higher intensity of activity at the site than during the operational phase. This will consist of heavy goods vehicle movement to and from the site as well as construction machinery within the site. Nonetheless, the perceived intensification of HGVs is likely to be limited as HGV are a characteristic feature of the surrounding road network due to the presence of the existing landfill facility and due to its near distance to the N2 National Primary Route.

In terms of physical landscape effects, the construction phase of the proposed development will result in some notable modifications to the existing landcover and landform, much of which will involve the removal of large areas of surrounding woodland (some c. 12.9 ha) to accommodate the proposed earthen berms and new landfill pit. In some areas, perimeter woodland will be cleared up to the site boundary, although existing boundary hedgerows will be retained, protected, and strengthened where necessary. The construction of the earthen berms, which will reach a maximum height of approximately c. 14 metres above existing ground levels, will involve substantial earthworks across the site. It should be noted that all material used for the berms will be sourced from within the site itself. Further landform modification will occur through the realignment of the Knockharley Stream within the site, which will predominately be unculverted, aside from a small section of the stream along existing access road crossings. In addition, localised excavation will be required to facilitate the incoming realignment of the 220kV overhead cable corridor and associated pylons. The construction and removal of larger built elements within the site, such as the proposed pylon structures, will also require the use of tower cranes, which are likely to be visible above the surrounding hedgerow network in the near vicinity of the site.

The landscape effects during the construction phase are considered to be *long-term* and will take place over a phased period of 17 years. A summary of construction activities within the site is provided below:

- HGVs transporting materials to and from the site;
- Movement of heavy earth-moving machinery and tower cranes on-site;
- Temporary storage of excavated materials and construction materials on-site;
- Gradual emergence of the proposed development, and associated works;
- Security hoarding and site lighting.
- Trees and hedgerows to be retained will be protected in accordance with British Standard BS5837: 2012 'Trees in Relation to Design, Demolition and Constriction

The intensity of on-site activity during the construction phase will be considerably higher than during the operational phase. This includes movement of machinery, HGV traffic, and temporary infrastructure such as cranes, lighting, hoarding, and materials storage.

It should be noted that the potential for the proposed development to alter the surrounding landscape character is limited, as the internal parts of the site are generally well contained by surrounding layers of dense intervening vegetation. Whilst the development will result in the removal of some large areas of vegetation, the existing hedgerows and tree lines marking the site boundary will be retained and protected, and will provide screening of internal construction activities. Overall, in terms of vegetation removal, there will be some c. 20 ha of existing forestry and vegetation removed within the site, of which 7.1 ha is already permitted as per ACP SID Reg. ref 303211. Therefore, the proposed development includes for the removal of some c. 12.9 ha of existing forestry and vegetation within the site. The most noticeable construction stage landscape effects are expected to occur when the earthen berms begin to rise towards their final height and built structures such as the proposed pylons start to emerge above the surrounding vegetation. At this stage, these larger constructed elements have the potential to influence the surrounding landscape character. The construction period is expected to last for approximately 17 years. However, due to the contained nature of the site most changes in landscape will not be perceivable outside on the site boundary. Although the construction period impacts in their totality will be long-term the associated landscape effects of the completion of the earthen berms and construction of pylons will occur over a period of months to a few years and are considered to be relatively brief in nature and will result in temporary to short-term landscape effects, in line with EPA definitions.

On the basis of the factors outlined above, the construction stage landscape effects are deemed to be High-Medium within the site and its immediate setting (<c. 200m), thereafter reducing to Low and Negligible at increasing distances where the site is predominately screened and will have little or no effect on the surrounding landscape character. Combined with the Low landscape sensitivity of the immediate site, the significance of construction stage effect is deemed ***moderate-slight*** and of a ***negative*** quality.

12.5.4 Magnitude of Visual Effects - Construction Phase

During the construction phase, the main visual impacts will arise from the frequent movement of heavy goods vehicles (HGVs) and worker vehicles travelling to and from the site via the designated site entrance. In addition, construction machinery and equipment, some of which may extend above intervening vegetation and existing buildings, will be present within the site. Stockpiles of stored construction materials will also be visible in certain areas, particularly during peak construction periods. However, beyond the immediate vicinity of the site, much of this short-term construction activity will be partially or wholly screened from view by the mature trees and established vegetation in the surrounding landscape. Indeed, the only residual visibility of the construction phase will likely be in the form of tower cranes that may rise above the intervening vegetation. However, the site is still afforded a notable separation distance from all surrounding receptors and is well screened by existing boundary vegetation which will be retained. Indeed, these natural features serve as a visual buffer, limiting the extent to which construction activities will be visible from the wider area.

The most notable construction-phase visual impacts are anticipated to occur to the west of the site where there will be some notable areas of vegetation removal to accommodate the incoming land fill and proposed screening berms. Indeed, the most notable area of vegetation removal occurs in the western extent of the site, where existing conifer woodland will be removed up until the western site boundary, denoted by and existing mature tree-lined hedgerow, which will be retained and protected. Indeed, there is some potential for glimpse views of construction activities here once the removal of conifer woodland has occur. However, once the screening berms have been established, the degree of construction stage activities will be much more limited.

In similar circumstances to the proposed screening berms, the realignment of the overhead cable corridors and new proposed pylon structures will occur in the western extent of the site, with much of the visibility

of the construction relate activities (likely to involve some tower cranes) potentially viewed above the intervening vegetation in the western aspect of the central study area.

In conclusion, construction-stage visual effects are assessed as being no greater than Medium in localised areas in the immediate vicinity of the site, with much of the construction stage works heavily screened from surrounding receptors, even those located in the immediate surrounds of the site. It is also important to note that the site is currently in use as an active land fill, and therefore brief and intermittent visibility of construction related machinery and HGVs travelling to and from the landfill is a characteristic feature of the site.

Coupled with the Medium-low visual receptor sensitivities in the near surrounds of the site, the construction stage visual impacts in the immediate vicinity of the site will be no greater than ***moderate*** and ***negative*** in terms of quality, however such effects only relate to localised areas surrounding the immediate site vicinity, with much of the surrounding visual receptors classified with Negligible effects as they will have no view of construction stage works. The duration of construction stage visual effects are classified as ***short-term***. As a result, construction stage visual impacts are assessed as Not Significant.

12.5.5 Magnitude of Landscape Effects - Operational Phase

The proposed development will result in further alterations to both the site's land use and landform; however, this is not out of keeping with the current use of the site, which is that of an active landfill. In terms of physical effects, the landfill void will extend further to the west of the existing landfill. It will result in the loss of some notable areas of perimeter conifer woodland, although all works are contained within the bounds of the existing development. Indeed, a point of importance is that the existing overall landfill site will not expand in terms of its current area. Nevertheless, the land cover within the site will change and there will be an expansion of existing activities on site. That said, areas of the existing landfill will continue to be capped off over time and reinstated as grassland, which marginally offsets the degree of intensification of the site.

Whilst there will be some notable physical effects on the receiving landscape associated with the alteration to the existing land forms, these physical effects will have a limited effect to notably alter the surrounding landscape character as much of the extended land fill will be almost fully screened by the surrounding screening berms and existing intervening vegetation. Nonetheless, the extension of the landfill will also generate a prolonged degree of disruption of the local landscape, with the period of active landfill operations extending beyond the existing permissions.

It should be noted that there will be some localised positive landscape effects with the removal of low quality conifer forestry in place of screening berms that will be planted with native broadleaf woodland. Indeed, over time the established woodland will provided screening of the site and will enhance the sites biodiversity values, whilst also strengthening the surrounding ecological corridors within the site and surrounding landscape.

Overall, the proposed development will contribute to a clear expansion of the existing landfill operations, which is a well-established land use in this context. Indeed, whilst there will be some notable physical effects associated with the excavation and establishment of the new land fill void, the operational phase of the development will have a limited impact on the surrounding landscape character, which is currently characterised by an active landfill. Thus, much of the operational phase effects relate to the intensification and prolongation of the existing land use. With reference to the significance matrix (Table 12-4) above, the ***medium-low*** landscape sensitivity judgement attributed to the study area, coupled with a ***medium*** magnitude of landscape effect in the immediate vicinity (<500m) of the proposed development is considered to result in an overall significance of no greater than ***moderate***, which is heavily localised to the site and its immediate surrounding landscape context. Indeed, much of the immediate surrounding landscape will see an indiscernible difference in the operational phase of the proposed development and

the current operations of the landfill. Beyond c. 1km from the site, there is a very limited potential for the development to generate any notable operational phase landscape effects

In summary, the significance of operational phase landscape effects is deemed ***moderate*** at the site scale, ***negative-neutral*** in terms of quality and ***permanent*** in terms of duration. Thus, operational phase landscape effects are deemed Not significant.

12.5.6 Magnitude of Visual Effects - Operational Phase

The assessment of visual impacts at each of the selected viewpoints is aided by 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:

1. Existing view;
2. Operation Phase View (showing extent of proposed development and 'as permitted' development);
3. Reinstatement View (showing extent of fully reinstated land fill capping) ;

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP1	Newgrange Passage Tomb: This is a locally elevated view afforded from the entrance to Newgrange Passage Tomb, north of the River Boyne. The depicted view is oriented to the southwest, across terrain that gently slopes towards the Boyne Valley, located in the middle ground. The distant landscape is cloaked in dense, layered vegetation and areas of conifer forest.	Very High	The proposed development will not be visible from this distance due to the rolling landform and intervening dense vegetation. The proposed pylon structures have the potential to be viewed just above the stacked vegetation in the distance to the southwest. Nonetheless, from this distance of over 5km, the proposed structures will likely be difficult to discern for the casual observer. Indeed, they will have no effect on the visual amenity afforded from this scenic designation and sensitive heritage receptor. It should be noted that existing pylon structures are visible to the east and southeast at a nearer distance. Overall, the magnitude of visual effect is deemed Negligible.	Imperceptible / Neutral / Permanent
VP2	N2 and Local road intersection at Rathdrinagh: This is a contained view afforded from the intersection of the N2 National Primary Route and a local road in the townland of Rathdrinagh. The depicted view is oriented to the southwest, towards a neighbouring local road corridor, and is representative of surrounding local receptors in addition to the major route. The view is enclosed at a short distance by dense roadside vegetation. The existing landfill is not visible from this location.	Medium-low	The proposed development will not be visible from this location due to the layers of intervening vegetation in the direction of the site. The proposed pylon structures will be fully screened from here by intervening vegetation Therefore, the magnitude of effect is deemed negligible by default.	Imperceptible / Neutral / Long-term

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP3 (a+b)	Local road at Knockharley: This is a view afforded from a local road in the townland of Knockharley, north of the existing landfill development, and is representative of the surrounding local community. The view is oriented to the south, towards the landfill site, where several residential dwellings line both sides of the local road corridor and are backed by areas of dense mixed vegetation and coniferous forest. Aside from a view of existing pylon structures within the landfill site, the existing development is fully screened here.	Medium-low	The proposed development will not be visible from this location, aside from some potential brief glimpses of establishing woodland vegetation along the alignment of the adjacent access track, which leads into the neighbouring lands to the south and is currently characterised by an existing pylon structure. The northernmost of the proposed pylon structures is visible here to the west of the nearest visible dwelling. It will be a notable scale built feature here, but it lattice structure allows for a degree of visual permeability, which notably reduces its perceived visual presence. Overall, the visible pylon structures will increase the intensity and scale of built development in this context, although it will not appear out of place as it represents the realignment of an existing overhead cable corridor. It should be noted that all other proposed pylon structures will be screened from this section of the local road. Overall, the magnitude of visual effect is deemed Medium-low and of a negative quality.	Moderate-slight / Negative / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP4	Local road at Curraghtown: This is a view from the entrance to a local sports pitch along a local road in the townland of Curraghtown. The depcited view extends south from the entrance to the sports pitch and represents local community receptors and users of the local amenity. The view to the south is contained at a near distance by dense conifer woodland. The existing landfill facility is not visible from here.	Medium-low	The proposed land fill development is not visible from this location due to existing screening in the direction of the site. Nonetheless, several of the proposed pylon structures will be visible over the top of the dense conifer forest to the south and southwest of this viewing context. The proposed pylon structures will add to the built skyline in this view and will increase the quantum of built development in this local context. Whilst the proposed structures will be visible from here, they do not present in a highly prominent manner as they are viewed setback beyond the dense layers of existing vegetation. Therefore, the magnitude of effect is deemed Low and of a negative quality.	Slight / Negative / Permanent
VP5	Local road at Seneschalstown: This is a view afforded from a local road in the townland of Seneschalstown to the northwest of the existing landfill. The local road contained is contained by a mix of clipped winter hedgerow vegetation and mature trees and is representative of views afforded from the surrounding local community. The depicted view extents southeast from the local road corridor and is contained at a near distance by existing built development and layers of winter vegetation. The exiting landfill facility is not visible from here.	Medium-low	The proposed land fill aspect of the development is not visible from this location due to existing screening in the direction of the site. There is potential for brief glimpses of the proposed pylon structures to be afforded from here, however, there will present as relatively modest-scale features in the distance and will be heavily veiled by intervening vegetation in the direction of the site. Overall, the magnitude of visual effect is deemed Low-negligible and of a Negative quality.	Slight-imperceptible / Negative / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP6	L5056 at Flemingstown (1): This is a view afforded from a local access lane that is heavily enclosed by dense roadside vegetation. A fleeting degree of visibility is available from the local road overpass of the Knockharley access road, which is visible to the west and is bounded by mixed scrubby vegetation. This is one of the clearer views into the proposed development from the surrounding local landscape, although it does not represent any nearby residential receptors. The brief view of the landfill facility includes large mounds of stored materials, which heavily screen any further views into the development. A brief view of a section of the reinstated landfill cap is also along the alignment of the landfill access road.	Medium-low	The proposed land fill aspect of the development will not be visible from here and is screened by the intervening modified landforms and areas of stored material in the middle ground of the view. A faint view of the proposed pylon structures has the potential to be afforded over the top of intervening vegetation. Nonetheless, in the context of this heavily modified view, it is unlikely that these brief glimpses will have any notable visual effect from here. Thus, the magnitude of effect is deemed Negligible.	Imperceptible / Neutral / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP7	Local road at Brownstown (1): This is an open, locally elevated view afforded from a local road in the townland of Brownstown, representative of surrounding local community receptors. It encompasses a section of open visibility extending east from the local road across a pastoral landscape comprising agricultural fields and intervening hedgerows. A broader view is afforded to the southeast and south, whilst to the east the view is truncated in the distance by dense vegetation. The existing landfill cap is partially discernible to the east, rising just above the stacked vegetation.	Medium-low	Whilst the existing land fill capping is briefly discernible here, the operational phase of the proposed development will be almost fully screened here. There is potential for glimpse views into the site, but these will only be of the newly constructed earthen berms on the western extent of the site, which will be established with native woodland planting on their lower portions. Overtime, these will become stacked with the existing boundary vegetation resulting in a comprehensive screen of the site. The proposed pylon structures will project just above the existing vegetated skyline to the east, with only the very uppermost portions of up to 4 of the proposed structures visible from here. The proposed structures will be well offset from this local context and will have a limited visual presence here. Indeed, whilst they will result in a marginal intensification of built development in this view, they will not block or obstruct any distant views afforded from here. Overall, the magnitude of visual effect is deemed no greater than Low-negligible and is of a negative quality.	Slight-imperceptible / Negative / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP8	L5056 at Flemingstown (2): This view is afforded from the L5056 local road in the townland of Flemingstown, adjacent to a linear cluster of residential dwellings that line the western verge of the road. The depicted view is oriented to the northwest across a neighbouring residential landholding, where the nearby dwelling and surrounding vegetation partially contain visibility to the west. A brief view of the existing landfill site is afforded to the northwest between the neighbouring dwelling and surrounding areas of stacked vegetation, where the existing landfill capping is partially visible.	Medium-low	The proposed land fill aspect of the development will not be visible from this location due to the intervening landform and vegetation screening in its direction. There is potential for some brief visibility of the proposed pylon structures in the distance to the west, albeit they will present as modest scale distant features and will have a minimal visual presence. Indeed, the fleeting visibility of the proposed structures will have no notable effect on the visual amenity afforded from here. Thus, the magnitude of visual effect is deemed no greater than Low-negligible and of a negative quality.	Slight-imperceptible / Negative / Permanent
VP9	Local road at Brownstown (2): This is a locally elevated view afforded from a section of local road in the townland of Brownstown that is representative of a designated scenic view and surrounding local community receptors. The scenic view relates to views to the southeast that extend across the surrounding pastoral landscape, whilst the depicted view is oriented directly east and is partially truncated by a nearby scrubby roadside hedgerow. A glimpse of more distant rolling land is afforded over the top of the hedgerow vegetation, whilst broader open views are available to the south and southeast, in line with the scenic designation.	Medium	The proposed landfill aspect of the development will not be visible from this viewing context due to the dense intervening vegetation in the direction of the site. There is potential for fleeting visibility of the proposed pylon structures from this locally elevated context; however, due to the intervening vegetation and the distance to the site, they are likely to go unnoticed, especially as the main aspect of visual amenity is oriented away from the proposed development, towards the south and southeast. Overall, the magnitude of visual effect is deemed negligible.	Imperceptible / Neutral / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP10	Local road at Veldonstown: This view is afforded from an agricultural field access in a dense, clipped hedgerow along a local road in the townland of Veldonstown. It is representative of surrounding local community receptors and briefly extends across the neighbouring pastoral field, which is bounded by winter hedgerow vegetation.	Medium-low	The proposed development will not be visible from here as a result of the intervening terrain and vegetation in the direction of the proposed development. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP11	R150 at Kentstown: This view is afforded from the R150 regional road corridor, adjacent to a local school on the outskirts of Kentstown. It is representative of the settlement of Kentstown and the neighbouring major route receptor. The depicted view extends north across pastoral fields and is contained in the distance by dense, stacked, mature vegetation. The existing landfill capping is partially visible, rising just above the vegetation in the distance.	Medium-low	The proposed landfill aspect of the development will be entirely screened from this location by the dense, stacked vegetation in the direction of the site. There is potential for the proposed vegetation removal to generate a minor degree of visual change; however, this is substantially diminished by the extent of existing stacked vegetation visible throughout the northern landscape. The proposed pylon structures will be partially visible to the north, with some just breaking the vegetated skyline. Nevertheless, from this distance, and due to the visually permeable nature of the proposed structures, they will have a minimal visual presence and will result in a limited degree of discernible visual change. Overall, the magnitude of visual effect is deemed no greater than low–negligible and of negative quality.	Slight-imperceptible / Negative / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP12	Hill of Skryne: This is a locally elevated scenic view afforded from the Hill of Skryne, extending northeast across the wider surrounding pastoral landscape, which is cloaked in fields of pasture and layers of stacked mature vegetation. Vegetation in the middle distance becomes stacked in perspective, obscuring much of the wider landscape, whilst in the far distance, low rolling hills and elongated ridgelines contain the view. The existing land fill development is visible in the distance, where large mounds of stored material are visible and contrast against the more verdant tones of the surrounding pastoral setting.	High	The proposed development has the potential to be visible from this location, albeit from a considerable distance of over 6 km. However, from this distance and in the context of the broad, sweeping view, the proposed landfill will not be a prominent feature. It is unlikely to draw the eye, while the stacked intervening vegetation, in addition to the proposed screening berms planted with native vegetation, will result in a well-screened and softened view of the landfill operations. With regard to the realignment of the proposed pylon structures, these will replace an existing corridor of pylons that currently traverse the site and are already visible. In this respect, the degree of visual change relates to the westward relocation of the existing overhead alignment. As such, the proposed pylons do not represent an intensification of development at this location, but rather the continuation of an existing form of built infrastructure, albeit in a slightly modified position. Overall, a very limited degree of visual change will be perceived from this distance, and in the context of this broad view, the magnitude of effect is deemed negligible.	Slight-imperceptible / Negative / Permanent

12.5.7 Magnitude of Landscape Effects – Reinstatement Phase

The reinstatement of the landfill void will occur concurrently with the operational phase of the development, as the void will be progressively capped throughout the lifespan of the proposed project. At the end of the operational lifespan, landfill operations will cease, and the landfill will be fully capped and conform to a post-settlement height of 85 mOD.

There will be some removal of buildings and machinery used during the operational phase, which will cause limited land disturbance. However, the majority of the reinstatement phase will focus on enhancing the site for biodiversity purposes. In this regard, new sections of hedgerow will be planted within the site, while existing woodland established around the earthen berms will be managed, with any dead or diseased plants replaced on a like-for-like basis using native species. The landfill capping will be established as a native meadow, returning the site to its original green characteristics.

Whilst the landfill capping remains a modified landform, the overall presentation of the site will shift towards a more natural appearance, with limited built elements and some residual access tracks retained. Over time, the industrial character of the operational landfill will diminish, as woodlands, hedgerows, and grasslands become more established and cloak much of the site.

Overall, the reinstatement phase of the development will result in an enhancement of local biodiversity (as outlined in Chapter 7 of the EIAR). The magnitude of landscape effect is deemed medium–low, the quality of effect is positive, and the duration of effect is classified as permanent.

In summary, the significance of reinstatement phase landscape effects is deemed ***moderate-slight*** at the site scale, ***positive*** in terms of quality and ***permanent*** in terms of duration. Thus, reinstatement phase landscape effects are deemed ***not significant***.

12.5.8 Magnitude of Visual Effects – Reinstatement Phase

The assessment of visual impacts at each of the selected viewpoints is supported by photomontages of the proposed development during the reinstatement phase. The same photomontage booklet, which presents the operational phase of the development, also includes views of the reinstatement phase. An assessment of the potential visual effects during the reinstatement phase of the development is provided below;

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP1	Newgrange Passage Tomb:	Very High	The reinstatement phase of the land fill will not be visible from here. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP2	N2 and Local road intersection at Rathdrinagh	Medium-low	The reinstatement phase of the land fill will not be visible from here. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP3 (a+b)	Local road at Knockharley	Medium-low	The reinstatement phase of the land fill will not be visible from here. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP4	Local road at Curraghtown	Medium-low	The reinstatement phase of the land fill will not be visible from here. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP5	Local road at Seneschalstown	Medium-low	The reinstatement phase of the land fill will not be visible from here. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP6	L5056 at Flemingstown (1)	Medium-low	With regard to the proposed reinstatement measures, the areas of stored material would be removed from the site, resulting in a more homogeneous view of the proposed capping embankment extending laterally through the scene, cloaked in grassland. The site would present with more typical rural green characteristics, with all embankments re-established as grassland, whilst surrounding vegetation would be allowed to grow out and managed accordingly. In this regard, there would be a marginal degree of visual change, primarily resulting from the removal of stored material and cessation of landfill activities. Thus, the magnitude of visual effect is deemed low, and the quality is classified as positive	Slight / Positive / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP7	Local road at Brownstown (1)	Medium-low	There is limited potential for clear visibility of the proposed landfill capping from this location due to the dense vegetation in the direction of the site. Indeed, much of the proposed landscape mitigation implemented during the operational phase of the development is likely to screen and soften any views of the reinstated landfill capping by the end of the project's operational lifespan. Thus, the magnitude of effect is deemed negligible.	Imperceptible / Neutral / Permanent
VP8	L5056 at Flemingstown (2)	Medium-low	Some of the operational-phase works and stored materials that are briefly visible from this location will cease and be removed from the site, resulting in a more 'green' and vegetated view. Nevertheless, there is potential for the existing surrounding vegetation to have fully screened the site by the time of the reinstatement phase, resulting in only a limited degree of visual change from this viewpoint. Overall, the magnitude of change is deemed no greater than low–negligible, and the quality of effect is considered positive.	Slight-imperceptible / Positive / Permanent
VP9	Local road at Brownstown (2)	Medium	The reinstatement phase of the land fill will not be visible from here. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP10	Local road at Veldonstown	Medium-low	The reinstatement phase of the land fill will not be visible from here. Thus, the magnitude of visual effect is deemed Negligible by default.	Imperceptible / Neutral / Permanent
VP11	R150 at Kentstown	Medium-low	There is potential for brief views of the reinstated capping from this location, albeit the surrounding vegetation will likely provide increased screening of both the existing and proposed capping over time as it matures. Nonetheless, where visible, the reinstated capping will present more typical rural 'green' characteristics and will assimilate well into the rural context, resulting in a magnitude of effect no greater than low–negligible, while the quality of effect is deemed positive.	Slight-imperceptible / Positive / Permanent

VP No.	Existing View	VP Sensitivity	Magnitude of Visual Effect	Residual Significance / Quality / Duration of Effect
VP12	Hill of Skryne	High	There will be some degree of visual change, albeit within the distant landscape, which limits the potential for receptors to discern the alteration. The primary change will be the reinstatement of the site to a more typical 'green' form of land cover, which will assimilate with the surrounding pastoral landscape. Overall, the magnitude of effect is deemed low–negligible, while the quality of effect is classified as positive.	Slight-imperceptible / Positive / Permanent

12.6 Mitigation Measures

12.6.1 Construction Phase

With regard to landscape and visual there are limited construction-stage mitigation measures as the site is well established and heavily screened from surrounding receptors. In this regard, there is no requirement for site hoarding or additional screening to screen the construction stage effects as much of the construction stage works will be heavily screened by the existing surrounding vegetation.

12.6.2 Operational Phase

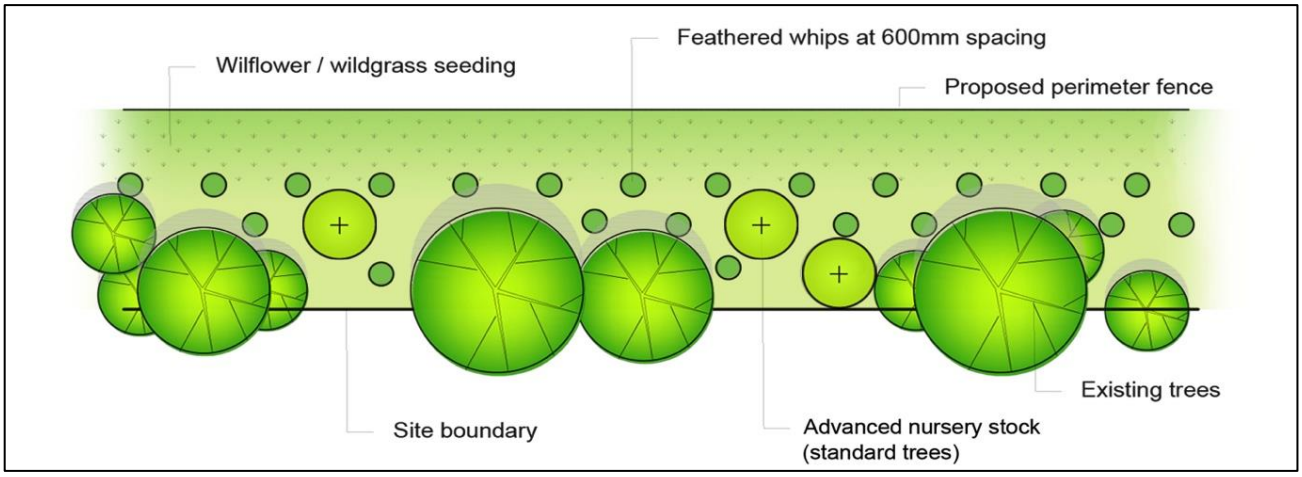
The main mitigation-by-avoidance measure employed in this instance is the siting of the proposed development within the bounds of the existing, well-established land use facility, which is heavily screened by mature vegetation along its perimeter. In this regard, the proposed development does not introduce a new land use into the study area. Furthermore, it remains contained within the existing land fill facility, although there will be some transition from more characteristic rural land uses (such as forestry) to more industrial uses, specifically, the extension of the proposed landfill.

Nevertheless, much of the proposed landfill operations will be heavily screened by the surrounding layers of mature vegetation both along the site's perimeter and within the intervening landscape. As a result of the strategic siting and contained nature of the proposed development, its potential to notably alter the surrounding landscape character is limited. Indeed, its contained nature will considerably diminish visual effects on surrounding receptors

In addition to mitigation by avoidance measures, retention of existing field boundaries within and around the site aids visual screening, and maintains the pre-existing field pattern. Although there will be some removal of conifer woodland along the site's perimeter, it is proposed to retain, protect and enhance the native hedgerows that define the sites boundary.

In addition to retaining the existing hedgerows around the site's perimeter, it is also proposed to bolster existing perimeter hedgerows 'where necessary' with under-planting and inter-planting of whip transplants (i.e. Hedgerow Type 1 - see Figure 12-7 below) in order to ensure dense and consistent screening of the site in perpetuity. This will be undertaken where required to thicken and fill gaps in the existing hedgerow network prior to the construction phase, thus allowing for any growth in the period between a grant of planning permission and construction of the development. Advanced nursery stock in the form of 8-10cm girth trees will be used to fill any noticeable gaps and plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance. Where not already exceeded by existing vegetation, it is intended to manage hedgerows up to 3-4m in height. This height will be achieved by a combination of allowing lower sections of existing hedgerows to mature, filling obvious gaps with advanced nursery stock and providing an additional line of whip planting to selected hedgerows that require densification. Indeed, over 3,840 linear meters of existing hedgerow within the site will be retained, protected and enhanced as per hedgerow type 1. Refer to the Landscape Drawing Set LD_PROJECT_WEST for details.

Figure 12-7 Hedgerow Type 1: indicative boundary planting detail showing the approach to inter-planting and under-planting of existing hedgerows (where consolidation is needed).



The proposed development will also employ several other noteworthy mitigation measures to further reduce potential impacts on the surrounding landscape. It is proposed to construct a series of earthen berms along the sites perimeter, utilising excess on-site material. The proposed rolling berms range in size and extent and are primarily contained in areas where existing conifer woodland is to be removed. In addition to the construction of the proposed berms, it is proposed to plant a native woodland mix on the lower half of the earthen berms to further screen the operational phase works and assimilate the development into the surrounding landscape, whilst enhancing the sites biodiversity. It is not proposed to plant any larger growing planting along the upper portions of the berms as this has the potential to accentuate the development along the skyline which is currently characterised by a relatively homogenous vegetated skyline. Instead, the upper portions of the proposed berms will be established as native grassland meadows and managed accordingly for biodiversity purposes. This native woodland mix provided along the lower half of the proposed berms will encompass high canopy (dominants) species, low canopy (sub-dominant) species, understory and fringe (higher shrubs) species and understory and edge (lower shrub) species, and will comprise of a mix of advanced nursery stock and whip planting of local provenance.

Overall, it is proposed to plant a total of 6.63 ha of native woodland across the site, whilst an additional 0.63 ha of native riparian vegetation will be planted along the realigned Knockharley Stream (total of c. 7.26ha of native woodland during the operational phase of the development). Furthermore, some 33.1 ha grassland meadow will be established across the site and managed for biodiversity purposed.

In total, including the woodland planting that will take place during both the operational and reinstatement phases, there will be a total establishment of 8.86 ha of woodland on the site. To compensate for the woodland removal on site under the Proposed Development (c. 12.9 ha) there will then need to be an additional 4.04 ha of woodland planting which will need to take place off site.

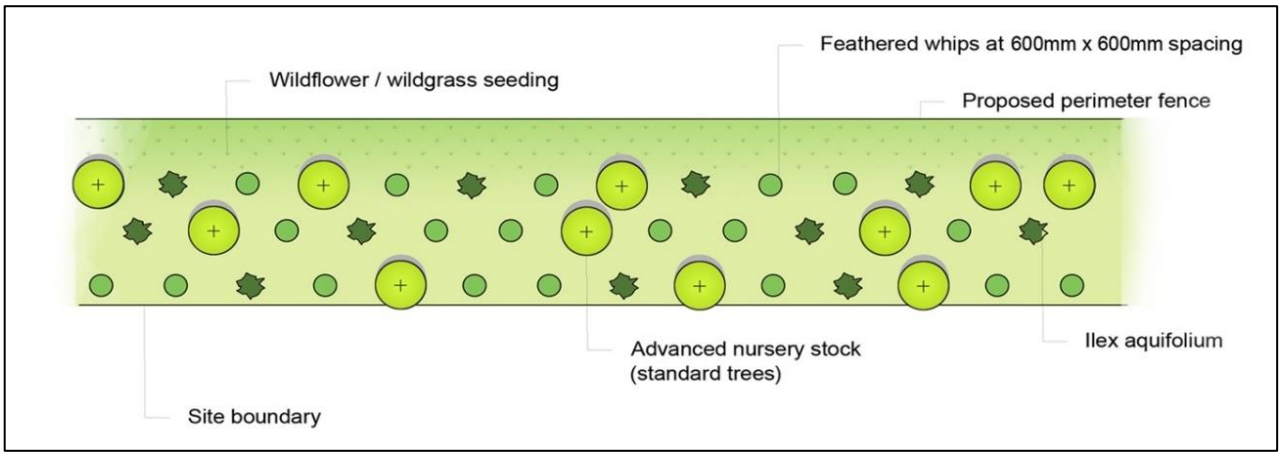
12.6.3 Reinstatement Phase

In addition to the landscaping measures proposed during the operational phase of the proposed development, several notable landscaping measures will also be proposed during the reinstatement phase of the development. This includes the planting of some 732 linear meters of new native hedgerows across the site. The proposed Type 2' hedgerows (Figure 12-8 refers), with whips and a high proportion of advance nursery stock trees (c.3m planted height), along the boundaries of some of the proposed parcels to further screen the proposed development from some of the nearest surrounding receptors (refer to Landscape Mitigation Plan drawing package LD_PROJECT_WEST). All of this planting will be allowed to

mature up to a maintained height of 3-4m and will further bolsters ecological corridors within the site and surrounding landscape.

It should also be noted that a further 1.6 ha of native woodland planting will also be established within the site during the reinstatement phase of the development, along with a further 32.3 ha of native grassland meadows. These combined landscape measures will restore the site to its original green characteristics, resulting in some positive landscape effects at the site and within the immediate surrounding landscape.

Figure 12-8 Hedgerow Type 2: indicative diagram showing the planting of new native 'type 2' hedgerows across the site.



In total, including the woodland planting that will take place during both the operational and reinstatement phases, there will be a total establishment of 8.86 ha of woodland on the site. To compensate for the woodland removal on site under the Proposed Development (c. 12.9 ha) there will then need to be an additional 4.04 ha of woodland planting which will need to take place off site.

12.7 Monitoring or Reinstatement Measures

12.7.1 Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the next available planting season after completion of the main civil engineering and building work.

All tree protection requirements will be installed on commencement of the development and removed on a phased basis as stages of the development are completed.

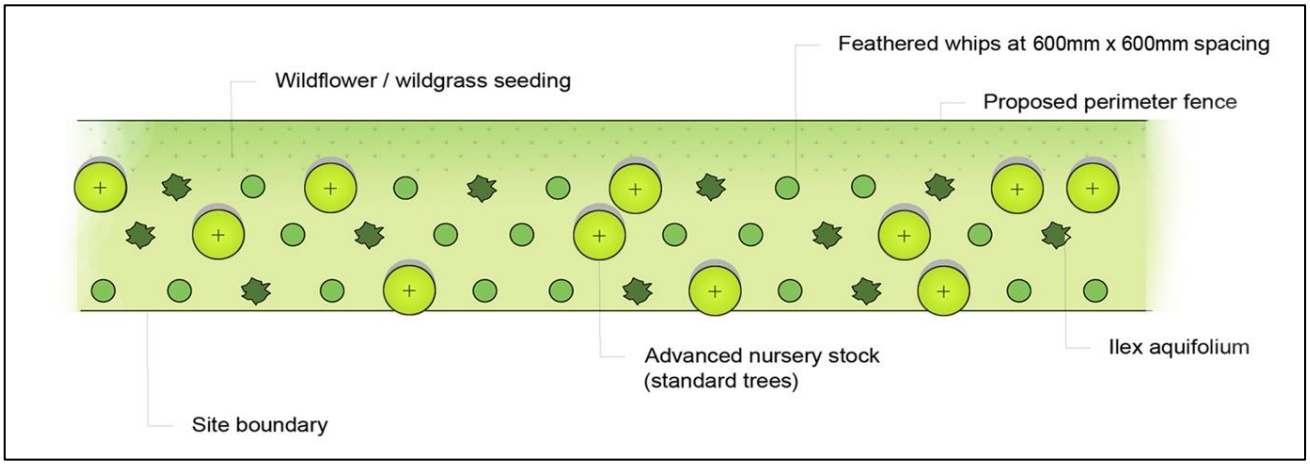
12.7.2 Operational Phase

This will consist of weed control, replacement planting, pruning etc. All landscape works will be in an establishment phase for the initial three years from planting. All works will be monitored on an ongoing basis to ensure the quality of the development is maintained.

12.7.3 Reinstatement Phase

The reinstatement phase of the development will encompass similar monitoring measures as the operational phase of the development, which will consist of weed control, replacement planting, pruning etc. In addition, land fill operations will cease and much of the heavy machinery on site will be removed, whilst stored materials will be utilised on site during the reinstatement phase. However in addition to the above management and monitoring of existing established vegetation, the reinstatement phase of the development will see the further establishment of native grassland meadows across the full extent of the capped land fill. Furthermore, new sections of native hedgerow will be established in the eastern extent of the site, whilst all other existing perimeter hedgerows will be enhanced with additional native hedgerow vegetation as necessary to fill any gaps. The existing enhanced hedgerows will be bolstered 'as necessary' as per hedgerow type 1 (refer to Figure 12-7 above), whilst new sections of native hedgerow will be planted as per 'Type 2' hedgerows (Figure 12-9 refers), with whips and a high proportion of advance nursery stock trees (c.3m planted height), within the site to further assimilate the reinstated lands into the surrounding landscape context whilst also bolstering the site biodiversity values. All of this planting will be allowed to mature up to a maintained height of 3-4m to aid in the screening and softening of the land fill capping.

Figure 12-9 Indicative planting detail showing the introduction of new hedgerow TYPE 2 during the reinstatement phase



Indeed, the reinstatement phase of the development will return much of the site to its pre-existing rural verdant 'green' characteristic presentation. The reinstatement phase of the development will also further the site's biodiversity values (refer to Biodiversity Chapter 7 of this EIAR) and enhance the ecological corridors within the site and its wider surrounds. All reinstatement works will be monitored on an ongoing basis to ensure the proposed landscaping measures effectively establish across the wider site.

12.8 Residual Effects of the Proposed Development

12.8.1 Construction Phase

The principal construction stage landscape and visual impacts are associated with the movement of heavy earth-moving machinery and the erection of tower cranes on-site. In addition, the temporary storage of excavated materials on-site and the gradual emergence of the proposed development will also generate landscape and visual impacts. Nevertheless, due to the heavily contained nature of the site, it is considered that both construction landscape and visual effects will be heavily diminished. However, at the site scale, there will be some notable degree of change in regards to removal of areas of woodland, construction of the new landfill and construction and removal of the realigned overhead cables corridors.

Overall, the construction stage landscape effect is deemed to be no greater than a Moderate-slight significance and Negative in quality, whilst the significance of construction stage visual impacts is deemed to be no greater than Moderate and of a Negative quality in the immediate surrounds of the site. Nonetheless, these impacts will reduce rapidly the immediate site context, which is well contained by both perimeter vegetation and layers of intervening vegetation within the immediate surrounding landscape. The construction stage landscape and visual effects are classified as 'short-term' in terms of duration. Overall, the residual construction stage effects are deemed ***not significant.***

12.8.2 Operational Phase

In terms of landscape impacts, the proposed development is of notable scale and extent, albeit contained within an existing, established landfill facility and well enclosed by surrounding perimeter vegetation. This vegetation will be enhanced as part of the proposed mitigation measures through the introduction of surrounding earthen screening berms and additional native woodland planting. In this regard, the development represents an intensification of an existing, established land use rather than the introduction of a new or unfamiliar one. While there will be a clear intensification of development at the site scale, this does not extend to the surrounding landscape, as the development will be well screened and contained to the bounds of the existing land fill facility. This considerably limits its potential to impact or alter the surrounding, relatively typical rural landscape character. In terms of landscape character, the proposed development is located within a modified landscape context, already influenced by the existing operational landfill and other surrounding anthropogenic land uses, such as overhead electricity corridors, major route corridors, and existing solar developments. Indeed, the study area presents as a fairly typical rural setting, although the wider landscape holds strong landscape values associated with cultural heritage, scenic amenity, and a degree of naturalistic character, particularly in the environs of the River Boyne. Notwithstanding, the central study area is not considered highly susceptible to change, a conclusion reinforced by the variety of existing developments and land uses in the surrounding area. The robustness of the receiving landscape is further supported by the Meath County Development Plan, which places the site within Landscape Character Area 'LCA 6 – Central Lowlands'. This area is defined as having a medium capacity to accommodate all types of development outlined in the assessment, including overhead cables, substations and masts, roads and railways, underground services, wind turbines (single turbines), biomass, and forestry.

Overall, the proposed development does not conflict with the current landscape and visual policies and objectives within the current CDP and represents the continuation and intensification of a well-established land uses. As a result, the significance of operational phase landscape effect is deemed Moderate, is of a Negative-Neutral quality and is Permanent in terms of duration. Therefore, the residual landscape effects are deemed ***not significant.***

In terms of operational-stage visual impacts, these were assessed from 12 no. viewpoint locations throughout the study area, representing a range of viewing angles, distances, and visual receptor types. As highlighted in the baseline views, there is very limited potential for any clear visibility of the current landfill operations due to the substantial degree of existing screening along the site's perimeter and within the immediate surrounding landscape. This is reflected in the assessment of visual effects, which concludes that the proposed landfill itself will not be visible from any of the representative viewpoints. Visibility of the development is primarily associated with the realignment of the existing overhead cable corridors, which includes several new pylon locations to the north and west of the site. Some of the closest views of the proposed pylon structures will be afforded to local receptors along a short section of local road immediately north of the existing landfill site. However, this part of the study area is already influenced by large pylon structures associated with the existing overhead alignment. Therefore, the effect is considered an intensification of an existing characteristic feature rather than the introduction of a new and unfamiliar built form. Nonetheless, the new pylon structures will result in an increase in the intensity and quantum of built development in some locations (refer to VP3 and VP4), with the residual significance of effect ranging between Moderate–Slight and Slight in the area immediately north of the existing landfill. All other visual receptors within the study area were assessed as experiencing a significance of visual

effect ranging from Slight–Imperceptible to Imperceptible, as the proposed pylons are typically viewed at a distance or are well offset from surrounding local receptors and those in the wider study area. It is important to note that the proposed landfill will not be visible from the Brú na Bóinne complex in the wider landscape to the northeast. While the proposed pylon structures may be visible from this location, due to the viewing distances involved and the visually permeable nature of the lattice steel structures, they will be barely discernible to the casual observer. Accordingly, the residual significance of effect was deemed Imperceptible. To the southwest of the site, at the Hill of Skyrne, which is also representative of potential views from the Hill of Tara further to the southwest, the existing landfill and its capping are discernible in the distant landscape, set among areas of dense, stacked mature vegetation. From this elevated viewpoint, there is potential for glimpse views of the landfill, and the proposed pylon structures may also be visible, situated among the same vegetative context. Nonetheless, given the expansive panoramic views afforded from this location and the considerable viewing distance of over 6 km, the proposed development will have a minimal visual presence. It will not result in any notable effect on the visual amenity experienced from this viewpoint, which already includes views of the existing distant landfill, its capping, and overhead cable corridors that traverse the site and wider surrounding area. Therefore, the residual significance of visual effect was classified as Slight–Imperceptible.

On balance of the reasons set out above and within the visual impact appraisal, residual visual effects are in the lower order of magnitude as the development tends to be well screened and where visible, will not present in a highly prominent manner, nor will it detract notably from the prevailing robust rural character of the surrounding landscape. Thus, it is assessed that residual operational phase visual effects generated by the proposed development are ***not significant***.

With regard to the reinstatement phase of the development, effects are generally considered to be positive in quality, as they represent the transition from a highly industrial land use to one that exhibits more typical rural characteristics. The landscape planting measures established and matured during the operational phase will be maintained and managed accordingly, while the final capping of the landfill will be developed as a native grassland meadow. Some new sections of native hedgerow will also be established within the site, whilst all operations will cease. This will present the site with verdant green tones more in keeping with the surrounding pastoral landscape. These measures will enhance the site's biodiversity value, aid in assimilating it into the surrounding rural environment, and contribute to the strengthening of ecological corridors both within the site and in the wider landscape context. As such, the reinstatement phase is assessed as generating a residual significance of landscape effect of Moderate–Slight. The residual visual effects associated with the reinstatement phase are assessed as ranging between Slight and Imperceptible. The quality of both the landscape and visual effects during the reinstatement phase is deemed Positive. Thus, it is assessed that residual reinstatement phase landscape and visual effects generated by the proposed development are ***not significant***.

12.9 Cumulative Impact

Two projects of note in the proximity to the development are the proposed 180 Megawatt gas fired peaking power plant (MCC Reg. Ref. 2460842) proposed to be located to the immediate southwest of the Proposed Development site, and a planned 165 ha solar farm in the vicinity of the Proposed Development site, however this has not yet within the planning system. The project is at non-statutory pre-planning community consultation stage.

12.9.1 Construction Phase

Should the construction of two or more of the above-noted developments occur in tandem, there is potential for a notable increase in the intensity of construction-stage activities within the study area. These activities principally relate to an increase in construction traffic travelling along the surrounding local, regional and national roads to and from the site, as well as noise and disturbance generated by general construction stage works.

However, it is important to note that the proposed development is well contained by established vegetation. While some of this will be removed during the construction stage, much of the immediate boundary vegetation will be retained, which has the potential to screen many of the more intensive construction activities associated with the proposed development. In contrast, both the proposed gas-fired peaking plant and the planned solar farm do not benefit from the same degree of existing screening, and therefore the proposed development is likely to have a more limited contribution to construction-stage landscape and visual effects than the other two development types. It should also be noted that construction-stage activities tend to be of a temporary and short-term duration and are reversible in nature.

Overall, due to the scale of the combined projects, there is potential for some notable construction-stage landscape and visual effects to occur. However, the principal point of note is that the proposed development is likely to make a more limited contribution to such effects due to the degree of existing screening in the surrounds of the site. Thus, construction-stage landscape and visual effects generated by the proposed development are deemed ***not significant***.

12.9.2 Operational Phase

With regard to potential operational phase cumulative landscape effects, the proposed development will form part of a wider group of established and emerging infrastructural land uses in the surrounding area, including the adjacent gas-fired peaking plant and the neighbouring planned solar farm. In combination, these developments will contribute to an increased level of human influence and modification within the receiving landscape. However, the degree of cumulative landscape change will vary between the different development types. The proposed development forms part of a well-established landfill operation and, therefore, its potential to notably alter the character of the receiving landscape is more limited than the other two developments, both of which would introduce new forms of development to this local context.

As noted above, the proposed development benefits from extensive existing vegetation around much of its perimeter, which will continue to provide a high degree of integration into the surrounding landscape. The proposed mitigation screen planting and the proposed earthen berms will further reinforce the existing vegetation along the site's perimeter, resulting in very limited residual visibility of the operational phase of the development, as evidenced in the above visual impact appraisal. When there is limited visibility of a development, there is limited potential for it to alter the surrounding landscape character. Compared with the potentially more visually open characteristics associated with the gas-fired peaking plant and the planned solar farm, the proposed development will have a relatively lower landscape presence and a reduced likelihood of contributing prominently to cumulative operational landscape effects.

Whilst, in combination, the three developments will contribute to utilitarian land uses becoming more prominent within the immediate surrounding landscape, the perception of these combined developments as the principal land use will likely be reduced in many locations, with intervening vegetation providing a considerable degree of screening that diminishes their combined perceived presence.

With regard to operational phase cumulative visual effects, there will be only very limited residual visibility of the proposed development, often relating to brief views or glimpses of the development through gaps in surrounding vegetation, or distant views from locally elevated lands. The proposed gas-fired peaking plant will comprise sizeable built components and is likely to be one of the more visually prominent developments of the three. Similarly, although comprising low, ground-hugging features, the planned solar development is not afforded the same degree of established screening vegetation as the proposed development. Given the combination of distance, screening and landscape assimilation, the proposed development is unlikely to give rise to any notable cumulative visual effects during the operational phase.

Overall, the operational landscape contribution of the proposed development is expected to be relatively limited in comparison to the other proposed and planned developments. As such, cumulative operational landscape and visual effects are assessed as ***not significant***.

12.10 References

- Department of Housing, Planning & Local Government (DHPLG) (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment
- Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- Landscape Institute and the Institute of Environmental Management and Assessment (IEMA) publication entitled Guidelines for Landscape and Visual Impact Assessment, 2013 (GLVIA3);
- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (2022); and
- 'Photography and Photomontage in Landscape and Visual Impact Assessment', Landscape Institute Technical Guidance Note 06/2019.

Chapter 13 – Material Assets – Traffic and Transportation

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13. MATERIAL ASSETS – TRAFFIC AND TRANSPORTATION

13.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) has been prepared to assess the potential significant effects of the proposed development on traffic and transportation. It should be read in conjunction with the project description, see Chapter 2 (Description of the Proposed Development) of this EIAR.

Knockharley Landfill opened in December 2004 and initially accepted residual household, commercial and industrial wastes together with construction and demolition wastes. Planning permission was granted by An Coimisiún Pleanála (ACP) (previously known as An Bord Pleanála (ABP)), in 2021 (ABP Ref. No. 303211-18), for an extension of the existing landfill to allow for 440,000 tonnes of waste disposal activities per annum. The Strategic Infrastructure Development (SID) application included an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). The site is an EPA licenced (IE Licence No. W0146-042) landfill in operation since 2004. Permission was granted on 30-Apr-2021 for the disposal, treatment and recovery of waste at Knockharley Landfill comprising an increase in the rate of waste acceptance up to 440,000 tonnes per annum consisting of up to 435,000 tonnes per annum of non-hazardous waste incl. Incinerator Bottom Ash (IBA) as well as household, commercial and industrial wastes incl. residual fines, non-hazardous contaminated soils. Construction and demolition (C&D) wastes and bailed recyclables, and up to 5,000 tonnes per annum of stable non-reactive hazardous waste.

Under ABP Ref. No. 321769-25 permission was sought to alter the 2021 permission and it was proposed to change from the permitted bio-stabilisation/composting operations at the site in favour of processing of C&D fines washing to better support circular economy objectives. There was no increase in the total tonnes processed at the facility. The proposed alteration to the 2021 decision was granted by ACP by order dated 09-May-2025.

The traffic assessment provided in this Chapter relates to a proposed development consisting of the expansion of an existing landfill by construction of an additional active void space for which planning permission is sough for acceptance of waste until the expanded landfill void is full. The additional active void space is 3.38M cubic metres with a further void space in the 'piggyback' cell of 807,000 cubic metres.

There is no proposed increase in the current permitted rate of annual acceptance of up to 435,000 tonnes per annum of non-hazardous wastes, which comprise up to 150,000 tonnes of IBA, as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, (C&D) wastes and bailed recyclables together with the acceptance of up to 5,000 tonnes per annum of stable non-reactive hazardous waste.

The proposed development involves an increase in the overall capacity of the landfill through the expansion of the active void space. Importantly, there is no proposed increase in the permitted annual rate of waste acceptance, and therefore it is reasonable to expect that the daily and annual volume of waste related vehicle movements to and from the site will remain consistent with the established operational pattern. Traffic generation during the operational phase of the expanded landfill can therefore be characterised as a continuation of the existing use, with no significant material intensification of traffic impacts on the surrounding road network. While periodic construction activity will be required for the development of new landfill cells, this again is a periodic activity that has prevailed throughout the life of the existing landfill. Such cell development and construction works are of a temporary and cyclical nature and as per the past two decades, will give rise to only modest, short-term increases in traffic volumes. These construction-related vehicle movements will not alter the long-term traffic profile of the site, which remains defined by the unchanged waste intake rate.

The aim of this Chapter is to provide sufficient roads and traffic related information to determine baseline traffic characteristics and based on industry-standard traffic forecasting methodologies, to inform an assessment of the potential traffic impact arising from the proposed development. The development is described in detail in Chapter 2 *'Description of the Proposed Development'* of this EIAR, those elements considered to have a potential effect, either direct or indirect on traffic and transportation generally comprise:

13.2 Expertise and Qualifications

This Chapter has been prepared by Julian Keenan of Trafficwise Ltd., Traffic and Transportation Planning Consultants.

Julian Keenan is an Engineer in practice and a director of Trafficwise Ltd. holding the degree of Bachelor of Engineering (Hons.) in civil engineering conferred by University College, Galway, in 1990. Mr Keenan is a member of the Institution of Engineers of Ireland and a member of the Chartered Institution of Highways and Transportation and has over 34 years engineering experience, including approximately seven years in local government in the United Kingdom and over 27 years of private engineering consultancy services in Ireland, of which 23 years have been with Trafficwise Ltd. He has specialised in roads design and traffic and transportation planning for approximately 29 years. Consultancy experience includes advising clients in relation to road schemes, residential, commercial, industrial and leisure developments for which the key work involves provision of professional services in the design and appraisal of schemes, including the preparation of planning applications and appeals. Mr Keenan has represented clients at ACP oral hearings for commercial development, strategic infrastructure development and represented landowners and stakeholders in relation to various road schemes and infrastructural works. He has given sworn evidence before the Property Arbitrator, including in relation to road schemes, and has provided expert witness testimony to the High Court.

Mr Keenan has carried out traffic assessments and has been involved in the preparation of EIARs for the following projects:

Project: **Knockharley Landfill, Kentstown, Co. Meath**
Planning Ref.: 01/5006 (ABP PL17.125891)
Description: Prepared Traffic Impact Assessment report and roads design elements including access from N2 National Primary Road. Permission was granted to Celtic Waste Ltd. for the development and operation of an engineered landfill and ancillary facilities at the Knockharley site on August 26th, 2002. The permission was subject to a condition that restricted the acceptance of waste for disposal at the facility to waste arising from the North-East waste management region. The quantities of waste accepted at the facility were restricted to 132,000 tonnes per annum until December 2007 and thereafter to a maximum of 88,000 tonnes per annum.

Project: **Knockharley Landfill, Kentstown, Co. Meath**
Planning Ref.: NA50453
Description: Prepared Traffic Impact Assessment report relating to proposal to remove condition of planning limiting waste to that arising from the North East Region. Permission refused by Meath County Council.

Project: **Knockharley Landfill, Kentstown, Co. Meath**
Planning Ref.: NA60336 (ABP PL17.220331)
Description: Prepared Traffic Impact Assessment report relating to proposal to remove condition of planning limiting waste to that arising from the North East Region. Permission granted by Meath County Council. Upon appeal by the applicant Greenstar, the Board granted permission on 21-Mar-2007 for an extension of the landfill footprint, for the removal of the regional restriction on the origin of the waste accepted at the facility and for the

continuation of the annual intake volume of 132,000 tonnes per annum until the end of 2010, reverting to 88,000 tonnes per annum thereafter. Permission was refused for an increase in the waste intake to 200,000 tonnes per annum.

Project: **Knockharley Landfill, Kentstown, Co. Meath**
Planning Ref.: ABP-PL17.PA0009
Description: Prepared Traffic Impact Assessment report relating to a proposal to increase the rate of waste acceptance at the permitted facility to 400,000 tonnes per annum for disposal. The application was refused with the reason for refusal stating that the proposed increase would compromise the viability of more sustainable waste infrastructure and the designation of Knockharley as the long-term residual landfill for the North East region and so would conflict with the waste management plan for that region.

Project: **Knockharley Landfill, Kentstown, Co. Meath**
Planning Ref.: SID Case Ref. ABP-303211-18
Description: Prepared Traffic Impact Assessment report (EIAR Chapter) for an increase in the rate of waste acceptance up to 440,000 tonnes per annum comprising up to 435,000 tonnes per annum of non-hazardous waste incl. IBA as well as household, commercial and industrial wastes incl. residual fines, non-hazardous contaminated soils. C&D wastes and baled recyclables, and up to 5,000 tonnes per annum of stable non-reactive hazardous waste. Permission Granted 30-Apr-2021.

Project: **Drehid Waste Management Facility, Co. Kildare**
Planning Ref.: Case Ref. PA09.317292
Description: Directed the preparation of a Traffic Impact Assessment report (EIAR Chapter) for a proposed development consisting of an extension to the existing Drehid Waste Management Facility to provide for acceptance of up to 440,00 tonnes per annum of non-hazardous waste material. Permission Granted 06-Sept-2024.

Project: **Ballynagran, Engineered Residual Landfill, Co. Wicklow**
Planning Ref.: 01/5285 (PL27.131213)
Description: Preparation of a Traffic Impact Assessment report together with roads and infrastructure design for a proposed development consisting of the operation of an engineered residual landfill to accept 180,000 tonnes per annum of non-hazardous waste.

Project: **East Galway Engineered Landfill, Ballinasloe, Co. Galway**
Planning Ref.: 02/3811 (PL07.205181)
Description: Preparation of a Traffic Impact Assessment report together with internal infrastructure design and road improvements scheme for a proposed development consisting of the operation of an engineered landfill facility accepting 100,000 tonnes per annum of residual waste at Killagh More, Kilconnell, Ballinasloe, Co. Galway.

Project: **Usk Quarry, Kilcullen, Co. Kildare**
Planning Ref.: 2176/01 (PL09.131620)
Description: Preparation of a Traffic Impact Assessment report together with internal infrastructure design and road improvements scheme for a proposed development consisting of the operation of an engineered landfill facility at Usk, Kilcullen, Co. Kildare.

Project: **Ballinclare Quarry, Inert Landfill Facility, Kilbride, Co. Wicklow**
Planning Ref.: ABP-309991-21 (Refused) & PA27.321255 (Current)
Description: Preparation of a Traffic Impact Assessment (EIAR Chapter) report together with internal infrastructure design and road improvements scheme for a proposed development consisting of the operation of an inert landfill facility to backfill the existing quarry to original ground level. Establishment and operation of a construction and demolition waste recovery facility and installation and operation of a soil washing plant.

13.3 Proposed Development

A full description of the proposed development is set out in Chapter 2 *'Description of the Proposed Development'* of this EIAR and so is not repeated here but those elements directly affecting traffic generation to the public road network are set out in brief below.

Permission is being sought for the following development at the existing permitted landfill site:

- The expansion of the existing landfill by construction of an additional active void space of 3.38 million m3 for landfilling (with further void space of 807,000 m3 for the 'Piggyback Cell').
- The proposed expanded landfill body will have a final post settlement contour height of 85mOD (aligning with the existing permitted post settlement contour height of the active landfill).
- Permission is sought for the acceptance of waste until the expanded landfill void is full.
- There will be no increase in the permitted annual acceptance of up to 435,000 tonnes per annum of non-hazardous wastes. Which comprises up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables. In addition, the acceptance of up to 5,000 tonnes per annum of stable non-reactive hazardous waste.
- Relocation of an existing 220kV overhead ESB powerline that traverses the site to the western boundary of the site so to accommodate development of the expanded landfill void.
- Diversion of the existing Knockharley Stream to the outer extent of the expanded landfill void. The diverted stream will not be culverted with the exception of existing access road crossings.
- Amendment and extension of 10m high permitted screening berms (ABP Ref: 303211) along the western planning boundary to revise the berm profile and extend the extent of berm.

13.4 Aspects Relevant to the Assessment

When considering a development of this nature, the potential traffic and transport impact on the receiving road network is considered for each of two distinct stages:

- Construction Phase
- Operational Phase
- Decommissioning Phase

During the construction phases which will occur throughout the life of the development, the main focus in relation to traffic and transport matters will arise from typical landfill cell construction activities. These activities have the potential to generate additional traffic to the receiving roads network. The construction phase impacts will be temporary to short-term in duration. Construction Phase aspects relevant to traffic assessment include:

- Vehicle types and numbers including Heavy Goods Vehicles (HGVs), construction machinery, and worker transport.
- Estimated number of vehicle movements per day/week.
- Proposed transport routes for materials, equipment and staff.
- Timing of traffic movements and delivery schedules to avoid peak hours.
- On-site parking and storage.
- Traffic management planning.

The primary potential sources of impact upon traffic and transport during the operational phase of the proposed development arise from staff travel together with deliveries or materials to and from the site and routine servicing of the development. All impacts during the operational phase are assessed as long-term. Operational Phase aspects relevant to traffic assessment include:

- Frequency and type of delivery vehicles (e.g. export of aggregates, import of soil and stone).
- Delivery scheduling/frequency/fluctuations.

- Workforce commuting.
- Staff numbers and shift patterns.
- Parking provision.
- Cumulative traffic impacts and interaction with existing or planned developments.
- Potential impacts at key junctions or road links/sections.

There is currently a reasonable basis to anticipate decommissioning of the proposed site plant at the end of the operational period. A decommissioning and aftercare plan ensures that decommissioning will be carried out in a controlled, environmentally responsible, and regulatorily compliant manner. The decommissioning process would be implemented in phases to mitigate potential environmental impacts. Where appropriate, elements of the development such as storage areas, plant, buildings and structural components, and grid connection infrastructure would be removed.

13.5 Methodology

The assessment will be undertaken using the following methodology:

- Baseline traffic surveys have been undertaken in the vicinity of the proposed development site in order to characterise the existing receiving road network and traffic environment;
- A review of the most applicable standards and guidelines to set a range of acceptable threshold criteria for the construction and operational phases of the proposed development;
- Predictive calculations of traffic generation relating to construction phase activities have been undertaken;
- Predictive calculations of traffic generation have been undertaken to assess the potential impacts associated with the operation of the development on the receiving road network within the study area both separately and cumulatively with other permitted and planned developments;
- A schedule of mitigation measures and monitoring has been incorporated where required, to reduce, where necessary, the identified potential impacts relating to traffic and transport arising from the proposed development.

13.5.1 Relevant Legislation and Guidelines

13.5.1.1 Legislation and Guidelines

This chapter has been prepared having regard to the following guidelines;

- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Housing, Planning & Local Government, 2018).
- *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report* (European Commission, 2017).
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022).
- *Meath County Development Plan 2021–2027*.
- Transport Infrastructure Ireland (TII) Publication TII-PE-PDV-02045 *'Traffic and Transport Assessment Guidelines'* (May 2014).
- TII Publication PE-PAG-02017 *'Project Appraisal Guidelines for National Roads Unit 5.3 Travel Demand Projections'* (Oct 2021).
- TII Publication PE-PAG-02039 *'Project Appraisal Guidelines for National Roads Unit 16.1: Expansion Factors for Short Period Traffic Counts'* (Oct 2016).
- TII Publication PE-PAG-02016 *'Project Appraisal Guidelines for National Roads Unit 5.2 - Data Collection'* (Dec 2023).
- TII Publication DN-GEO-03060 *'Geometric Design of Junctions'* (May 2023).
- TII Publication DN-GEO-03031 *'Rural Link Design'* (May 2023).
- IEMA *'Environmental Assessment of Traffic and Movement'* (2023).

13.5.1.2 The Traffic and Transport Assessment Guidelines

The TII *'Traffic and Transport Assessment Guidelines'* provide a comprehensive framework for evaluating the impacts of developments on traffic and transportation. These guidelines are used by planners, engineers, developers, and government agencies to ensure that the traffic and transportation demands of projects meet whist minimising negative effects on traffic flow and safety. Below is an overview of key elements involved in the preparation of the Traffic Assessment in this chapter:

- **Purpose and Scope:** The objective is to ensure that new developments or changes to existing travel infrastructure are assessed for their impacts on traffic and transportation systems. The guidelines apply to various types of projects, including residential, commercial, industrial, and infrastructure developments.
- **Assessment Process:** Initially there is a screening process based upon various threshold and sub-threshold values to determine whether the predicted impacts are significant enough to warrant full traffic and transport assessment (involving predictive modelling etc.), the need for which is typically based on the scale, nature and traffic generation characteristics of the project.
- **Scoping:** Initial high-level assessment the define the extent and focus of the assessment, including the geographical area, time periods, and specific issues to be studied.
- **Data Collection and Analysis:** This includes for surveys of current traffic volumes, road capacities, public transport availability, and accident statistics. This is used to establish baseline data and includes the collation of data on current transportation network performance including traffic flows. Data collection includes future projections and estimation of future traffic conditions with and without the proposed development, taking into account population growth, economic trends, and other relevant factors.
- **Impact Assessment:** Calculation of trip generation and estimation of the number of trips generated by the development, including different modes of transport. Forecasting trip distribution and assignment to the receiving road network providing rationale for the analysis of where trips will originate and end, and the routes they will take.
- **Capacity Analysis:** Evaluation of forecast traffic impacts based upon assessment threshold values and criteria. Modelling assessments of whether existing or planned infrastructure can handle the additional traffic, including intersections, road segments, and public transport facilities in the case of urban development.
- **Mitigation Measures:** Where impacts are sufficiently significant to warrant infrastructure Improvements typically recommendations for road upgrades, intersection improvements, or new transport facilities are put forward. This may include traffic management strategies to optimise traffic flow, such as staff shift scheduling, new signage, or traffic calming measures. In developments generating significant staff numbers, sustainable transport solutions including the promotion of public transport, cycling, and walking can be considered to reduce reliance on private vehicles.

13.5.1.3 Objective of Assessment

The underlying objective of this chapter is to assess the existing and future receiving road network and internal site infrastructure for suitably to cater for the forecast traffic flows and travel demands by all modes arising directly from the proposed development.

0Where impacts are identified and where appropriate to the development of infrastructure serving the development site and receiving road network environs proposed mitigation measures are put forward. This chapter examines the proposed vehicular access arrangements, car parking provision, site layout, and facilities for pedestrians and cyclists; as well as assessing the availability of sustainable transport options for uses of the development and outlining mobility management measures that may be adopted to promote and facilitate the future use of sustainable transport modes.

A core objective of this chapter is to examine the traffic impact of the proposed development on the receiving local road network. This involves analysing the receiving road network traffic flows and the

forecast traffic generation of the proposed development and where appropriate providing comparative assessments of the relative performance of the existing and future receiving road network using traffic flow modelling and capacity modelling programs to determine the incremental impact of forecast assessment levels of additional traffic and the effects upon road network capacity and delay through the examination of road link and junction performance.

Traffic analysis models provide a basis of comparison between existing and future junction performance from which to evaluate and determine the impact of the proposed development on the receiving road network.

Future traffic flow scenarios are based upon forecasts of traffic generation arising at the proposed development together with potential traffic generation arising from the development of zoned lands in conjunction with the application of other various network traffic growth factors which are applied to baseline traffic count data at existing key junctions on the receiving road network.

The general structure and methodology adopted for the assessment of traffic impact in this report is summarised as follows:

- **Traffic Data Collection:** 12-hour classified vehicular traffic count surveys were undertaken on Tue 08-April-2025 by Traffinomics Transportation Surveys. The surveys cover 07:00 and 19:00hrs at 7 no. sites within the study area. In addition, an Automatic Traffic Counter (ATC) survey spanning 1 no. week was undertaken on National Primary Road N2. The ATC survey commenced on Tues 05-April-2025. A copy of the traffic flow data is provided in Volume 3, Appendix 13.1 of this EIAR.
- **Trip Generation:** A development trip generation assessment has been carried out using a combination of the first principles method and the comparison method and by reference to weighbridge records for the existing development and other similar developments to determine the potential vehicular and person trips to and from the proposed development.
- **Trip Distribution:** Based upon existing traffic characteristics on the surrounding road network, and reference to weighbridge data an appropriate distribution has been assigned to site development vehicular trips across the road network.
- **Network Assessment and Capacity Assessments:** Assessment of the existing and future traffic flows and assessment of the operation of junctions on the receiving road network to evaluate the traffic impacts arising from the proposed development.
- **Future Network Assessment and Capacity Assessments:** Future year traffic forecasts were derived from the application of Traffic Infrastructure Ireland (TII) Project Appraisal Guidelines (PAG) growth factors to baseline survey data. Together with the forecast development trip generation figures and potential traffic generation arising from the development of zoned lands. The performance of the junctions in the receiving road network are modelled for various scenarios including the proposed year of opening, +5 years after opening and +15 years after opening. Assessments are undertaken both with and without the proposed development to assess the incremental impact arising directly form the construction phase(s) and operational phase of the development.

13.5.1.4 The 'Traffic and Transport Assessment Guidelines' - Thresholds

Traffic and Transport Assessment or Traffic Impact Assessment must accompany all planning applications for developments which could potentially generate significant traffic volumes. Initially there is a screening process based upon various threshold and sub-threshold values to determine whether the predicted impacts are significant enough to warrant full traffic and transport assessment. The following sets out the various relevant thresholds:

- Development traffic exceeds 10% of the traffic flow on the adjoining road.
- Development traffic exceeds 5% of the traffic flow on the adjoining road where congestion exists, or the location is sensitive.
- Residential development in excess of 200 dwellings.
- Retail and leisure development in excess of 1,000sq.m.

- Office, education and hospital development in excess of 2,500sq.m.
- Industrial development in excess of 5,000sq.m.
- Distribution and warehousing in excess of 10,000sq.m.

Relevant thresholds for Traffic Assessment where the development has the potential to affect national roads are as follows:

- 100 trips in / out combined in the peak hours for the proposed development
- Development traffic exceeds 10% of turning movements at junctions with and on National Roads.
- Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive.
- Industrial development in excess of 5,000sq.m.
- Distribution and warehousing in excess of 10,000sq.m.
- 100 on-site parking spaces.

Sub threshold criteria for Traffic Assessment are as follows:

- The character and total number of trips per day is such that as to cause concern.
- Location of the site is not consistent with national guidance or local plan policy, or accessibility criteria contained in the Development Plan.
- The development is part of incremental development that will have significant transport implications.
- The development may generate traffic at peak times in a heavily trafficked/ congested area or near a junction with a main traffic route.
- The development may generate heavy vehicles in a residential area.
- There are concerns over the development's potential effects on road safety.
- The development is in a tourist area with potential to cause congestion.
- The planning authority considers that the proposal will result in a material change in trips patterns or raises other significant transport implications.

13.5.1.5 Assessment Criteria

13.5.1.5.1 Traffic and Transportation Assessment Guidelines

TII PE-PDV-02045 '*Traffic and Transportation Assessment Guidelines*' 2014, Table 2.1 '*Traffic Management Guidelines Thresholds for Transport Assessments*' sets out various threshold values and criteria that typically trigger that a Traffic Assessment is required where national roads are affected by traffic arising from any proposed development. A general threshold value which is commonly used to identify whether a Traffic Assessment including detailed junction capacity modelling assessments is required is as follows:

- Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road or 5% in a congested network or sensitive area

It should be noted the 10% flow is generally a prompt for whether or not a Traffic Assessment is recommended, it is not typically used to determine the significance of effects. It is nonetheless commonly used in Traffic Assessments to reference the scale of increase in traffic flows when assessing the forecast long-term operational traffic effects of proposed developments. It is used herein as a preliminary measurement of the potential magnitude of effect on the receiving road network.

The 10% threshold value helps planners, engineers, and local authorities assess when mitigation measures or further studies are necessary to manage traffic impacts. Over time, transportation studies have shown that increases in traffic volumes of less than 10% typically have minimal perceptible impact on congestion, travel times, or road safety. This has led to the general rule that increases below this level may not warrant significant infrastructure changes.

In transport planning practice, the 10% threshold is often seen as a conservative baseline for determining when the impact of a development is likely to be noticeable and significant. It provides a clear, measurable trigger for when to conduct detailed assessments or implement mitigation measures.

Road networks are typically designed with a certain level of spare capacity to accommodate fluctuations in traffic. A 10% increase is generally within this buffer, meaning that a road system can often handle this additional load without significant degradation in service levels, unless the network is already operating at or near capacity.

Increases in traffic volume under 10% are often not noticeable by drivers and do not substantially change the level of service (LOS) of a road network. This is because variations in daily traffic patterns, such as seasonal fluctuations or changes in driving habits, can already cause similar increases or decreases without significantly altering the traffic flow.

Using a percentage-based threshold like 10% makes traffic and transport assessments more straightforward. It provides a clear, objective criterion for when further investigation is required, reducing uncertainty in the planning process.

13.5.1.5.2 IEMA 'Environmental Assessment of Traffic and Movement' (2023).

The assessment of traffic impacts arising from the proposed development has been undertaken in accordance with the Transport Infrastructure Ireland (TII) *'Traffic and Transport Assessment Guidelines'* (2014). These guidelines represent the nationally recognised standard for the appraisal of transport impacts associated with developments in Ireland and are the benchmark used by planning authorities and ACP.

The TII Guidelines set a threshold criterion of 10% impact on traffic flows at junctions or links on the receiving road network as the point at which more refined, detailed modelling of junction capacity may be required. This relatively conservative threshold ensures that even relatively modest levels of development-related traffic are subject to scrutiny in terms of potential operational or safety implications. By comparison, the Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic (2023), which are increasingly cited in the preparation of Environmental Impact Assessment Reports in the UK and Ireland, set out a higher threshold of 30% change in traffic flows as the level at which further environmental consideration of potential impacts (such as severance, pedestrian amenity, fear and intimidation, accidents and safety) is generally warranted.

It is important to note that while the IEMA guidance focuses primarily on the environmental effects of changes in road traffic, rather than capacity or operational performance, there is a degree of overlap between the two approaches. By applying the TII thresholds, which are lower and therefore more precautionary than those set out in the IEMA guidance, the assessment presented in this chapter inherently addresses and exceeds the requirements of IEMA. In effect:

- Where traffic impacts are shown to be below 10%, they are well below the IEMA trigger of 30%, and therefore environmental impacts associated with increased traffic are highly unlikely to be significant.
- Where impacts approach the 10% threshold, more detailed modelling is typically undertaken in line with TII guidance, ensuring that junction performance and network capacity are considered.
- The TII framework ensures alignment with national road design and operational standards, while the IEMA framework is more strategic in considering environmental consequences at higher thresholds of change.

In summary, the assessment methodology applied in this EIAR is based on the TII Guidelines as the primary national standard. However, because the TII thresholds are more stringent than those in the IEMA guidance, this assessment inherently covers and goes beyond the higher thresholds identified by IEMA for environmental effects of traffic. On this basis, the methodology used is robust, precautionary, and fully consistent with best practice.

13.6 National and Regional Planning Strategies and Guidance

13.6.1 Project Ireland 2040

Project Ireland 2040 - *The National Planning Framework* (NPF) and *National Development Plan 2018-2027* (NDP) is a strategic planning initiative undertaken by the Irish government to guide the country's development over the coming years. The project was officially launched in February 2018 and recently updated.

13.6.2 The National Planning Framework

The *National Planning Framework* (NPF) – First Revision (April 2025), approved by both Houses of the Oireachtas, sets a refreshed long-term strategic vision for Ireland's spatial development to 2040. This revision responds to evolving demographic, housing, infrastructure, and climate imperatives since the NPF's initial publication in 2018.

A core objective of the revised NPF is to facilitate compact growth and transport-oriented development, with explicit support for sustainable communities at brownfield and greenfield locations aligned with existing or planned high-capacity public transport corridors.

The framework now plans for a population increase to between 6.1 million and up to 6.3 million by 2040, aiming to achieve an ambitious housing target, approximately 50,000 new homes annually, rising towards 60,000 per year by 2030.

Transportation-related goals are also framed within the "Avoid-Shift-Improve" model, promoting active travel, reducing transport emissions, improving permeability, and facilitating more sustainable transport patterns through enhancements in walking, cycling, and public transport infrastructure.

This revised policy landscape provides a robust strategic foundation for evaluating traffic and transport effects, including cumulative impacts. It underlines the importance of integrating land use planning with sustainable transport objectives and supports methodologies, such as employing national traffic growth factors, that inherently reflect these forward-looking spatial, social, and infrastructural priorities.

13.6.3 The National Development Plan

The *National Development Plan* (NDP) Review 2025, published in July 2025, updates and extends Ireland's infrastructure investment strategy through to 2035, marking it as the largest-ever capital investment plan in the history of the State.

The review outlines a total of €275.4 billion in public capital investment between 2026 and 2035, representing a substantial uplift over previous funding plans.

It allocates €102.4 billion for the years 2026–2030, with a further €100 billion earmarked for 2031–2035.

Insofar as it relates to transport priorities, the Department of Transport has been allocated €24.33 billion under the revised NDP, supporting major transport initiatives over the next five years, including:

- Public transport enhancements such as MetroLink, BusConnects, and DART+;
- Expansion and safety improvements of the road network;
- Investment in active travel infrastructure and greenways;
- Measures promoting road transport electrification in line with climate objectives.

The scale of investment is matched with a renewed emphasis on effective delivery. The April 2025 launch of the NDP review signalled a government-wide commitment to prioritise transformative and growth-enhancing infrastructure, including the use of diverse funding sources like the Apple Escrow Fund and AIB share proceeds. However, a recent taskforce has highlighted persistent bottlenecks in project delivery

that are related to bureaucracy, planning delays, and legal challenges which it advises will need to be addressed to ensure the NDP's ambitions are realised.

This strategic framework directly underpins the transportation context within the EIAR, reinforcing that the projected transport-related developments are rooted in a credible and quantified forward-looking investment programme and a realistic understanding of delivery constraints.

13.6.4 Regional Spatial & Economic Strategy for the Eastern and Midland Region

The *Regional Spatial & Economic Strategy* (RSES) for the Eastern and Midland Region is a long-term strategic plan guiding the development of Ireland's Eastern and Midland Region, which includes County Meath and Leinster. It was prepared by the Eastern and Midland Regional Assembly (EMRA) and aligns with national planning policies, particularly the National Planning Framework (NPF).

The RSES sets out a 12-year framework (2019–2031) for, spatial planning, economic growth, infrastructure and environmental sustainability. Key goals and priorities include: balanced regional development, sustainable growth, enhanced economic opportunities, improved connectivity and infrastructure.

The RSES guides local authorities in shaping their County Development Plans, it influences government and EU funding for infrastructure and economic initiatives and it promotes collaboration between local, regional, and national agencies.

The RSES is part of the broader planning framework aimed at achieving balanced regional development and sustainable growth and it is consistent with the NPF. The RSES outlines a spatial vision for the region, identifying areas for growth, conservation, and development. It addresses issues such as land use, urban development, transportation, and infrastructure. As part of the integration of land use and transportation planning there is an emphasis on reducing the need to travel and promoting a modal shift away from a dependence on the private car to more sustainable modes of transport.

13.6.5 The 'Smarter Travel' Document

Smarter Travel is a transport policy published by the Department of Transport, Tourism and Sport in 2009 providing government policy aimed at promoting sustainable and smarter modes of transportation. The policy focuses on reducing the environmental impact of travel, improving public transportation, encouraging walking and cycling, and fostering more sustainable commuting practices.

The initiative encourages the use of sustainable transportation options, such as walking, cycling, and public transit, to reduce dependence on private car travel and mitigate the environmental impact of transportation.

The policy involves investments in infrastructure to support sustainable transportation, including the development of cycling lanes, pedestrian-friendly pathways, and improvements to public transportation networks.

Smarter Travel aims to promote active modes of travel, such as walking and cycling, as healthier and more environmentally friendly alternatives to motorized transportation. The initiative typically includes public awareness campaigns and educational programs to inform the public about the benefits of sustainable travel and to encourage travel behaviour change.

The *National Cycle Policy Framework* was published in 2009 alongside the Smarter Travel policy document. The objective is to encourage a culture of cycling nationwide through various objectives that focus on investment in cycling infrastructure that will make it safer and a viable travel mode.

13.6.6 Strategy for the Future Development of National & Regional Greenways

The objective of the strategy is to assist in the strategic development of nationally and regionally significant Greenways in appropriate locations constructed to an appropriate standard in order to deliver a quality experience for all Greenways users. It also aims to increase the number and geographical spread of Greenways of scale and quality around the country over the coming years with the objective of achieving a significant increase in the number of people using Greenways as a tourist experience and as a recreational amenity.

13.6.7 Planning Authority Policies and Objectives

In summarising current transportation policies and future objectives for the general area, reference has been made to the Meath County Development Plan 2021-2027 which sets out the vision, policies, strategies and objectives for planning and sustainable development of County Meath. The Meath County Development Plan 2021-2027 guides the county's future growth and development. It outlines policy objectives and an overall strategy for responsible planning and sustainable development over the subject six years.

13.6.7.1 General Road Policy and Objectives:

The following policy objectives are of importance or relevant to the subject site in the context of general policy and transportation

MOV OBJ 26
To provide for and carry out improvements to sections of national, regional and county roads that are deficient in terms of alignment, structural condition or capacity, where resources permit, and to seek to maintain that standard thereafter. To ensure that, where possible, any maintenance and improvement strategies have regard to future climates.
Relevance to Proposed Development
In terms of traffic generation, the proposed development is for continuation of operations at an existing operational landfill site which will be accessed via an existing direct access ghost island junction on N2. The assessments provided in this chapter of the EIAR demonstrate that the facility is expected to generate relatively low levels of additional vehicular traffic, importantly, the nature of the proposed use involves controlled and scheduled vehicle movements, which will be distributed across the day and managed to avoid peak traffic periods. In this context, the proposed development is consistent with the objectives of MOV-OBJ-26, as it does not generate significant additional traffic, and will not reduce the level of safety, the strategic transport function, the capacity or efficiency of national roads, motorways. Detailed assessments show that the development traffic does not impact significantly on the operation of the N2 and will not reduce the level of service at associated junctions. The proposal complies with the intent of the policy and does not undermine N2 strategic function.

MOV OBJ 27
To regulate, control and improve signage throughout the County and avoid proliferation of roadside signage, especially outside the 50-60kmh speed limit areas.
Relevance to Proposed Development
The development will rely upon the existing access junction from the N2 which is provided with standard junction ahead signing augmented with distance plates. No additional signs are proposed.

MOV POL 32
To ensure the protection of the existing roads infrastructure while improving the capacity and safety of the road network to meet future demands.
MOV OBJ 40
To develop an annual strategic road network plan for upgrading and required works for national, regional and strategically important local roads for the targeting of funding.
MOV OBJ 41
To develop in consultation with the TII, a programme for the upgrading, improvement and maintenance of the national road network within the County.
MOV OBJ 42
To develop and implement, in consultation with the Department of Transport a programme for the upgrading, improvement and maintenance of the non-national road network in the County.
Relevance to Proposed Development
These upgrades will result in improved capacity, safety, and functionality of the haul routes used by the existing development and proposed to continue to serve the proposed development. By virtue of the location of the landfill facility along an improved and improving national regional route, the project benefits from and has the potential to contribute towards the goals of MOV POL 32 and MOV OBJ 40, 41 and 42.

MOV OBJ 61
To utilise, where appropriate, the provisions of Section 48 and 49 of the Planning and Development Act, 2000 (as amended) to generate financial contributions towards the capital costs of providing local and strategic transport infrastructure, services or projects in the county. This will be done in conjunction with adjoining Local Authorities, where appropriate.
Relevance to Proposed Development
The proposed development, which seeks the expansion and continuation of use of the Knockharley Landfill at the same permitted rate of intake, will not result in any intensification of traffic generation beyond that already established and assessed as part of the existing operations. Notwithstanding this, the development will be subject to the normal requirements of the Planning and Development Act 2000 (as amended) in respect of Section 48 development contributions, and any specific levies under Section 49 where applicable. In this way, the project can be considered to comply with and support the County Development Plan Objective by making appropriate financial contributions towards the capital costs of local and strategic transport infrastructure. This approach ensures that, notwithstanding the extended duration, in the proposed circumstances where the development does not materially increase demands on the road network above the current scenario, it nonetheless has the potential to contribute to the wider programme of transport improvements in the county, consistent with the objective and in cooperation with adjoining local authorities where relevant.

MOV OBJ 50
To continue to deliver targeted capacity road upgrades within the County to eliminate congestion blackspots.
MOV OBJ 49
To support essential public road infrastructure including, bypasses of local towns and villages and proposed national road schemes and where necessary reserve the corridors of any such proposed routes free of development, which would interfere with the provision of such proposals. Such road schemes include those specified in the non-exhaustive list in Table 5.1: Each of these projects will be subject to the outcome of the Appropriate Assessment process. - Slane By-pass (N2) - N2 Rath Roundabout to Kilmoon Cross
MOV OBJ 38
To continue to support and facilitate TII, Fingal County Council, Louth County Council and Monaghan County Council in the planning and delivery of upgrades to the N2, as appropriate and to reserve route corridor free from development which would interfere with the delivery of identified schemes, when finalised.
CDP Section 5.8.3 'N2 Corridor'
"The N2 corridor functions as a vital cross border economic artery which is essential to facilitate strategic traffic movement and to maintain and improve accessibility to employment areas. The importance of this North-South route and its role in maintaining an "open all island" economy post Brexit is recognised within both the National Development Plan 2018-202719and the NPF20. The NTA Strategy for the Greater Dublin Area 2016-2035 includes an objective to provide 'enhancements of the N2/M2 national route inclusive of a bypass of Slane, to provide for additional capacity on the non-motorway sections of this route, and to address safety issues in Slane village associated with, in particular, heavy goods vehicles.21' The National Development Plan makes particular reference to and prioritises the upgrade of the N2 from Rath Roundabout to Kilmoon Cross section of road which is already underway. The delivery of these works will continue to be supported and facilitated by the Council and the Council will seek the delivery of the Slane Bypass in the future in conjunction with TII and the Department of Transport."
Relevance to Proposed Development
By virtue of the location of the landfill facility on the N2 between Kilmoon and Slane, the project benefits from and has the potential to contribute towards the goals of MOV OBJ 38, 49 and 50.

MOV OBJ 37
When finalised and agreed, to reserve the route corridor of the Leinster Orbital Route free of developments which could otherwise interfere with the provision of the project.
MOV POL 23
To support the delivery of the Leinster Orbital Route, which is considered to comprise important infrastructural development, and when finalised, to protect the route corridor free of developments which could interfere with the provision of the project.

Relevance to Proposed Development
In the long term, the Leinster Outer Orbital Route has been identified as a key strategic link between Drogheda-Navan-Trim-Maynooth-Naas-Wicklow. This scheme would comprise a road corridor connecting Drogheda and Navan with Enfield and Naas. It would serve as a second bypass of Dublin City to complement the M50 and would link the majority of Dublin's main radial routes: M1, M2, M3, M4 and M7. The M11 would not be served by the Leinster Orbital Route. The proposed scheme would be provided with a new interchange with the existing N2 or future M2 Ashbourne to Ardee Road. If built, the interchange is expected to be located in the vicinity of the existing Knockharley landfill. Notwithstanding the fact that access to the existing landfill is of high quality, a nearby interchange providing additional accessibility to new strategic infrastructure would benefit the landfill development. Consultants undertook a Feasibility Study for the proposed Leinster Orbital Route and this was submitted to the Department of Transport in 2007. It appears unlikely that the orbital route will be constructed during the lifetime of the landfill development. The Transport Strategy for the Greater Dublin Area 2016-2035 confirms that up to the horizon year of the plan, no work will take place on this road, though its route will be kept clear of development for possible later implementation. The planning history of Knockharley Landfill site confirms that the landfill and access to it do not have any impact on the route corridor of the Leinster Orbital Route and will not otherwise interfere with the provision of the project.

MOV POL 24
To safeguard the capacity and safety of the National road network by applying the provisions of the Department of Environment Community and Local Governments – 'Spatial Planning and National Roads-Guidelines for Planning Authorities, 2012' to avoid the creation of any additional development access to national roads and intensification of existing access to national roads to which speed limits greater than 60kph apply, save in accordance with agreed 'exceptional circumstances' included in MOV POL 33.
MOV POL 33
To avoid the creation of any additional access point from new development/intensification of traffic from existing entrance onto national roads outside the 60kph speed limit, except at the following locations: 4. N2 Slane in the vicinity of the exiting Grasslands Fertilizers Facility (Map 5.3.4); 6. N2 at Knockharley in the vicinity of existing regional landfill facility (Map 5.3.6); 7. N2 at Rath Roundabout to junction of Curragha Road (Map 5.3.7).
CDP Section 5.9.4 'Exceptional Circumstances'
"Government policy regarding access onto national roads as provided for in the "Spatial Planning & National Roads Guidelines" seeks to avoid the creation of any additional access point from new development / intensification of traffic from existing entrances onto national roads outside the 60kph speed limit. Section 2.6 of the Guidelines provides for exceptional circumstances to the above general policy provision. Planning Authorities may identify stretches of national roads where a less restrictive approach may be applied as part of the Development Plan process. Two scenarios arise, firstly in relation to developments of national and regional strategic importance and secondly, in relation to lightly trafficked sections of National Secondary Routes. *The Guidelines provide that a less restrictive approach may be adopted in the case of developments of national and regional strategic importance which by their nature are most appropriately located outside urban areas, and where the locations concerned have specific characteristics that make them particularly suitable for the developments proposed.*

The Development Plan has identified a number of locations where exceptional circumstances to the general policy may be considered, as follows:

- *N2 at Knockharley in the vicinity of existing regional landfill facility*
- *N2 at Rath Roundabout to junction of Curragha Road"*

Relevance to Proposed Development

The assessments provided in this chapter of the EIAR demonstrate that the development does not have the potential to generate significant traffic movements. This chapter of the EAIR nevertheless provides a detailed Traffic and Transportation Assessment and includes reference to a previously accepted Roads Safety Audit. Notwithstanding the exemption of the N2 at Knockharley with respect to MOV POL 24 it should be noted that the development does not involve the addition of a new junction or access and it does not give rise to the intensification of traffic at the existing junction.

MOV OBJ 39

To facilitate the delivery of all of the roads projects outlined in the National Development Plan 2018-2027 and National Transport Authority's Transport Strategy for the GDA 2016-2035, in conjunction with the NTA, TII, Department of Transport and other stakeholders. Development of these road projects will be subject to the outcome of the Appropriate Assessment process.

MOV OBJ 36

To support and facilitate the delivery of an N2 Bypass to the east of Slane Village, which is considered to comprise essential infrastructural development and to construct same subject to obtaining the relevant development consents required and to reserve and protect route option corridors from development which would interfere with the provision of the project. Development of the project will be subject to the outcome of the Appropriate Assessment process.

Relevance to Proposed Development

Knockharley Landfill site does not interfere with the provision of any projects related to the improvement of the N2 and does not in any material or significant way interfere with the delivery of the N2 Bypass of Slane.

MOV POL 28

To promote the carrying out of Road Safety Audits and Road Safety Impact Assessments on new road schemes, road and junction improvements and traffic management schemes in accordance with the TII Publication TII-GE-STY-01024 and advice contained in the DTTAS (DTO) Traffic Management Guidelines 2012.

CDP Section 11.2.1 'Pre-Application Discussions'

"Traffic and Transport Assessment (TTA), Road Safety Audits (RSA) and Road Safety Impact Assessments are required to accompany planning applications for major developments with significant potential to generate traffic and or which could create a significant hazard or safety performance impact on a major road, particularly national roads. When preparing the TTA's regard should be had to the provision of the 'Design Manual for Urban Roads and Streets and the 'Traffic Management Guidelines, 2012'. Where a Transport and Traffic Assessment identifies necessary on and off-site improvements for

the development to be able to proceed, the developer will be required to fund the improvements by entering into a formal agreement with the Council.

The requirement for a TTA is at the discretion of the Council but the following thresholds can be used for guidance purposes only:

- *Traffic to and from the proposed development exceeds 10% of the traffic flow on the adjoining road;*
- *Traffic to and from the proposed development exceeds 5% of the traffic flow on the adjoining road where congestion exists;*
- *Residential development in excess of 100 dwellings (Applications for 100 or more dwellings are decided by An Bord Pleanála as an SHD);*
- *Retail and leisure development in excess of 1,000 sq.m;*
- *Industrial development in excess of 5,000 sq.m, and; and*
- *Distribution and warehousing in excess of 10,000 sq.m."*

Relevance to Proposed Development

The assessments provided in this chapter of the EIAR demonstrate that the development does not have the potential to generate significant traffic movements. This chapter of the EAIR nevertheless provides a detailed Traffic and Transportation Assessment and includes reference to a previously accepted Roads Safety Audit. The Traffic and Transportation Assessment incorporated in this chapter of the EIAR assesses the effect of the proposed development on travel demand and the capacity of surrounding transport links in accordance with the thresholds set out in Tables 2.1, 2.2 and 2.3 of *Traffic and Transport Assessment Guidelines* (Transport Infrastructure Ireland, 2014).

The proposed development involves no modifications whatsoever to the layout and geometry of the road network or the existing development access on the N2. All works are internal to the site which is served by an access road of approx. 800m length and thus well removed from the N2. The development access already exists and was designed in accordance with the former NRA DMRB standard and complies with the corresponding current TII standard renumbered from the NRA DMRB but for the most part unchanged in terms of technical requirements. The design and construction of the existing access from the N2 was subject to a Road Safety Audit to the satisfaction of the relevant authority as follows, Stage 1 at planning application, Stage 2 prior to construction and Stage 3 post construction. Since there is no proposed permanent alteration to the road network there is no subject matter in the current proposal that might warrant a Road Safety Audit.

The design parameters of the existing junction on the N2, save one relating to auxiliary left turn lanes, have not changed since the design and construction of the existing site access junction. It follows therefore that the existing layout and design of the junction meets with the requirement of TII Standard DN-GEO-03060 *'Geometric Design of Junctions'*. Save for the consideration of the retention or removal of the left turn auxiliary lane, no changes are required to ensure that the junction layout complies with this standard.

As established in the determination of ABP-303211-18, the existing junction incorporates a left turning auxiliary lane which is consistent in character with the series of other N2 junctions with R150, R152 and R153 to the south. An underlying principle in roads design is that sequences of junctions should provide drivers with layouts that have consistent standards that are not likely to confuse them, accordingly, it is not proposed to alter the existing site access junction.

MOV OBJ 13
To require Mobility Management Plans and Traffic and Transport Assessments for proposed trip intensive developments, as appropriate. Please refer to Chapter 11 Development Management Standards and Land Use Zoning Objectives.
Relevance to Proposed Development
The proposed development currently employs 25 no. staff operating in a single shift. This compliment of staff is not proposed to increase under the current proposal, as such, the total employment figure falls significantly below the typical threshold of 50-100 no. employees triggering a Mobility Management Plan. The nature of the proposed development further supports the conclusion that the preparation of a formal MMP would not represent an effective or proportionate use of resources. The current site operations do not generate trips by bicycle so there is no demand for cycle parking. The applicant nevertheless makes provision in the onsite welfare facilities for a bicycle to be stored securely on site should the demand for same arise.

13.7 Planning History

The following outlines the planning history relevant to the Knockharley Landfill site to date.

- **Planning Reg. Ref. 01/5006 (PL17.125891):** Permission was granted to Celtic Waste Ltd. for the development and operation of an engineered landfill and ancillary facilities at the Knockharley site on 26-Aug-2002 subject to a condition restricting the acceptance of waste for disposal to that arising from the North-East waste management region which included counties Meath, Louth, Cavan and Monaghan. The total quantity of waste accepted at the facility were restricted to 132,000 tonnes per annum until December 2007 and thereafter to a maximum of 88,000 tonnes per annum.
- **Planning Reg. Ref. NA50453:** In April 2006, Meath County Council refused permission to Greenstar Holdings Ltd. for a material change of use of maintenance building to offices, including a proposed new first floor within the existing building and for permission to omit the condition under Planning Reg. Ref. 01/5006 (PL17.125891) which limited the waste accepted at the facility to waste arising from the North East Region.
- **Planning Reg. Ref. NA60336(PL17.220331):** In November 2006 permission was granted to Greenstar Ltd. for the removal of the regional restriction on the origin of the waste accepted at the Knockharley Landfill facility by modifying the relevant condition under Planning Reg. Ref. 01/5006 (PL17.125891) and permitting the facility to accept waste from adjoining waste regions. Upon first party appeal An Bord Pleanála granted permission on 21-Mar-2007 for an extension of the landfill footprint, for the removal of the regional restriction on the origin of the waste accepted at the facility and for the continuation of the annual intake volume of 132,000 tonnes per annum until the end of 2010, reverting to 88,000 tonnes per annum thereafter. Permission was refused for an increase in the waste intake to 200,000 tonnes per annum.
- **Planning Reg. Ref. NA70015:** Permission was granted to Greenstar Ltd. in April 2007 for the installation and operation of a gas utilisation plant on a 0.3 hectare site which was proposed to be phased and to generate up to 4.2 MW of electricity for export to the national grid.
- **An Coimisiún Pleanála Reference: PL17.PA0009:** Greenstar Holdings Ltd. refused permission on the 14-May-2009 to increase the rate of waste acceptance at the permitted facility to 400,000 tonnes per annum for disposal, to alter the landfill phasing sequence, with no extension to the permitted landfill void, and all ancillary works including the installation of a second wheelwash. The reason for refusal stated that the increase would compromise the viability of more sustainable waste infrastructure and the designation of Knockharley as the long-term residual landfill for the North East region and so would conflict with the waste management plan for that region.
- **Planning Reg. Ref. AA161431:** In December 2016, Knockharley Landfill Ltd. applied for an extension of the duration of planning permission under Planning Reg. Ref. 01/5006. Permission was granted by Meath County Council in January 2017.

- **Planning Reg. Ref. AA180145:** In February 2018, Starrus LFG Ltd. applied for permission for the development of a solar farm over reclaimed landfill with an export capacity of approximately 3MW comprising photovoltaic panels on ground mounted frames, connection to existing single-storey ESB sub-station, installation of three no. transformers, ducting and underground electrical cabling and all associated ancillary works and services. Permission was granted in June 2018.
- **An Coimisiún Pleanála Reference ABP-303211-18**: Proposed increase in the rate of waste acceptance up to 440,000 tonnes per annum comprising up to 435,000 tonnes per annum of non-hazardous waste incl. IBA as well as household, commercial and industrial wastes incl. residual fines, non-hazardous contaminated soils. C&D wastes and baled recyclables, and up to 5,000 tonnes per annum of stable non-reactive hazardous waste. Permission Granted 30-Apr-2021.
- **An Coimisiún Pleanála Reference ABP-321769-25:** Under ABP Ref. No. 321769-25 permission was sought to alter the 2021 permission and it was proposed to change from the permitted bio-stabilisation/composting operations at the site in favour of processing of C&D fines washing to better support circular economy objectives. There was no increase in the total tonnes processed at the facility. The proposed alteration to the 2021 decision was granted by ACP by order dated 09-May-2025.

13.8 Consultation

A Section 247 consultation meeting was held with representatives of Meath County Council in advance of making this planning application. The proposed development has been designed having full regard to the specific requirements detailed by Meath County Council. Further detail in this regard is provided within the Planning Statement and relevant reports that accompany this application under separate cover.

Additionally, as this is an application to continue the development in part, the advice provided by Meath County Council and statutory consultee responses to the original planning and previously permitted development under ABP-303211-18 and ABP-321769-25 have been reviewed.

The development has been designed cognisant of the relevant information provided in these responses and has addressed them insofar as is practicable. This approach ensures that the development aligns with the requirements and considerations highlighted by the relevant authorities.

13.9 Difficulties Encountered

There were no difficulties encountered when compiling this assessment.

13.10 Baseline Environment

13.10.1 Site Location

The site is located in the townland of Knockharley, approximately 6km south of Slane on the west side of the N2 National Primary Route. Navan is located approximately 13km to the west of the site via Balrath Cross and the R153 Regional Road.

To the north, the site is bounded by the CR384 County Road running east-west. To the east the site is bounded by the CR384 running north-south between the N2 and R150. The CR384 in this location runs almost parallel to the N2. To the south, the site is bounded by farmland, which is generally located adjacent to the R150 on the Kentstown side of the N2. To the west, the site is bounded by mainly gently sloping farmland, mostly in large fields generally defined by mature hedgerows with some groups of trees.

The N2 has a posted speed limit of 100kph in the vicinity of the site and is the primary access route to and from the site.

Save for the CR384, which is not used by site traffic, the general road infrastructure in the immediate vicinity of the development site is of a relatively good standard in terms of road alignment, surfacing and cross-section.

The site comprises an existing operating landfill, with some residential and agricultural uses located in close proximity.

In the vicinity of the site access, the carriageway is flanked by hard strips / hard shoulders that vary in width on both sides, typically ranging from approximately 0.25m to 3.0m. The width and continuity of these strips respond to local conditions, such as changes in road alignment, the presence of private accesses, and junctions, resulting in a variable cross-section along this section of road.

The mainline carriageway is delineated with yellow road edge markings and a standard configuration ghost island in the centre of the N2 carriageway road serves the proposed development, the width of the carriageway between the edge markings is measured at 7.3m with 3.65m wide lanes in either direction.

There are no weight, height or vehicle width restrictions on National Primary Road N2 in the vicinity of the existing development access.

Figure 13.1 shows the location of the development site (highlighted red) in the context of the receiving road network. The principal haul routes serving the site are the N2 National Primary Road which carried the vast majority of development generated HGV traffic. A lesser volume of HGV traffic is generated on the R150 between the Indaver site at Duleek and on the R153 between the site and Navan.

13.10.2 Study Area

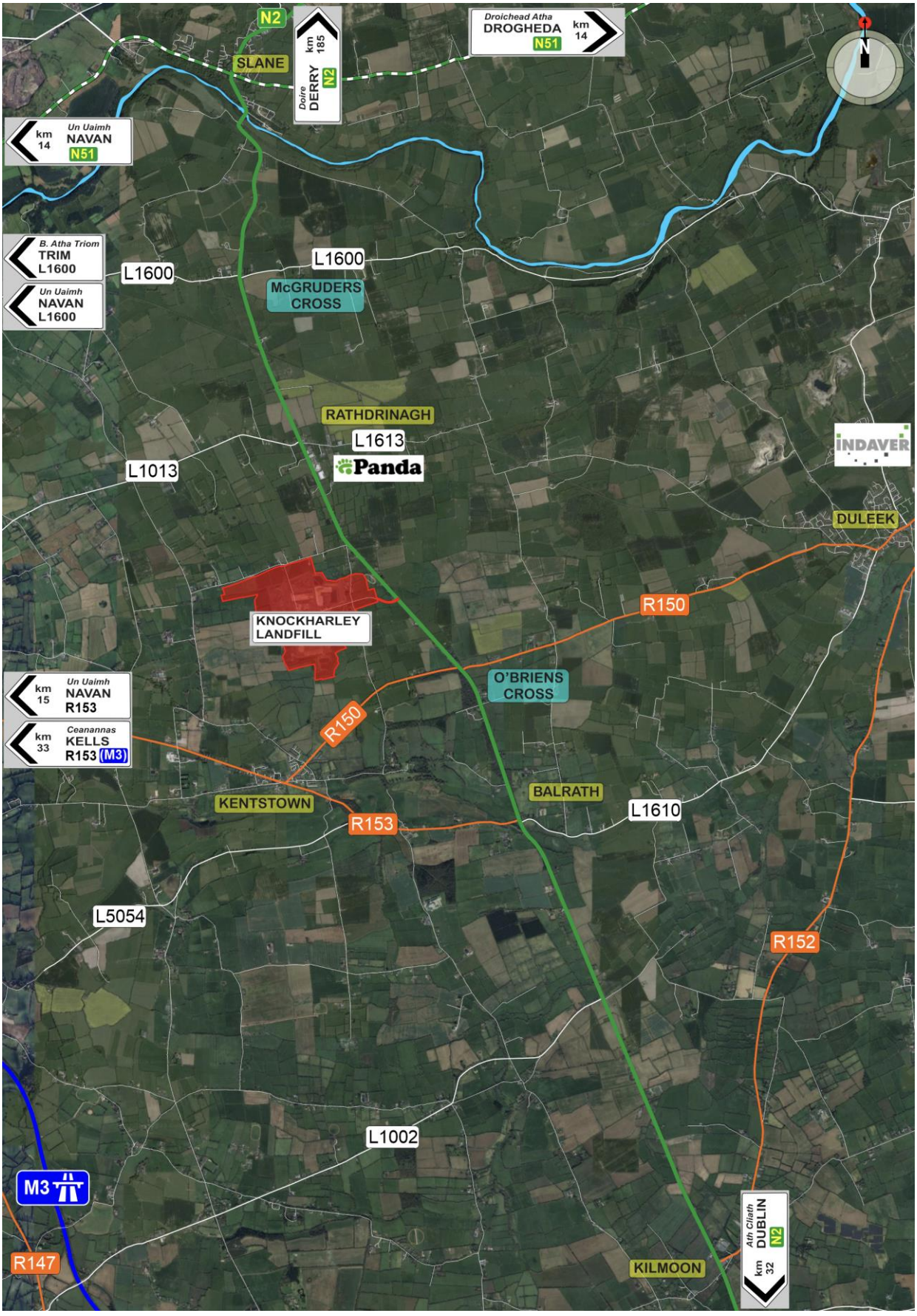
The site connects directly to N2 which is the primary haul route for all directions of travel.

Given the current level of traffic generation arising from permitted site activities, the duration of the current permission, the character of the existing road environment, and given the scope of the study and assessment agreed with the Local Authority at the time when previous traffic studies were prepared, the scope of this Chapter is consistent with those previous studies and covers the network that includes the existing site access and the operation of the existing haul route.

The study area comprises N2 between Kilmoon and Slane including the junctions of the N2 with the N51 at Slane and the R152 at Kilmoon.

The load bearing capacity of any bridges, culverts or structures along the haul routes has not been measured as the proposed development will not require any abnormal loads and will generate traffic with similar characteristics to those permitted to service the existing landfill. As such, any bridges on the haul routes comprising regional roads, national roads and motorway are reasonably expected to be capable of continuing to carry general traffic together with the vehicles transporting materials to and from the proposed development site.

Figure 13-1. Site Location in Context of Receiving Road Network



Source: Google Maps Imagery 2025 annotated by TWL, August 2025)

13.10.3 Existing Site Access

The existing site enjoys direct vehicular access to the national roads network with primary access facilitated at a ghost island junction on the N2. The ghost island provides sheltered access for right turning vehicles travelling from the north. This is complimented with an auxiliary left turn deceleration lane to facilitate access for vehicles coming from the south. Both turning facilities aid in preserving the flow, speed and therefore the capacity of through traffic on the N2. The junction was designed and constructed in accordance with the NRA: Design Manual for Roads and Bridges (DMRB) and has been the subject of Roads Safety Auditing (Stages 1, 2 and 3) in accordance with procedures set out in the relevant NRA guidelines at the time of its planning, design and construction.

The access road to the site from the N2 runs due west through arable lands, thereafter running under the CR384 County Road. The entrance proper to the site is located approximately 80 to 100 metres west of the underpass of the CR384. A security gate with closed circuit television is located on the access road. This aids site security staff in preventing unauthorised traffic from entering the site.

13.10.4 Traffic Surveys

13.10.4.1 Traffic Turning Count Surveys

Traffic turning count surveys are conducted to understand traffic patterns at junctions and interchanges specifically to track the number and direction of vehicles turning left, right, or continuing straight. The typical method involves CCTV cameras that are installed at strategic locations to capture clear views of the intersection.

Depending on the complexity of the junction, multiple cameras may be used to cover all approaches and movements and the cameras are typically mounted on poles, traffic signals, or existing infrastructure at a height that allows a complete view of the traffic flow.

After the survey, video footage is reviewed manually or with the help of video analytics software to detect and classify vehicles (cars, trucks, buses, etc.) and log the turning movements (left, right, straight). CCTV allows for a precise record of vehicle movements, with the ability to re-analyse footage if necessary, and since cameras are positioned off-road, they do not interfere with traffic flow, making the method non-intrusive.

Traffinomics Transportation Surveys Ltd. carried out classified turning count surveys on the public road network using CCTV on Tuesday 08-April-2025 between 07:00 and 19:00hrs. A copy of the survey data is provided in Volume 3, Appendix 13.1 of this EIAR.

Traffic data was collected for the following locations identified in Figure 13.2 where the prefix 'J' indicates the location of classified turning counts and the prefix 'A' indicates the location of Automatic Traffic Counter sites. The traffic turning count data was collected mid-week to reflect typical weekday traffic patterns and includes the commuter peak periods. The weekday commuter peak periods typically tend to have the heaviest hourly network flows. Traffic data was collected for the following locations identified in Figure 13.2.

- Site 1: Slane Crossroads N2/N51- Signalised Crossroad
- Site 2: Rathdrinagh Crossroads N2/L1013/L1613 - Ghost Island Staggered Crossroad
- Site 3: Knockharley Landfill Site Access - Ghost Island Junction
- Site 4: O'Briens Cross N2/R150 - Ghost Island Staggered Crossroad
- Site 5: Kentstown R152/R150 – Simple Priority Junction
- Site 6: Balrath Cross N2/R153/L1610 - Ghost Island Staggered Crossroad
- Site 7: Kilmoon Cross N2/R152 - Ghost Island Junction

The traffic flow data from the April 2025 surveys forms the basis of the assessments of road network capacity and the assessment of the likely impact of the proposed development on the operation of the receiving road network.

Table 13-1 provides a summary of the recorded average daily traffic flows by direction at the junction turning count locations. The road link numbers used in the table correspond to those used in the network flow diagrams provided Volume 3, Appendix 13.2 of this EIAR which for ease of reference correspond with the survey site numbering convention used by Traffinomics Ltd. provided Volume 3, Appendix 13.1, of this EAIR.

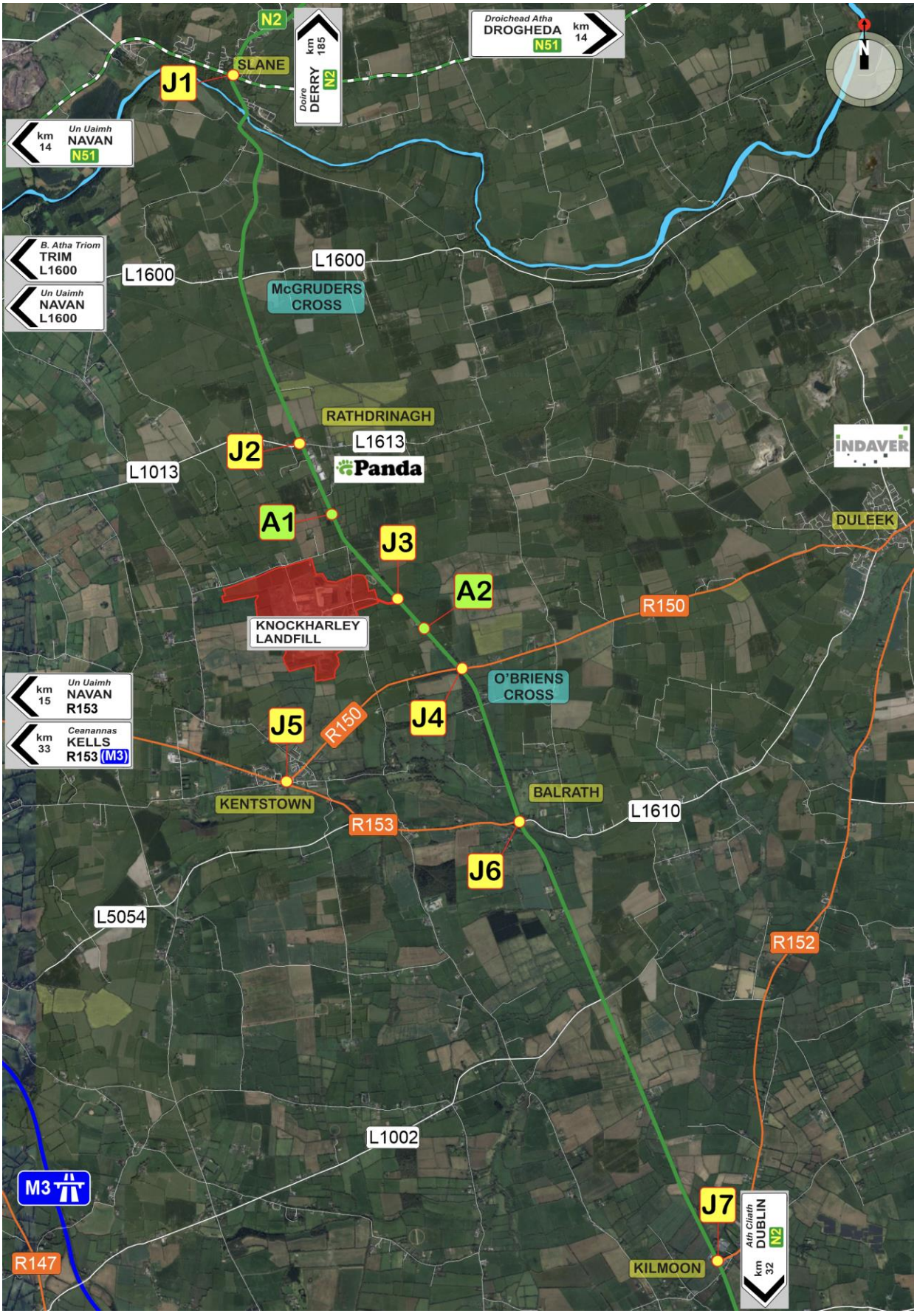
AADT is a commonly used metric in transportation engineering and planning, particularly in the context of roads design and maintenance. AADT represents the total two-way flow of vehicles passing a specific point on a road over the course of a year divided by the number of days per year.

With respect to traffic volume assessment, AADT is a fundamental measure for understanding the traffic flow on a road. It provides insights into how busy a particular stretch of road is, which is crucial for designing and maintaining roads to accommodate the expected volume of traffic. AADT is also a key parameter in the design of roads. Engineers use this data to determine the appropriate road cross-section, design speed, and other features which aid to determine that the road can handle the anticipated traffic demand. The volume and weight of traffic are critical factors in determining the type and thickness of pavement needed for a road. AADT data is used in pavement design to ensure that roads can withstand the expected traffic loads. Accordingly, AADT data is also often used in transportation planning to prioritise infrastructure investment. It helps roads authorities allocate resources by identifying roads with higher traffic volumes that may require upgrades or expansions and is valuable in scheduling road maintenance programmes.

AADT data is also used in environmental impact assessments related to transportation projects. The volume of traffic can affect air quality, noise levels, and other environmental factors, and planners use AADT to evaluate these impacts. AADT is a statistical measure that helps transportation professionals make informed decisions to ensure that road infrastructure meets the demands of the traveling public.

The estimates of AADT are based upon the total flows recorded in traffic surveys to which are applied the appropriate factors derived from TII Publication PE-PAG-02039: Project Appraisal Guidelines Unit 16.1 (2016) *'Expansion Factors for Short Period Traffic Counts'* (Oct 2016).

Figure 13-2. Baseline Traffic Survey Locations



Source: Google Maps Imagery 2025 annotated by TWL, August 2025)

Table 13-1 shows the average weekday traffic flow and percentage HGV content enumerated for 12 hours and provides an estimate of 2025 Annual Average Daily Traffic (AADT).

The network flow diagrams of Volume 3, Appendix 13.2 of this EIAR, each provide a schedule of the link numbers, and each link is identified on the diagrams.

Table 13-1. Surveyed 2025 Network Link Road Traffic – Two-way Daily Traffic Flows

Road Link		Survey Traffic Flows 12hrs 07:00-19:00hrs			AADT
		Total	Heavy	%HGV	
1	N2 North of Slane Crossroad	7,952	1,122	14.1%	10,052
2	N2 North of Rathdrinagh Crossroad	7,427	1,151	15.5%	9,389
3	N2 Between Rathdrinagh and Landfill Access	7,776	1,337	17.2%	9,830
4	N2 Between Landfill Access and O'Briens Cross (R150)	7,862	1,429	18.2%	9,939
5	N2 Between O'Briens Cross and Balrath Cross (R153)	8,169	1,361	16.7%	10,327
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	9,415	1,395	14.8%	11,902
7	N2 South of Kilmoon	17,104	2,536	14.8%	21,622
8	R150 West of O'Briens Cross (Kentstown)	2,751	306	11.1%	3,478
9	R150 East of O'Briens Cross (Duleek)	4,480	610	13.6%	5,663
10	R153 Between Balrath and Kentstown	4,469	400	9.0%	5,649
11	R152 West of Kentstown	5,785	411	7.1%	7,313
12	N51 Navan Road (Slane)	8,395	1,043	12.4%	10,612
13	N51 Drogheda Road (Slane)	5,161	557	10.8%	6,524

Source: Traffic Survey Data provided in Vol. 3, Appendix 13.1 of this EIAR
Note: AADT Mid-East Daily Traffic 07:00-19:00hrs 0.775, Weekly Flow Index (Tue) 0.97, Monthly Flow Index (Apr) 1.01.

The peak hours and associated traffic flows recorded in the April 2025 surveys are as follows:

- Weekday AM Network Peak Hour 08:00-09:00hrs
- Weekday PM Network Peak Hour 17:00-18:00hrs

Table 13-2 and Table 13-3 provide summaries of the recorded two-way peak hour traffic flows on the receiving road network in the morning and evening peak hours.

Table 13-2. Surveyed 2025 Network Link Road Traffic – Two-way Daily Traffic Flows

Road Link		Weekday AM Peak Hour 08:00-09:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	781	109	14.0%
2	N2 North of Rathdrinagh Crossroad	774	115	14.9%
3	N2 Between Rathdrinagh and Landfill Access	768	132	17.2%
4	N2 Between Landfill Access and O'Briens Cross (R150)	785	145	18.5%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	791	134	16.9%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	719	117	16.3%
7	N2 South of Kilmoon	1,451	232	16.0%
8	R150 West of O'Briens Cross (Kentstown)	313	27	8.6%
9	R150 East of O'Briens Cross (Duleek)	470	58	12.3%
10	R153 Between Balrath and Kentstown	385	37	9.6%
11	R152 West of Kentstown	569	38	6.7%
12	N51 Navan Road (Slane)	777	90	11.6%
13	N51 Drogheda Road (Slane)	471	44	9.3%

Source: Traffic Survey Data provided in Vol. 3, Appendix 13.1 of this EIAR

Table 13-3. Surveyed 2025 Network Link Road Traffic – Two-way Daily Traffic Flows

Road Link		Weekday PM Peak Hour 17:00-18:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	825	70	8.5%
2	N2 North of Rathdrinagh Crossroad	910	81	8.9%
3	N2 Between Rathdrinagh and Landfill Access	926	85	9.2%
4	N2 Between Landfill Access and O'Briens Cross (R150)	933	85	9.1%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	1,004	82	8.2%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	1,054	101	9.6%
7	N2 South of Kilmoon	2,018	136	6.7%
8	R150 West of O'Briens Cross (Kentstown)	290	19	6.6%
9	R150 East of O'Briens Cross (Duleek)	521	32	6.1%
10	R153 Between Balrath and Kentstown	502	19	3.8%
11	R152 West of Kentstown	640	23	3.6%
12	N51 Navan Road (Slane)	827	56	6.8%
13	N51 Drogheda Road (Slane)	497	29	5.8%

Source: Traffic Survey Data provided in Vol. 3, Appendix 13.1 of this EIAR

Corresponding network flow diagrams of the recorded daily, and peak hour traffic flows, are provided in network flow diagram format in Volume 3, Appendix 13.2 of this EIAR

- Figure 1 *'Surveyed 2025 Weekday Daily Traffic Flows 07:00-19:00hrs'*
- Figure 2 *'Surveyed 2025 Morning Peak Hour Traffic Flows 08:00-09:00hrs'*
- Figure 3 *'Surveyed 2025 Evening Peak Hour Traffic Flows 16:30-17:30hrs'*

In order to illustrate the general pattern of traffic flow on the receiving road network at the time of the April 2025 traffic surveys, a series of figures are presented to show the directional profile of link flows recorded at the seven survey locations.

Figures 13.3 and 13.4 present total traffic flows and HGV flows respectively for Link 1, while Figures 13.5 and 13.6 provide the corresponding data for Link 2. This approach is continued for each of the 13 surveyed road links, together with the development site access, all of which are detailed in full within Volume 3, Appendix 13.1 of this EIAR.

Link 14 relates specifically to the surveyed operational traffic flows associated with the permitted development on 08-April-2025. This does not represent the baseline condition for traffic arising from the proposed development. The relevance of the Link 14 data to the development of the Baseline scenario (which is a scenario in which the existing permitted Landfill closes) is set out in the following narrative relating to the receiving road network and the traffic flows recorded.

For clarity, the full dataset from the traffic surveys is presented in Volume 3, Appendix 13.1, with key results summarised in Tables 13-1, 13-2 and 13-3 of this chapter. In addition, the data is illustrated in a network flow diagram format in Volume 3, Appendix 13.2, providing a clear overview of the distribution and scale of traffic volumes across the surveyed road network.

Figure 13-3. Traffic Survey Data – Link 1 Total Traffic Flow.

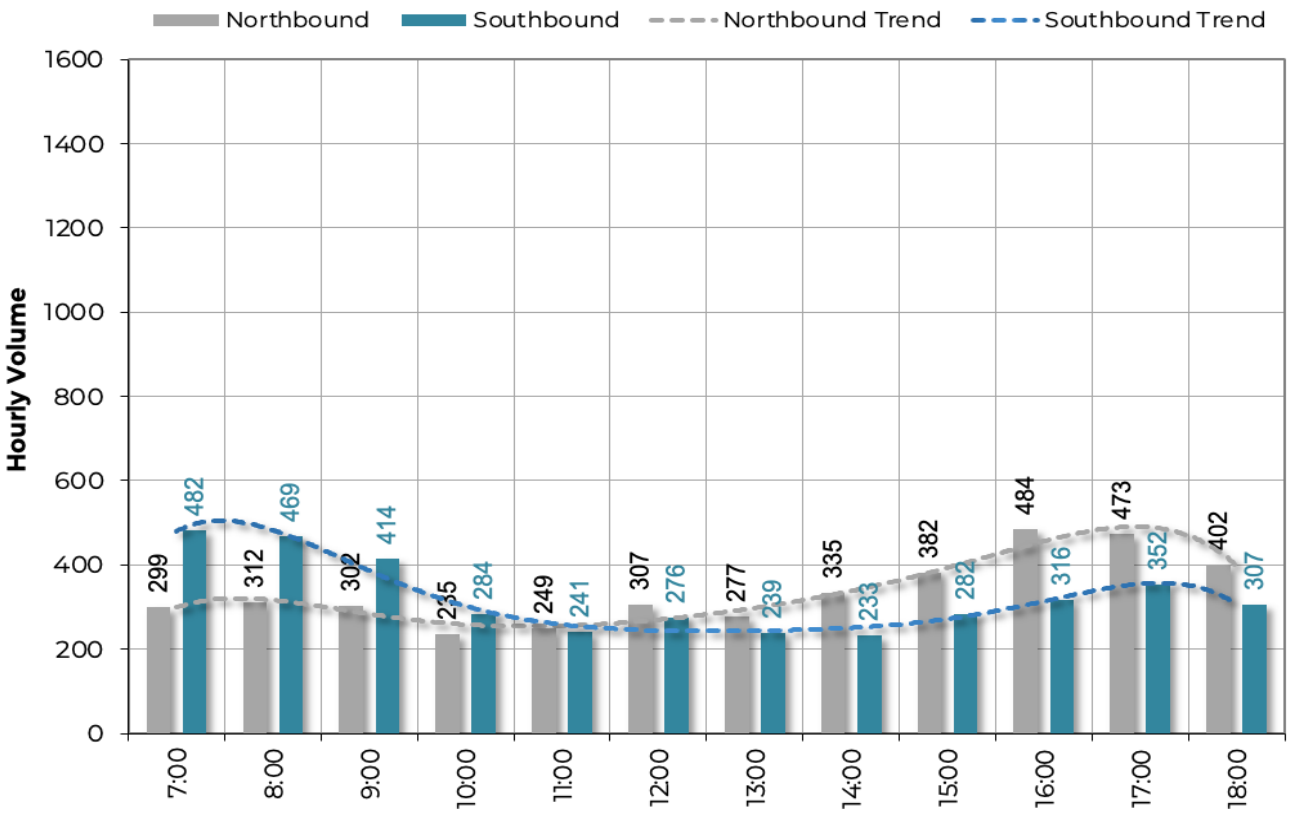


Figure 13-4. Traffic Survey Data – Link 1 HGV Traffic Flow.

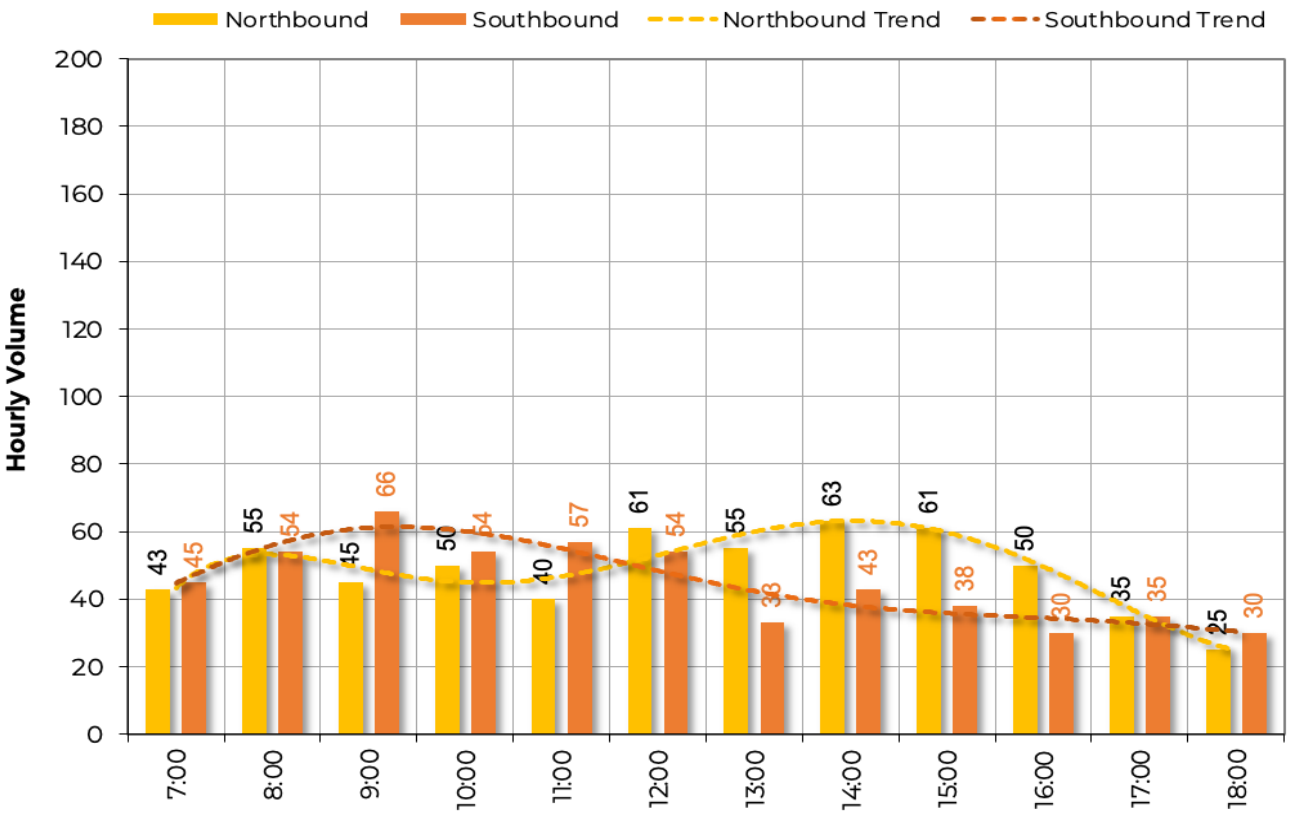


Figure 13-5. Traffic Survey Data – Link 2 Total Traffic Flow.

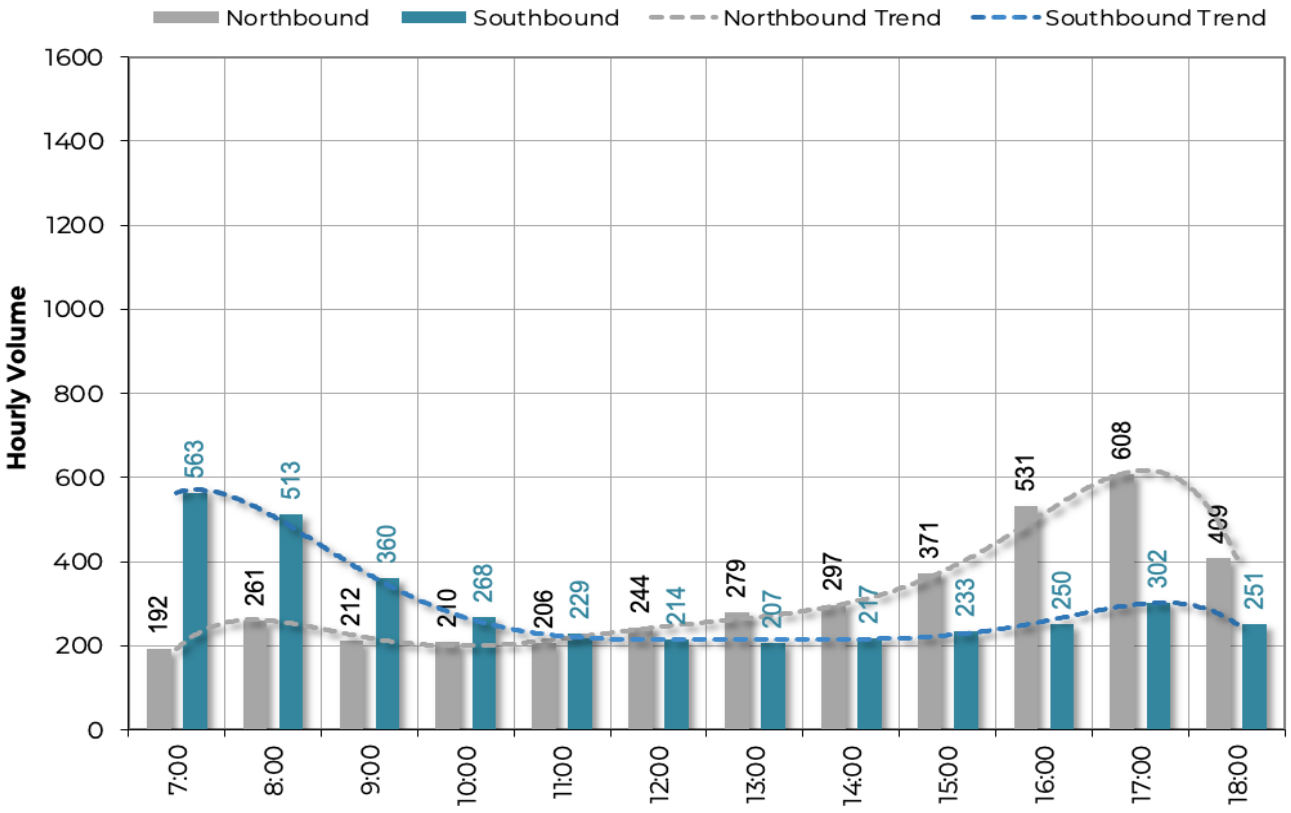


Figure 13-6. Traffic Survey Data – Link 2 HGV Traffic Flow.

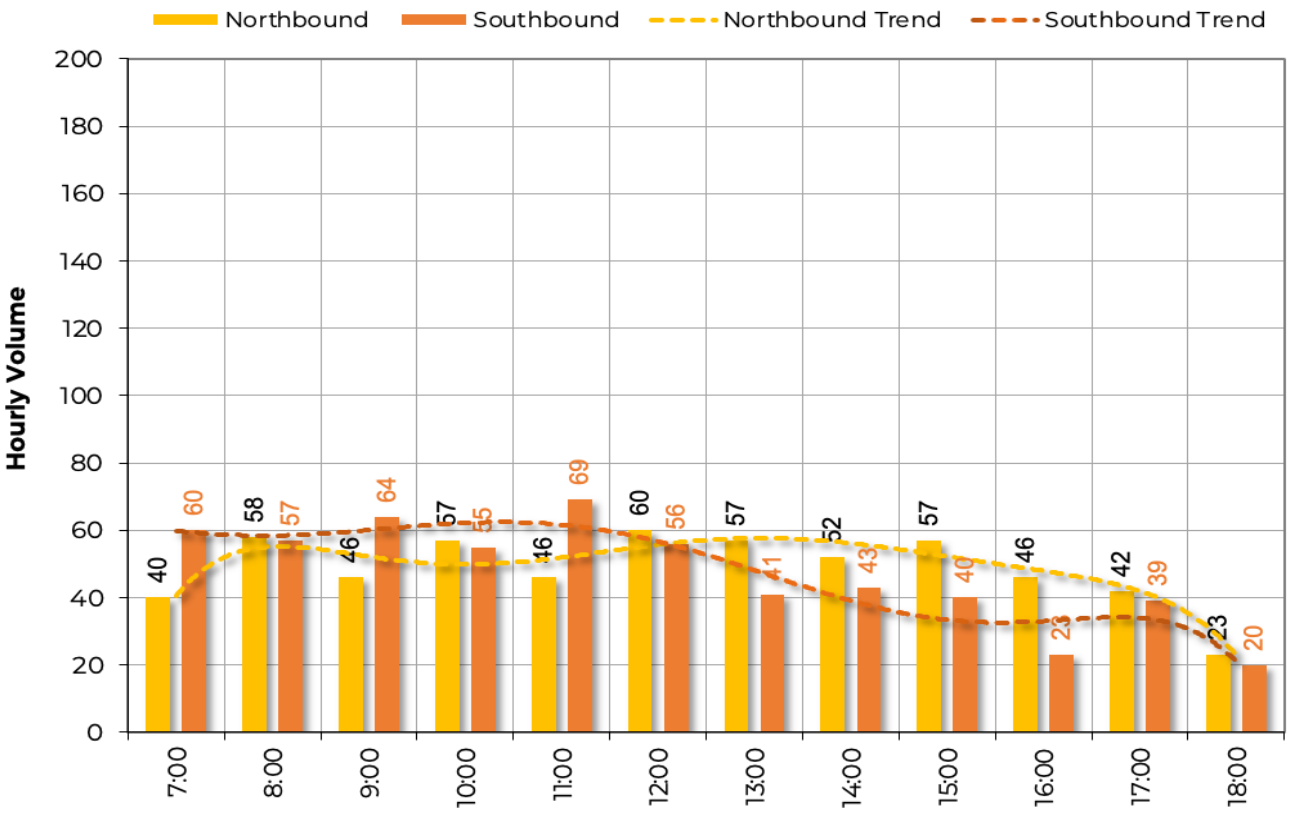


Figure 13-7. Traffic Survey Data – Link 3 Total Traffic Flow.

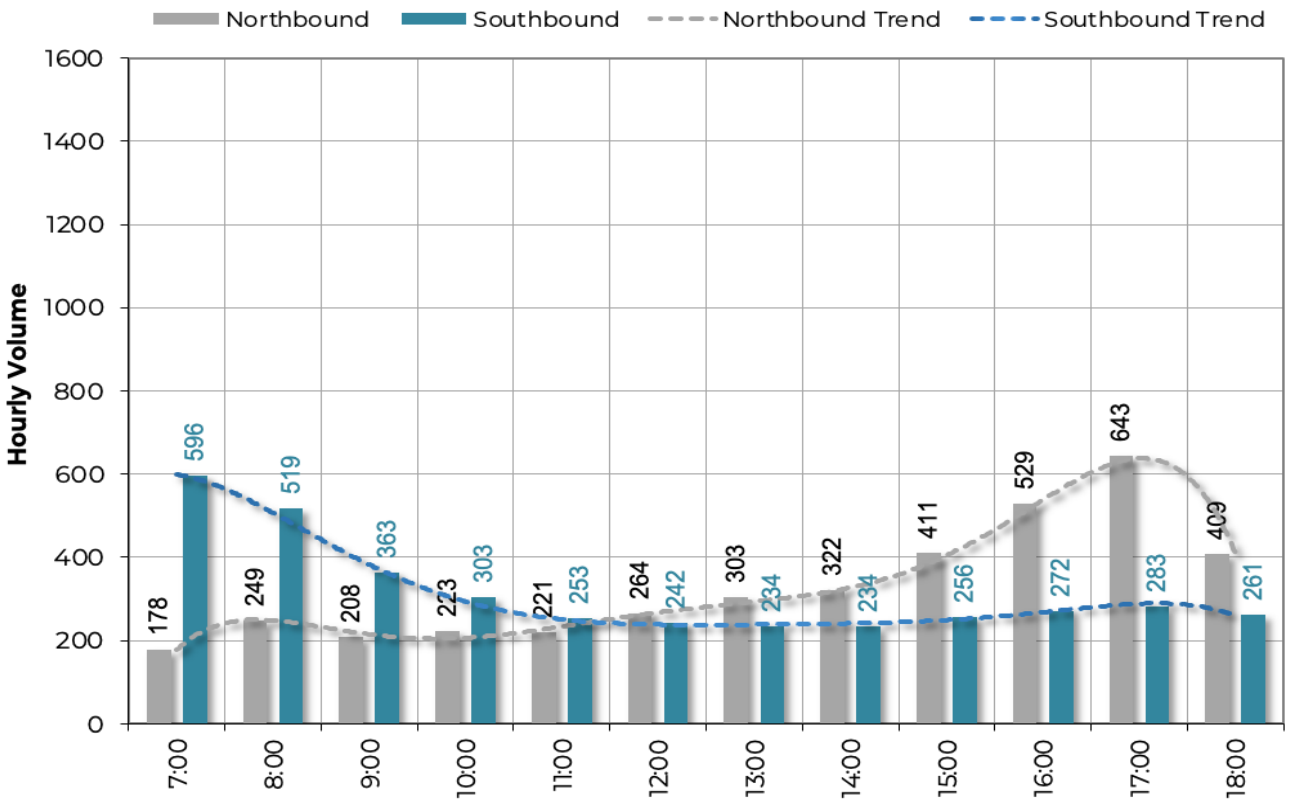


Figure 13-8. Traffic Survey Data – Link 3 HGV Traffic Flow.

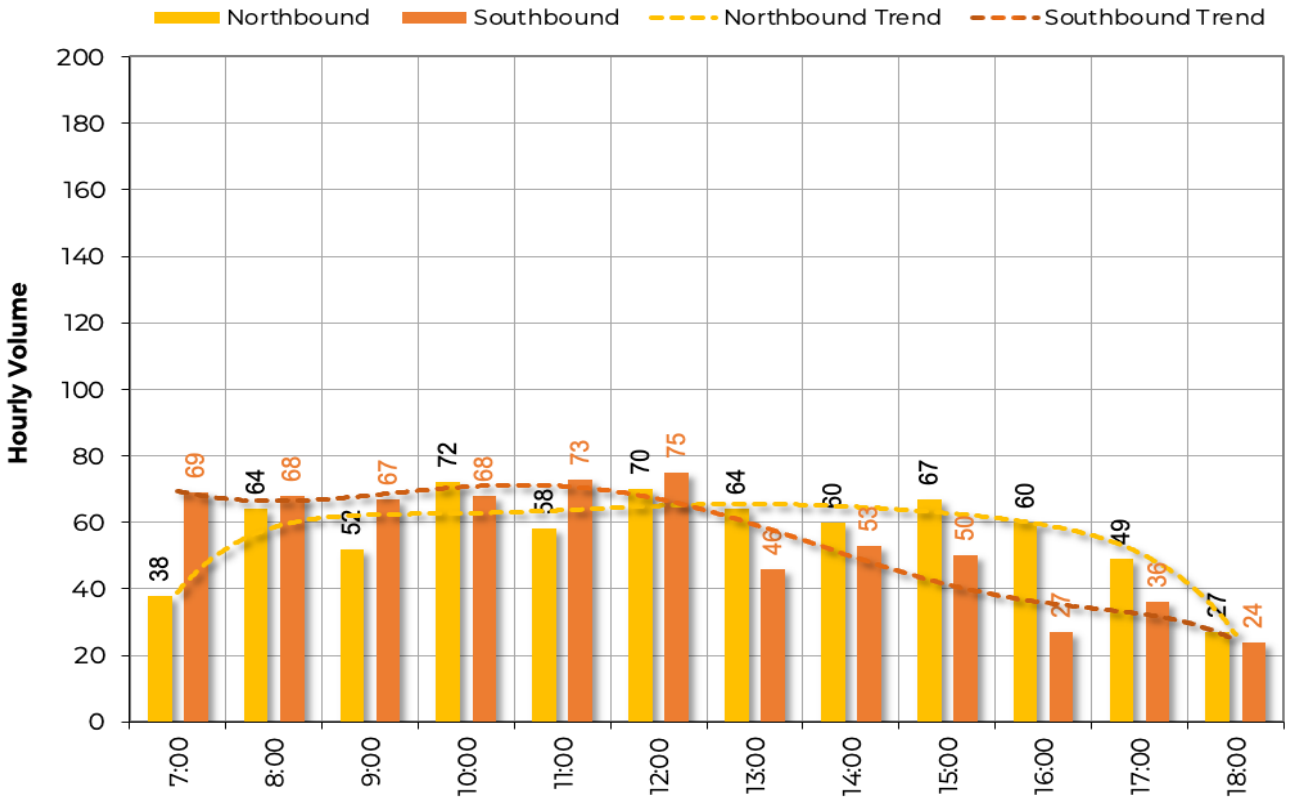


Figure 13-9. Traffic Survey Data – Link 4 Total Traffic Flow.

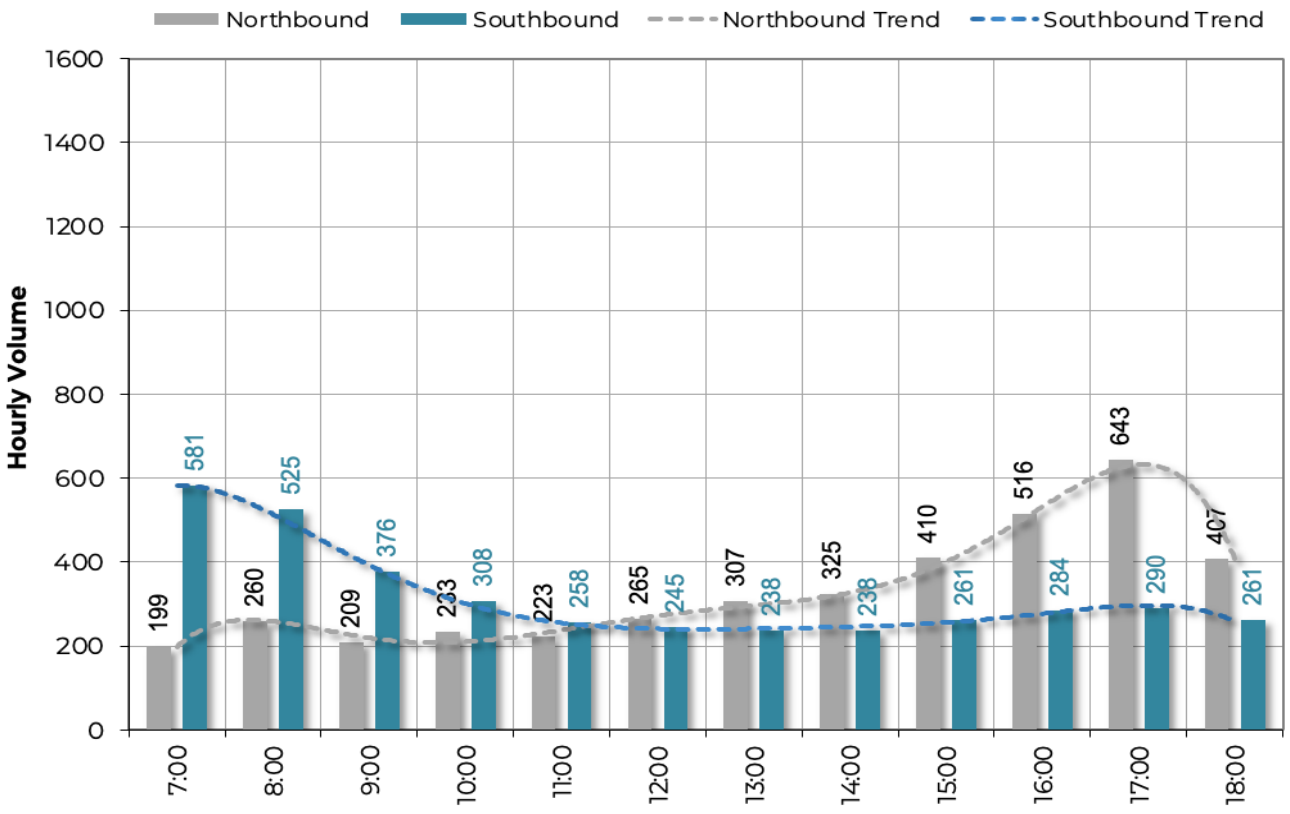


Figure 13-10. Traffic Survey Data – Link 4 HGV Traffic Flow.

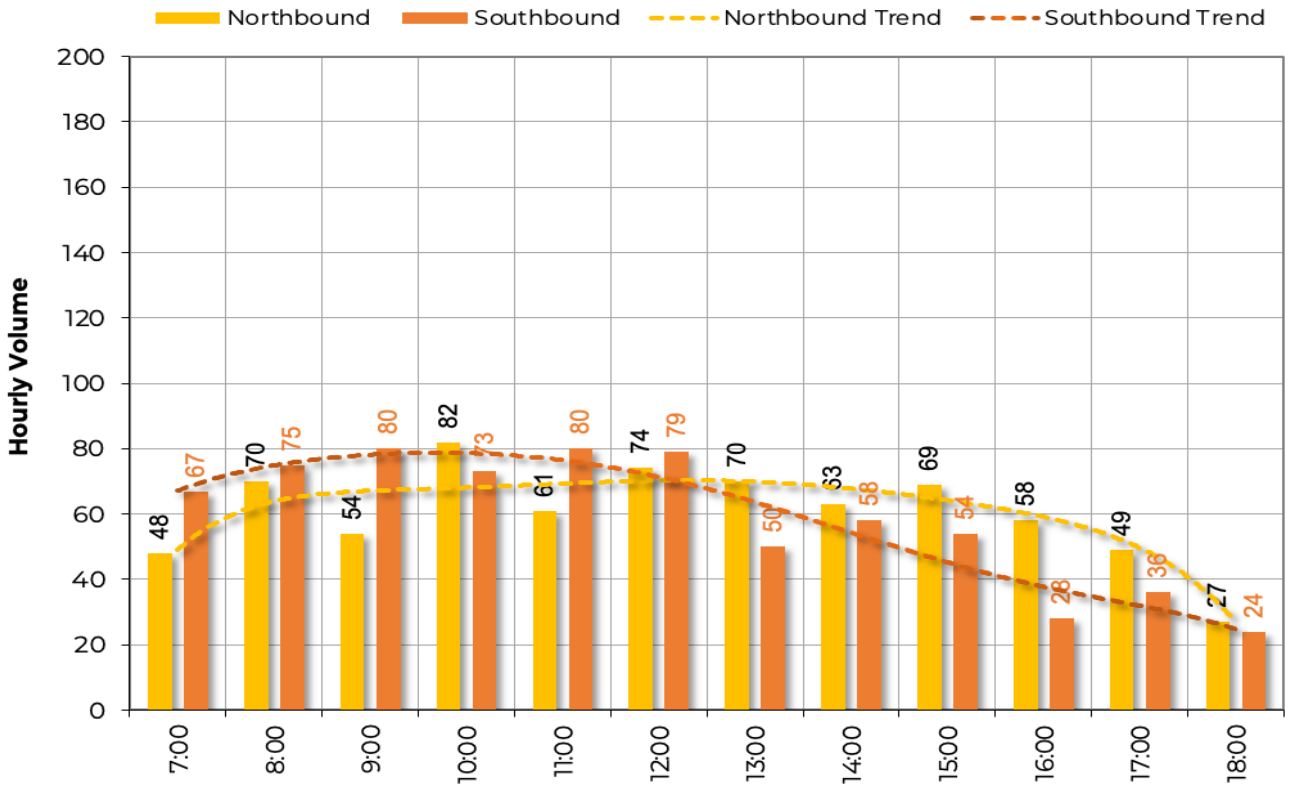


Figure 13-11. Traffic Survey Data – Link 5 Total Traffic Flow.

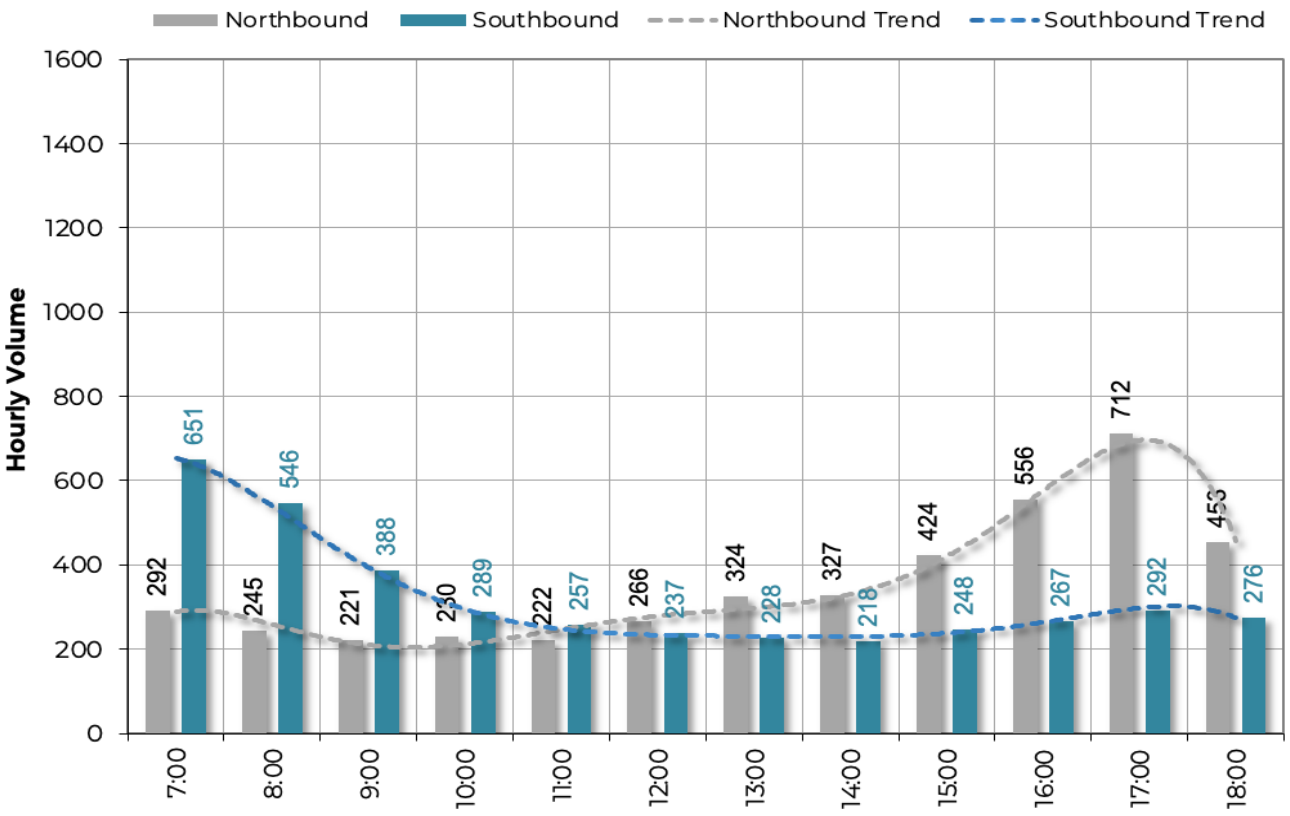


Figure 13-12. Traffic Survey Data – Link 5 HGV Traffic Flow.

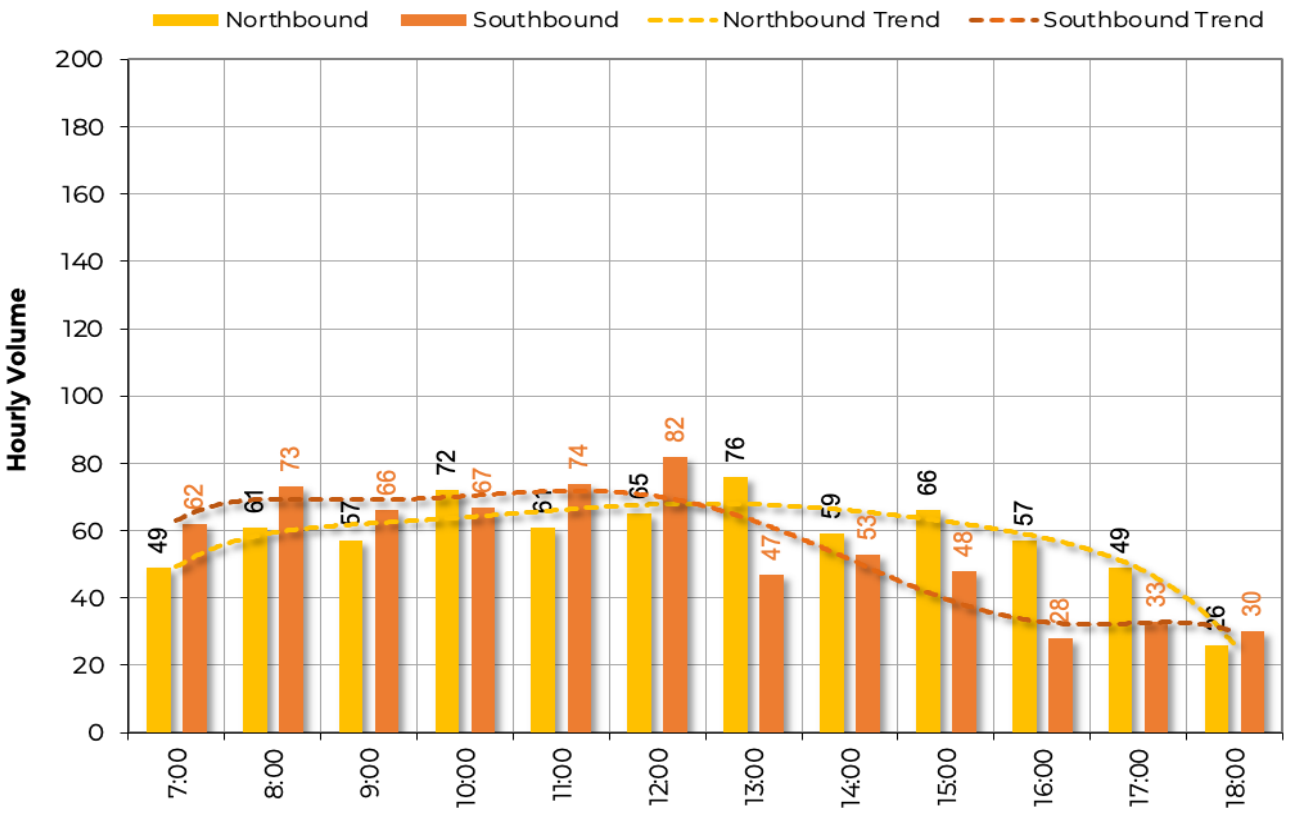


Figure 13-13. Traffic Survey Data – Link 6 Total Traffic Flow.

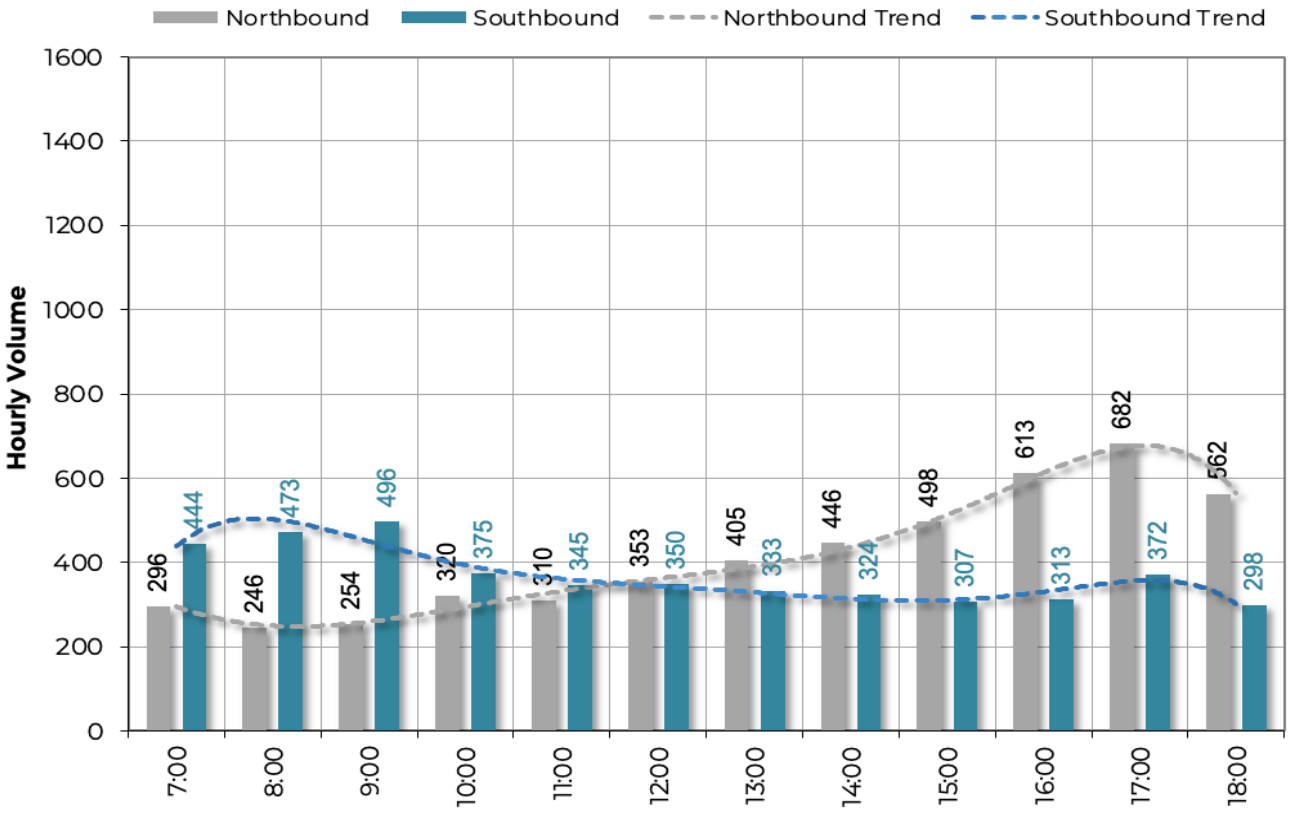


Figure 13-14. Traffic Survey Data – Link 6 HGV Traffic Flow.

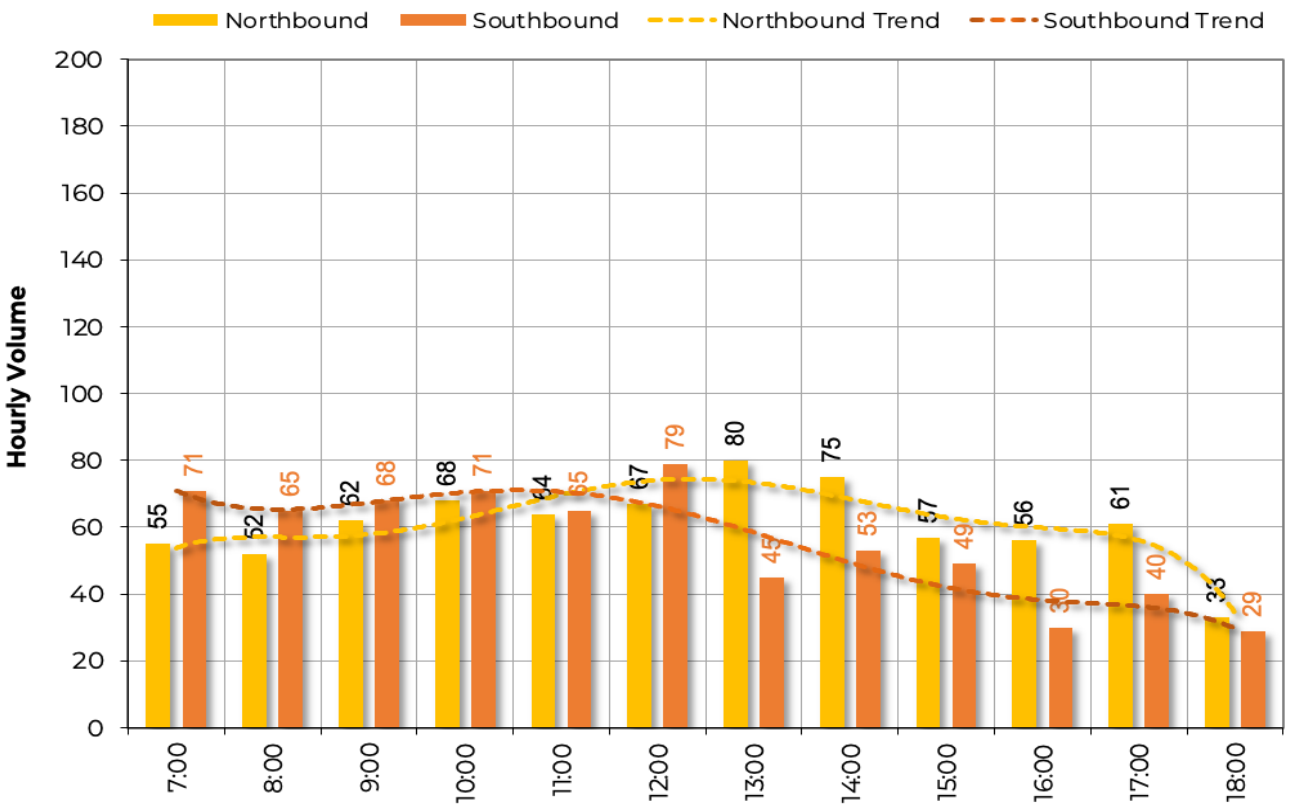


Figure 13-15. Traffic Survey Data – Link 7 Total Traffic Flow.

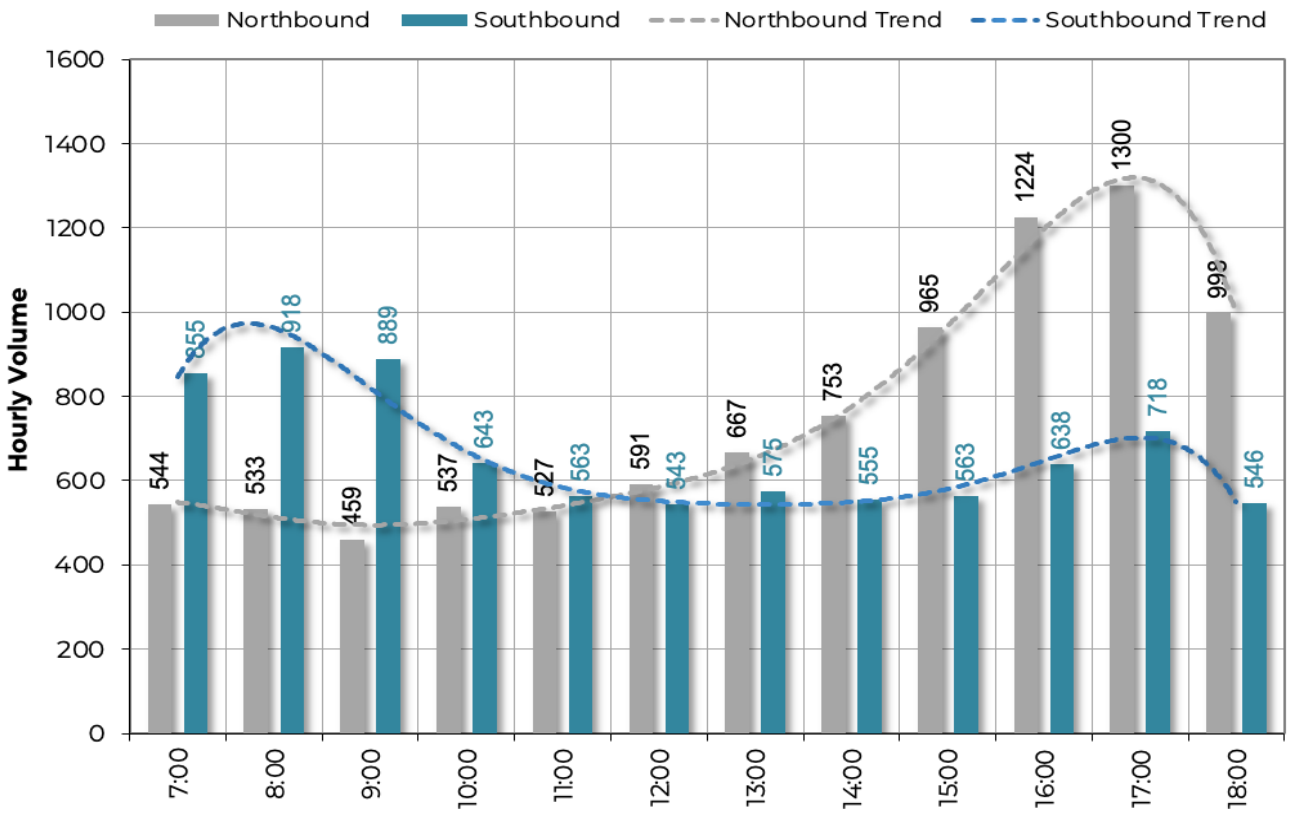


Figure 13-16. Traffic Survey Data – Link 7 HGV Traffic Flow.

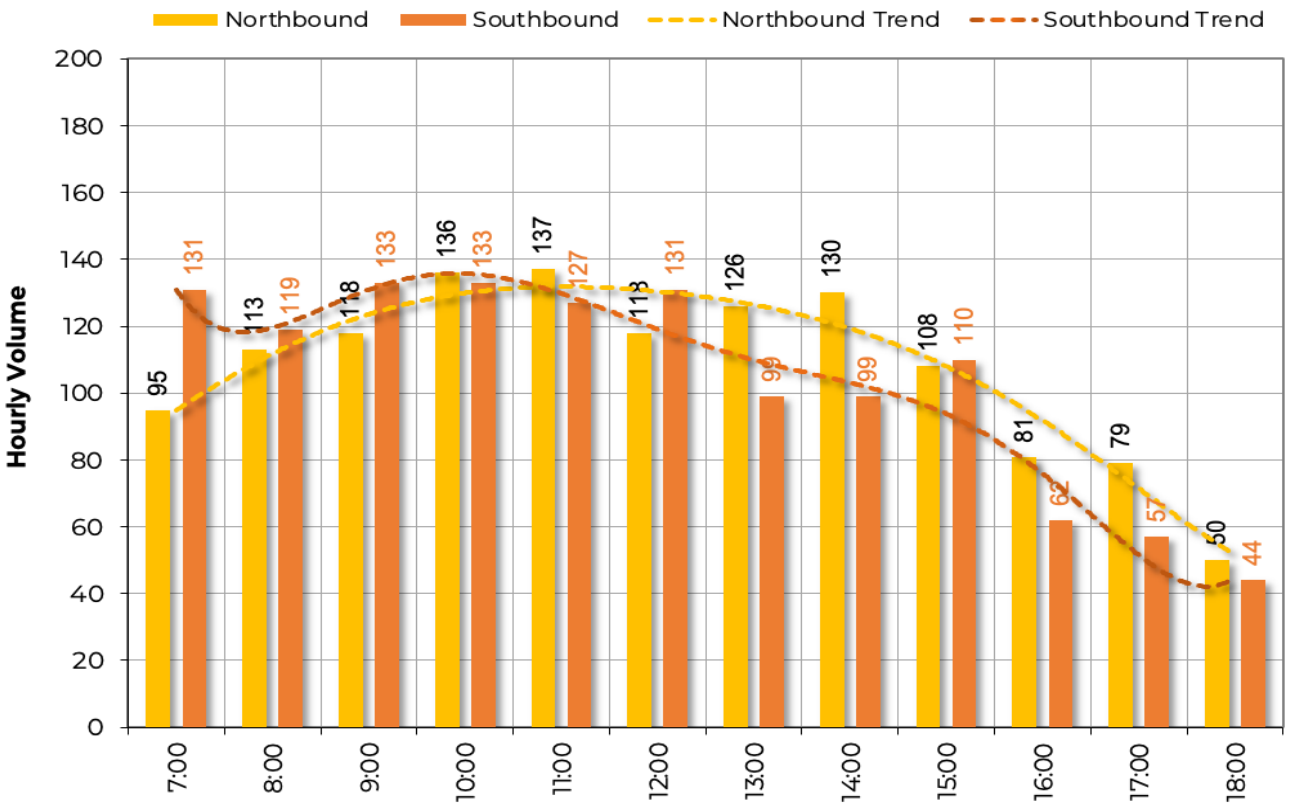


Figure 13-17. Traffic Survey Data – Link 8 Total Traffic Flow.

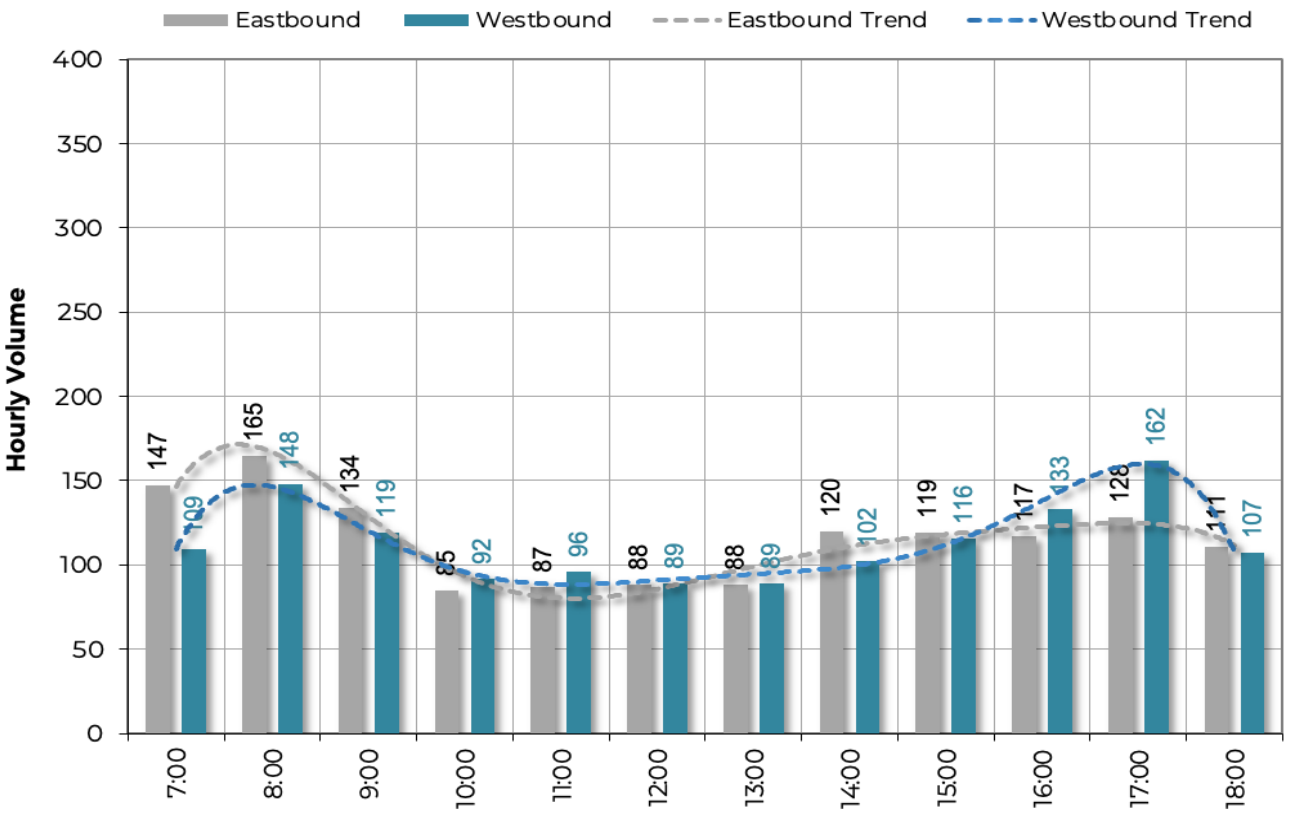


Figure 13-18. Traffic Survey Data – Link 8 HGV Traffic Flow.

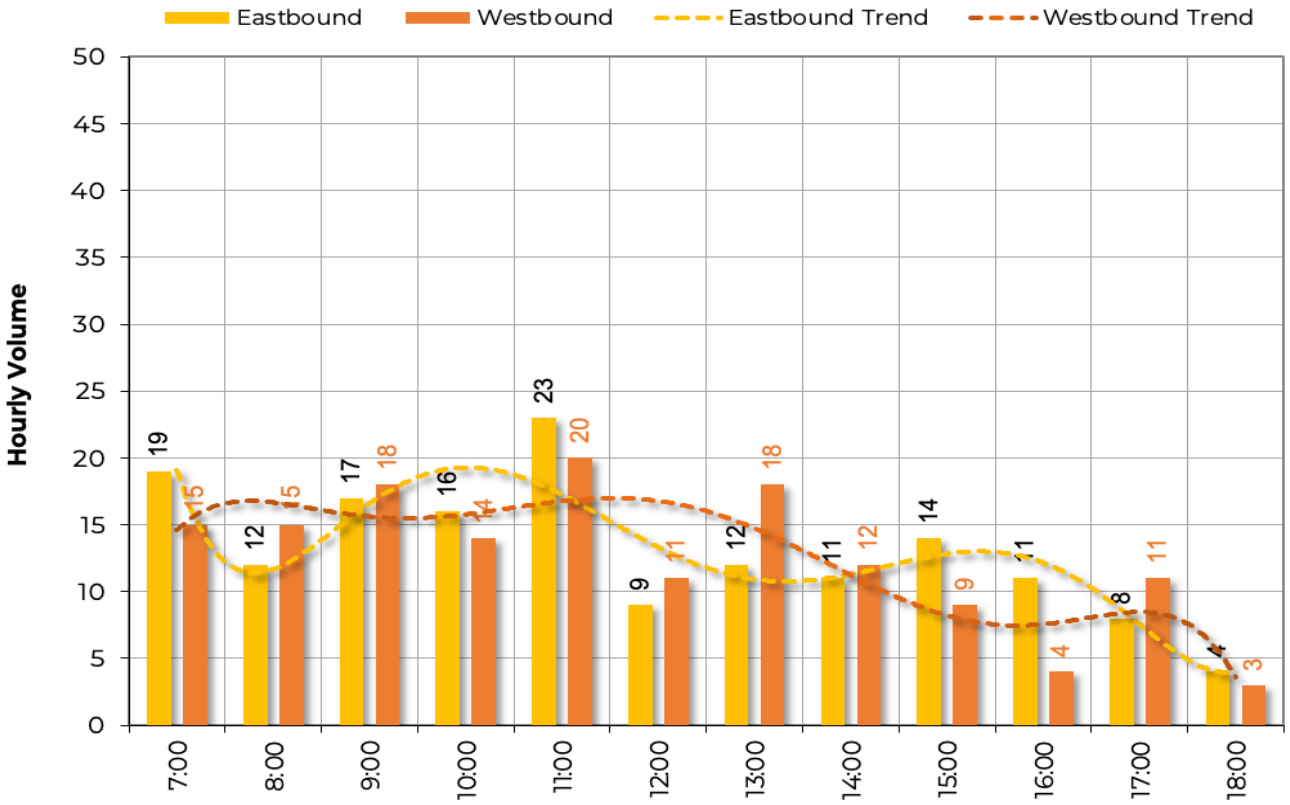


Figure 13-19. Traffic Survey Data – Link 9 Total Traffic Flow.

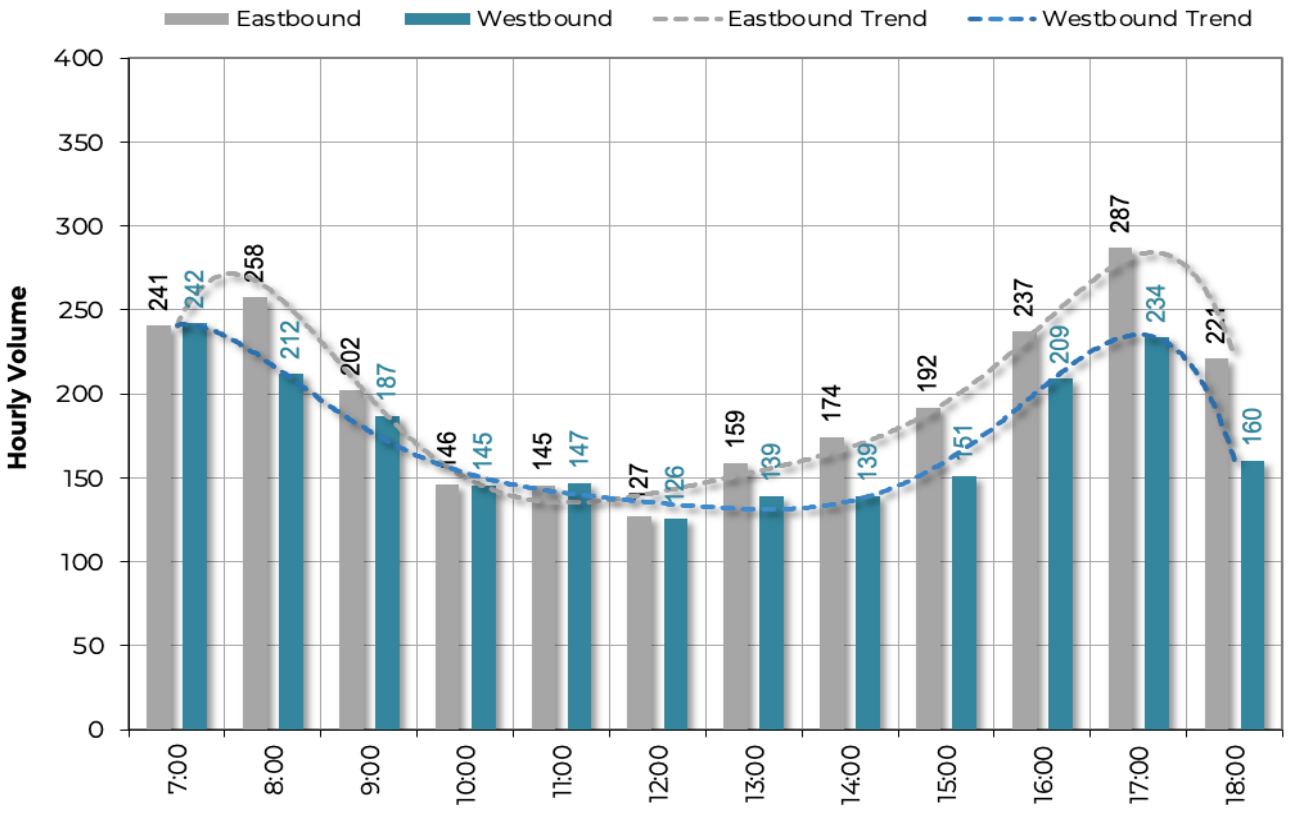


Figure 13-20. Traffic Survey Data – Link 9 HGV Traffic Flow.

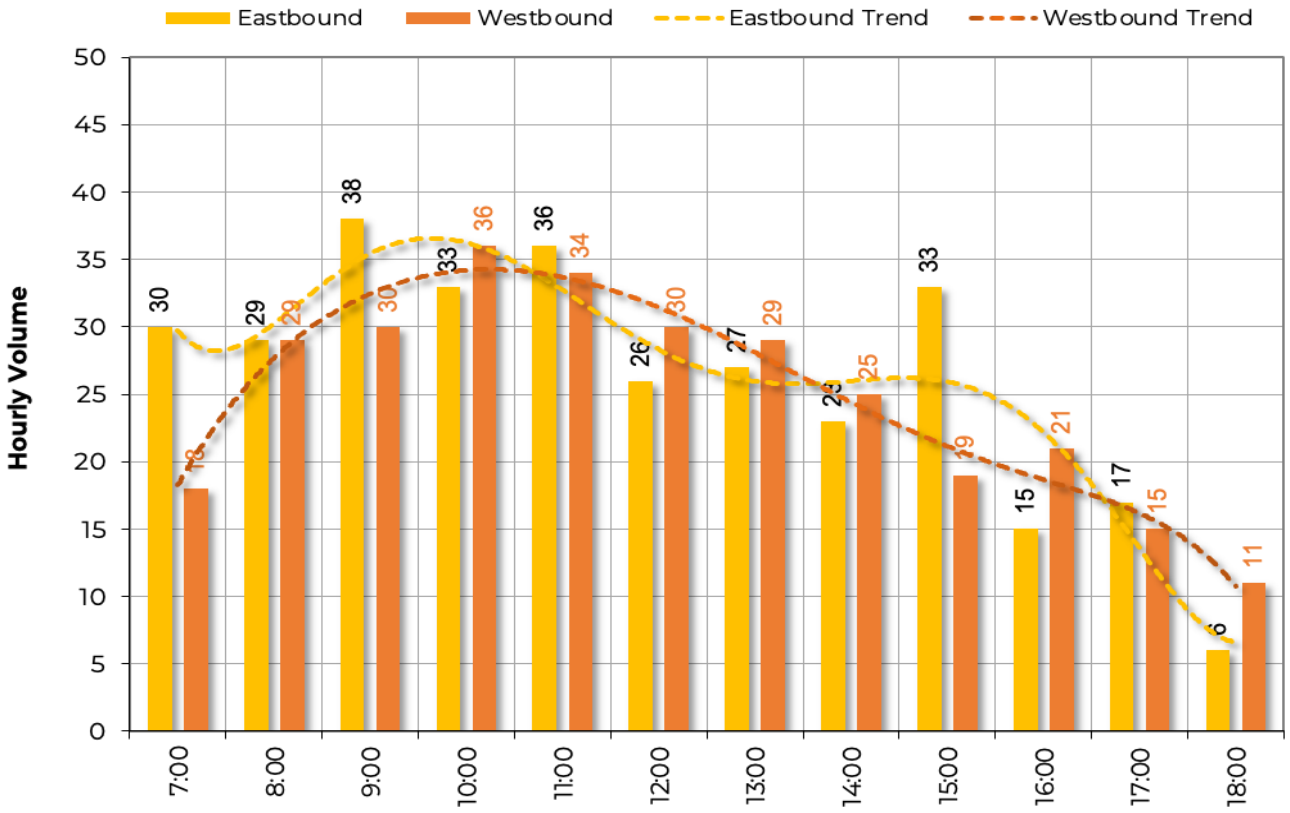


Figure 13-21. Traffic Survey Data – Link 10 Total Traffic Flow.

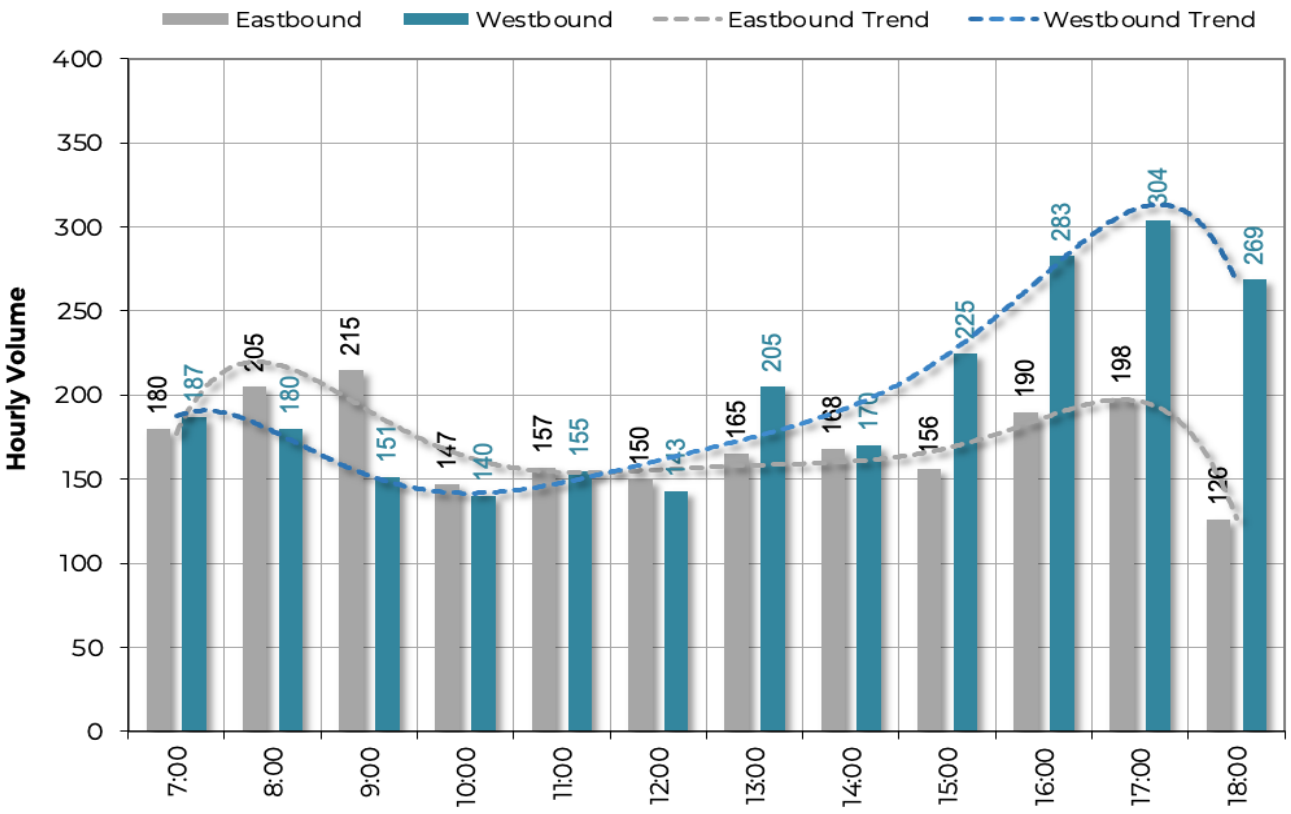


Figure 13-22. Traffic Survey Data – Link 10 HGV Traffic Flow.

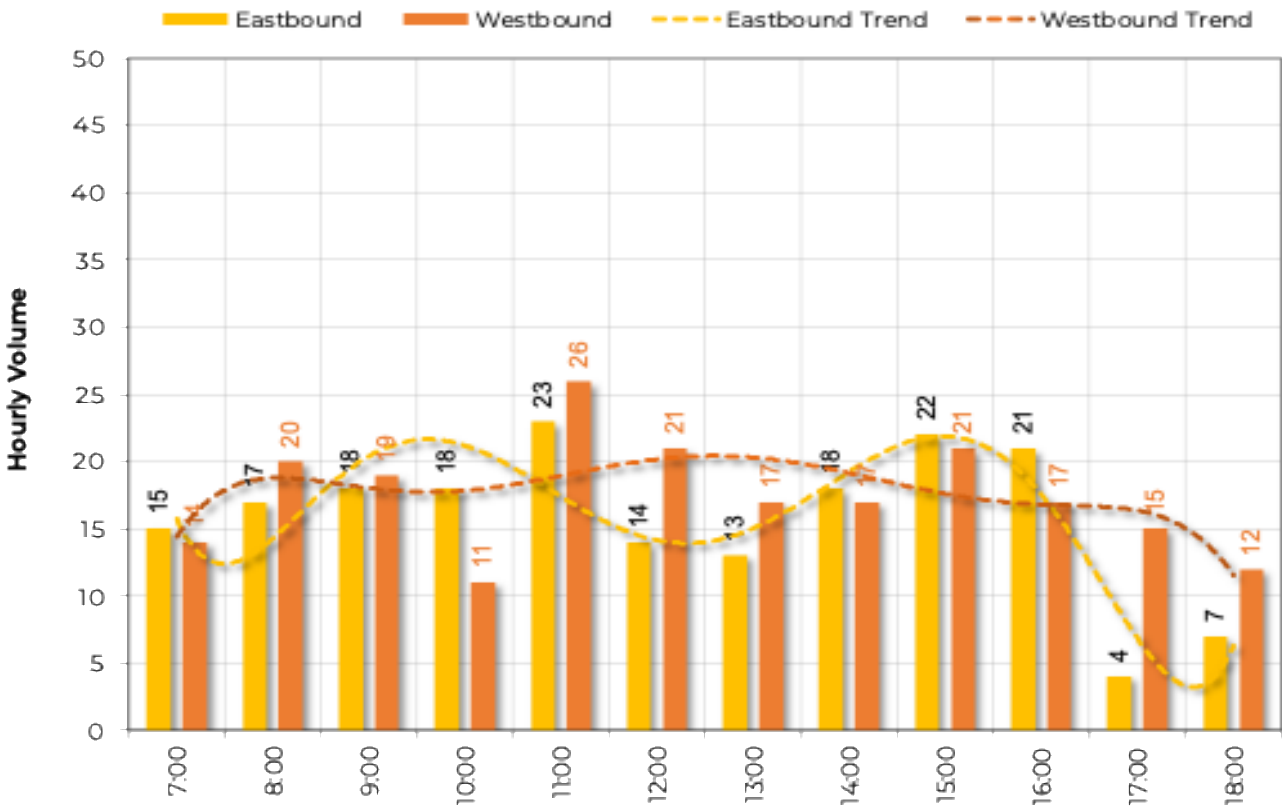


Figure 13-23. Traffic Survey Data – Link 11 Total Traffic Flow.

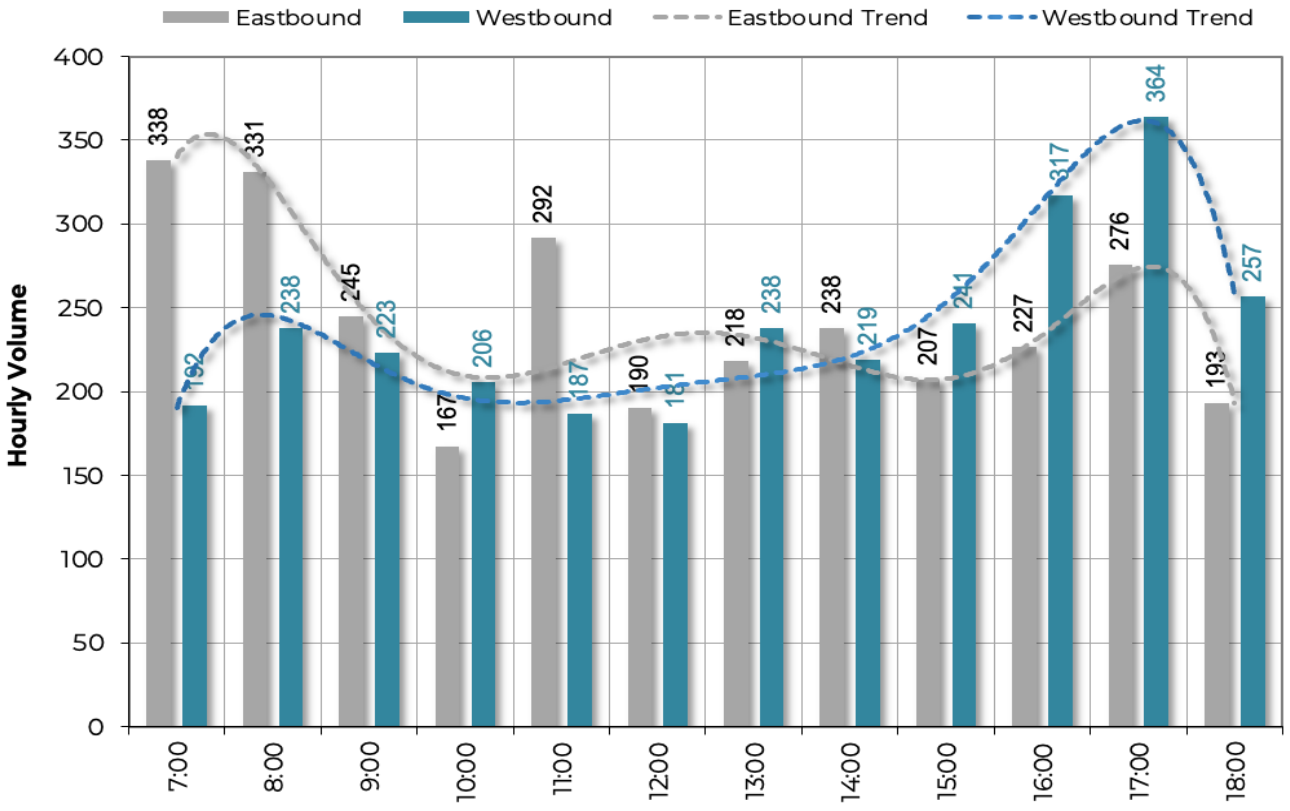


Figure 13-24. Traffic Survey Data – Link 11 HGV Traffic Flow.

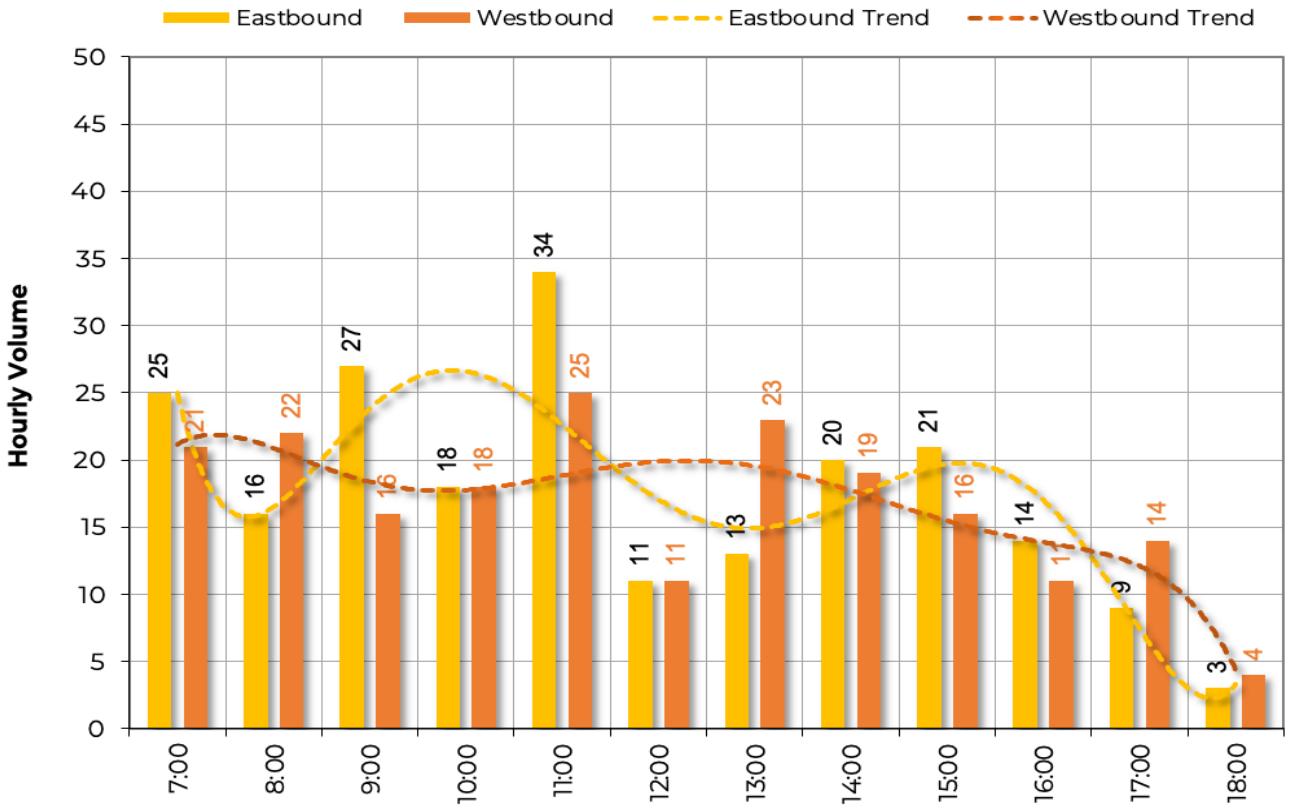


Figure 13-25. Traffic Survey Data – Link 12 Total Traffic Flow.

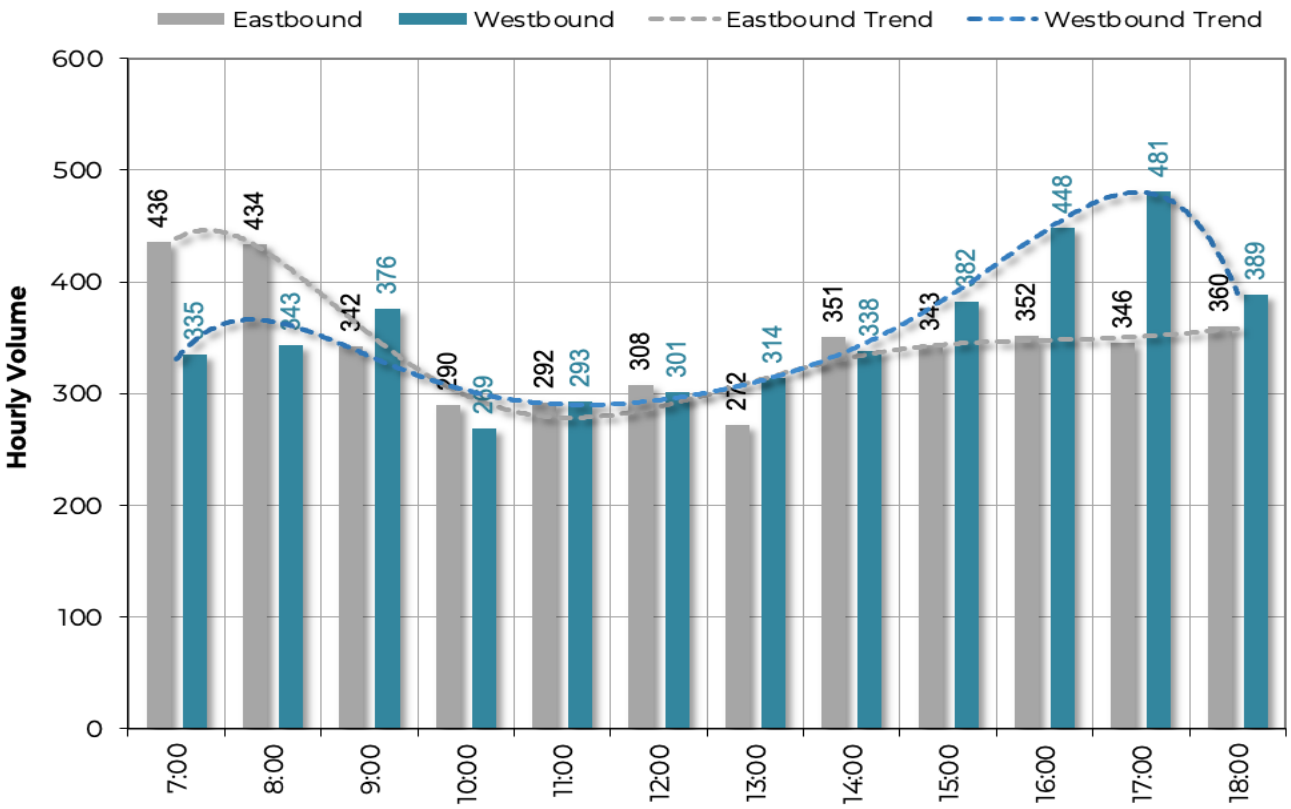


Figure 13-26. Traffic Survey Data – Link 12 HGV Traffic Flow.

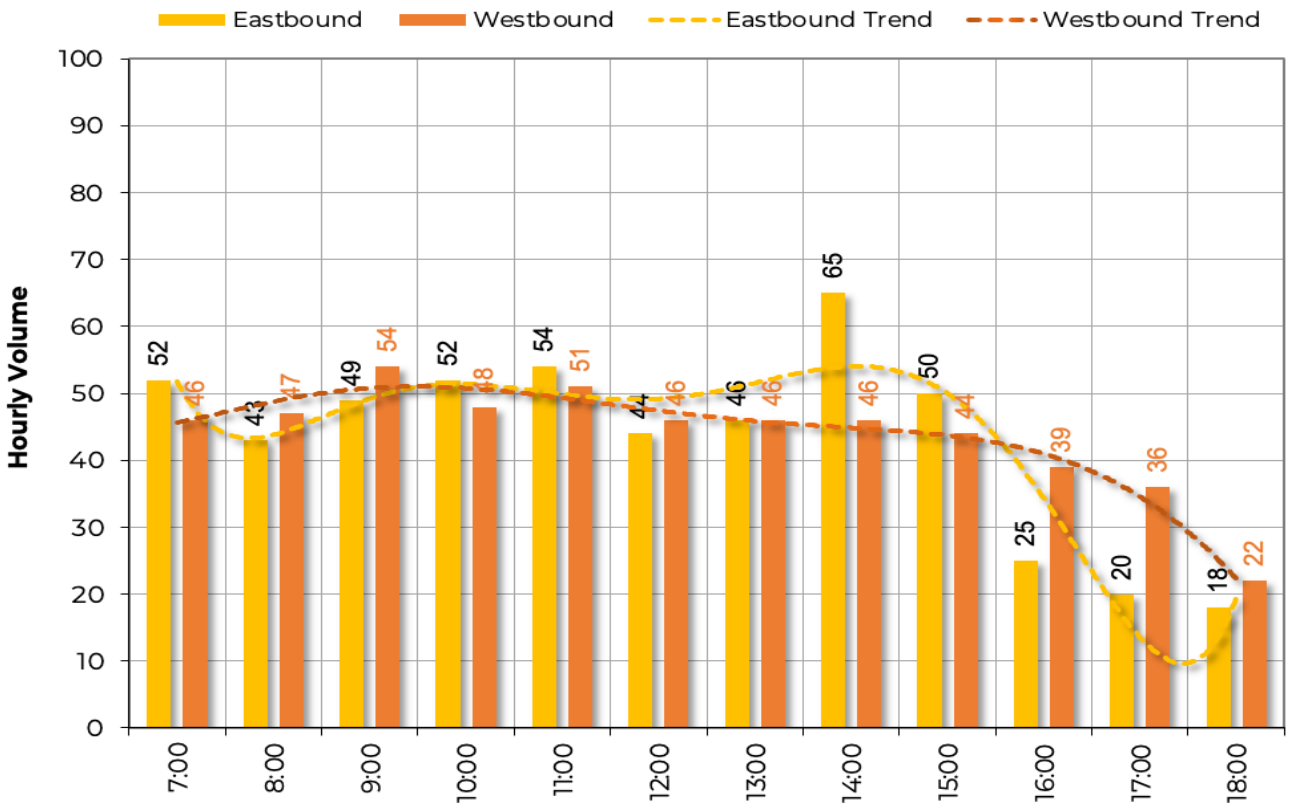


Figure 13-27. Traffic Survey Data – Link 13 Total Traffic Flow.

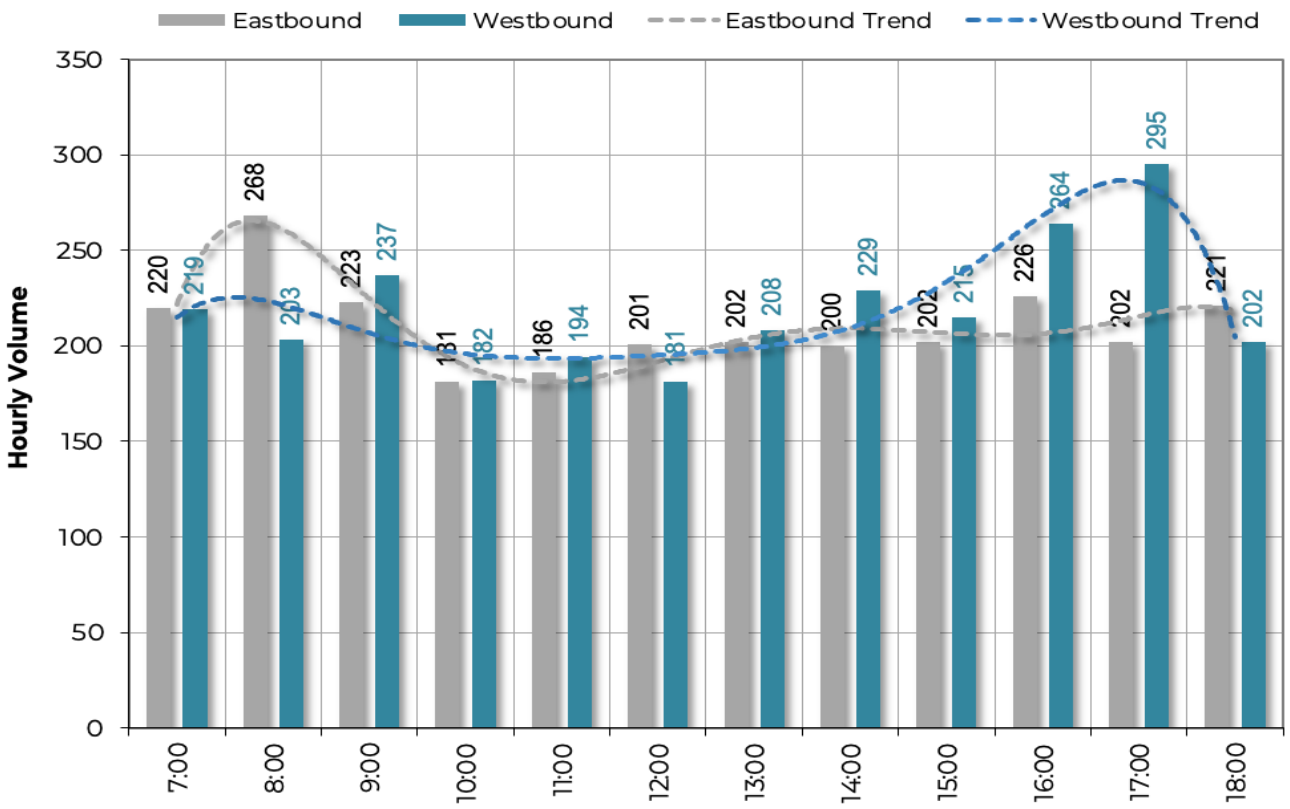


Figure 13-28. Traffic Survey Data – Link 13 HGV Traffic Flow.

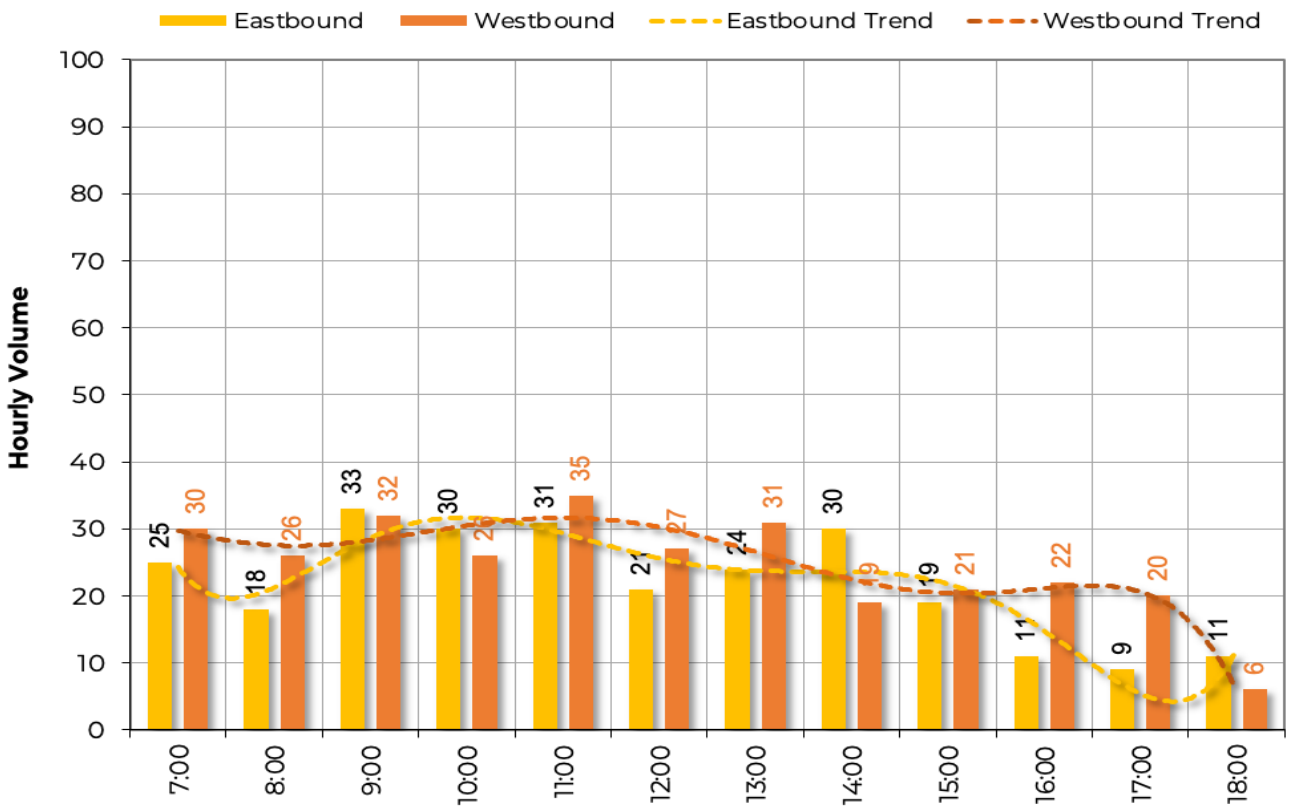


Figure 13-29. Traffic Survey Data – Link 14 Total Traffic Flow.

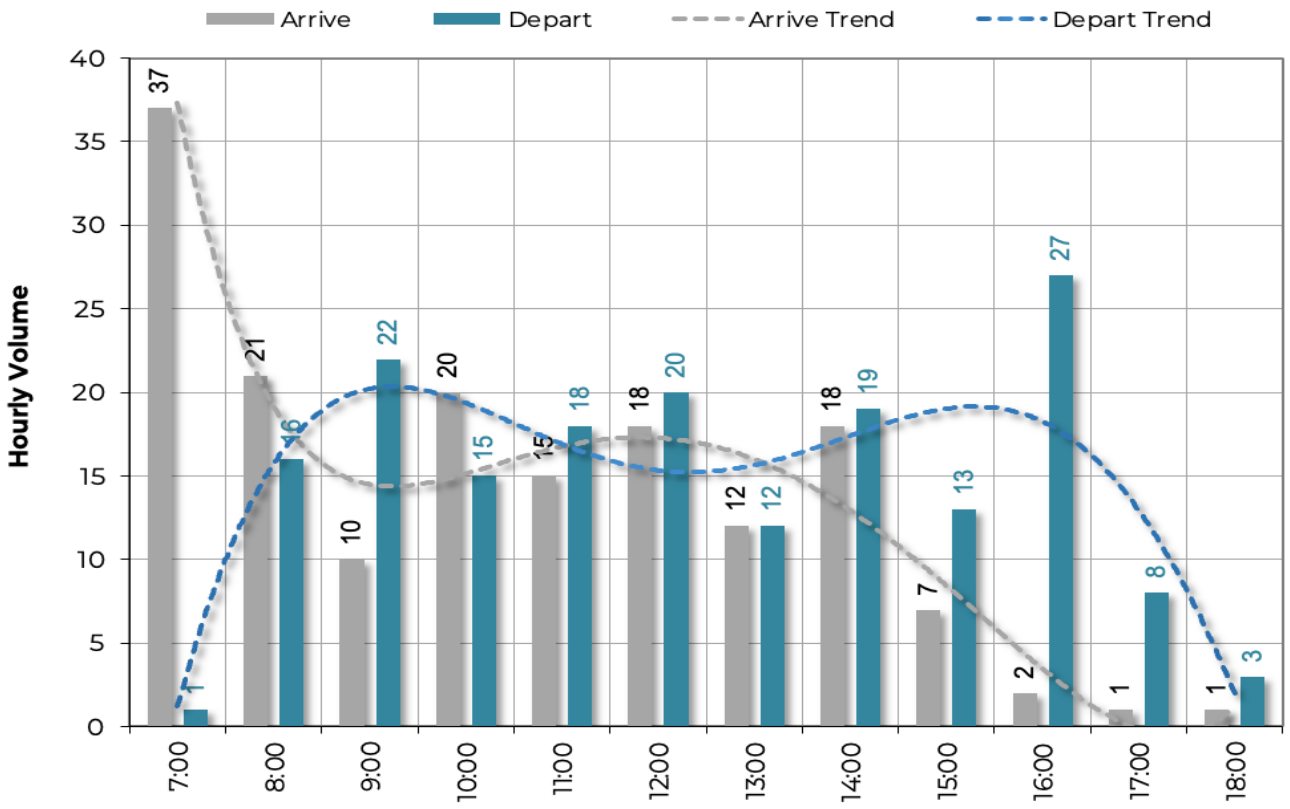
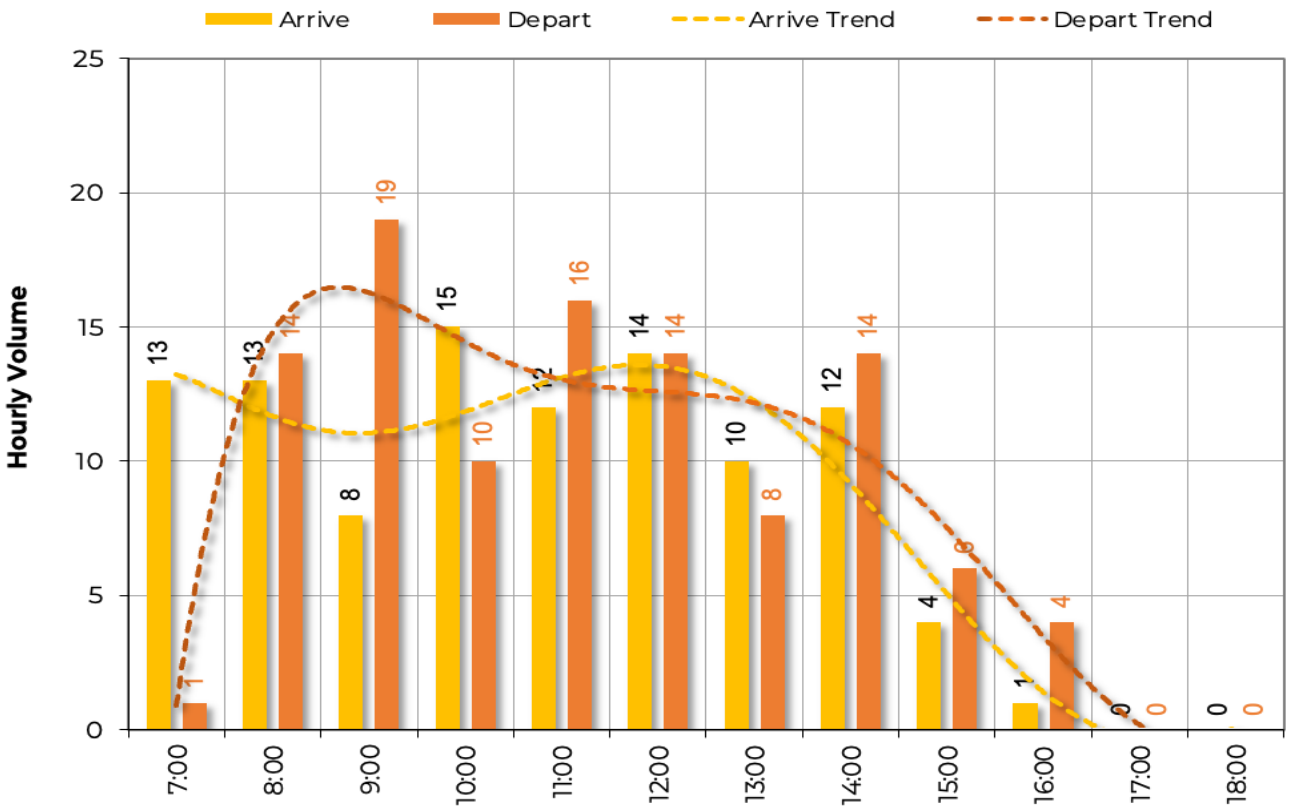


Figure 13-30. Traffic Survey Data – Link 14 HGV Traffic Flow.



13.10.4.1.1 National Primary Road N2 – Link 1 to Link 7

The N2 is a key element of the national primary road network, providing a strategic north–south corridor linking Dublin to Monaghan and onward to the Northern Ireland border at Moy Bridge. Within County Meath, the N2 connects a number of settlements including Ashbourne, Kilmoon Cross, Slane and Collon, and forms an important route for the movement of both regional and national traffic, including significant volumes of heavy goods vehicles (HGVs).

In the vicinity of the proposed development at Knockharley Landfill, the N2 runs between Slane to the north and Kilmoon Cross to the south, where it intersects with the R152 and provides connections towards the M2 and Dublin. The section of the N2 between Slane and Kilmoon is predominantly a single carriageway road, subject to varying local conditions including changes in alignment, gradients, and direct private accesses. Traffic flows on this corridor reflect both long-distance through traffic and local access movements, with HGVs representing a notable proportion due to the road's function as a strategic freight route.

For the Knockharley Landfill site, the N2 provides the principal arterial route that connects the facility to the wider national and regional road network. The site access arrangements and associated haul routes are therefore closely linked to the operation of the N2 corridor. Given the strategic nature of the N2, any assessment of traffic and transport effects associated with the proposed continuation and expansion of the landfill must take account of its role in accommodating both local and strategic traffic, and the importance of maintaining safe and efficient operation of this section of the national road network.

Meath County Development Plan 2021-2027, Section 5.8.2 *'N2 Corridor'* states the following:

"The N2 corridor functions as a vital cross border economic artery which is essential to facilitate strategic traffic movement and to maintain and improve accessibility to employment areas. The importance of this North-South route and its role in maintaining an "open all island" economy post Brexit is recognised within both the National Development Plan 2018-202719and the NPF20. The NTA Strategy for the Greater Dublin Area 2016-2035 includes an objective to provide 'enhancements of the N2/M2 national route inclusive of a bypass of Slane, to provide for additional capacity on the non-motorway sections of this route, and to address safety issues in Slane village associated with, in particular, heavy goods vehicles.21' The National Development Plan makes particular reference to and prioritises the upgrade of the N2 from Rath Roundabout to Kilmoon Cross section of road which is already underway. The delivery of these works will continue to be supported and facilitated by the Council and the Council will seek the delivery of the Slane Bypass in the future in conjunction with TII and the Department of Transport."

Link 1 – Total Traffic Flow

The section to the north of Slane centre and the N51 is **Link 1**. The following traffic flow data is derived from survey Site 1 – Slane Crossroads N2/N51.

Traffic surveys undertaken on the N2 north of Slane are summarised for total traffic flow in Figure 13.3 which demonstrates clear directional patterns in the daily and peak-hour flows. The recorded daily two-way flow between 07:00-19:00hrs is in the order of 7,952 no. vehicles per day, with a broadly balanced split between northbound and southbound directions across the 12-hour survey period.

In the northbound direction, hourly flows range from approximately 230 no. to 480 no. vehicles per hour with the average being 338 no. vehicles . The peak northbound movement occurs during the evening peak, reaching a maximum of around 484 no. while the morning peak is lower, at approximately 312 no.

In the southbound direction, flows are generally higher in the morning, with the AM peak reaching approximately 482 no vehicles around 08:00–09:00hrs, reflecting commuter traffic travelling towards Dublin. Flows then reduce steadily through the middle of the day to between 239–284 no. per hour, before rising again in the evening towards a secondary peak of 352 no vehicles.

The data illustrates a tidal flow pattern, with southbound flows stronger in the morning and northbound flows stronger in the evening. This is considered consistent with commuter and commercial traffic patterns on this section of the N2. The average hourly flow across the day is approximately 300–350 no. vehicles per direction. HGVs traffic forms a notable proportion in both directions equating to 14.1% to total two-way traffic flow.

Link 1 – N2 North of Slane (Northbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.715502, -6.531762
Note: North of Access to Grassland Agro approx. 1km north of Slane Cross N2/N51

Link 1 – HGV Traffic Flow

The survey data presented in Figure 13.4 shows that heavy goods vehicle (HGV) traffic forms a consistent and notable element of overall flows on the N2 north of Slane. The recorded daily two-way HGV volume in the hours 07:00-19:00hrs is in the order of 1,122 no. vehicles per day, with directional flows broadly balanced but showing relatively distinct peak patterns.

In the southbound direction, HGV flows are higher during the morning, peaking at 66 no. vehicles per hour at 09:00hrs, reflecting goods movements towards Dublin and the wider motorway network. Midday volumes decline steadily to between 30–40 no. per hour before settling into a lower but steady evening profile of approximately 35–38 no. vehicles per hour.

In the northbound direction, HGV traffic peaks later in the day, consistent with return goods movements. The morning period records around 40–50 no. vehicles per hour, while the afternoon and evening rise to a maximum of 63 no., with sustained flows of around 55–61 vehicles per hour into the evening period.

Overall, the pattern indicates a tidal flow in HGV traffic, with southbound HGV demand highest in the morning and northbound flows building towards the evening, consistent with logistics operations distributing goods into the Greater Dublin Area in the morning and returning northbound later in the day.

The average hourly HGV flow is approximately 40–55 no. vehicles per hour per direction, which highlights the strategic freight role of this section of the N2 corridor.

Link 2 – Total Traffic Flow

The section of the N2 to the south of Slane centre and the N51 but north of Rathdrinagh Crossroad (L1013) is referenced as **Link 2** in the network flow diagrams provided in Volume 3, Appendix 13.2 of this EIAR. The following traffic flow data is derived from survey Site 2 – Rathdrinagh Crossroads N2/L1013.

Link 2 – N2 South of Slane (Southbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.681771, -6.540237
Note: South of Mcgruders Cross N2/L1600

Traffic surveys undertaken on the N2 south of Slane are summarised for total traffic flow in Figure 13.5 The survey data for the N2 south of Slane indicates a lower overall traffic demand compared with the corresponding section of the N2 to the north of Slane, reflecting the attraction of traffic to the N51 and in the direction of Navan in the west and Drogheda in the east. The average daily two-way flow is of the order of 7,427 no. vehicles per day, compared with approximately 7,952 no. vehicles per day on the section north of Slane.

In directional terms, a strong southbound morning peak is evident, with flows rising sharply between 07:00 and 09:00 and reaching a maximum of 563 no. vehicles per hour, compared with a lower northbound flow of around 192 no. vehicles per hour during the same period. This tidal pattern reflects the significant commuter demand towards Dublin in the morning.

During the inter-peak period, both northbound and southbound flows remain relatively steady, typically within the range of 200–300 no. vehicles per hour per direction, with no pronounced midday spike.

The evening peak shows a reversal of the morning trend, with northbound flows rising substantially, reaching a maximum of 608 no. vehicles per hour, compared with 302 no. vehicles per hour southbound. This demonstrates the commuter return movement away from Dublin and towards settlements in the north of County Meath and beyond.

The average hourly flows across the day equate to approximately 350–400 no. vehicles per hour southbound and 250–300 vehicles per hour northbound, but with marked directional imbalance at peak times.

When compared with the section of the N2 north of Slane, the south section experiences:

- Lower total daily volumes;
- More pronounced tidal commuting patterns, with strong southbound peaks in the morning and northbound peaks in the evening;
- Greater influence of strategic commuting movements towards and away from Dublin.

The data confirms the role of the N2 south of Slane as a key radial commuter and strategic traffic corridor.

Link 2 – HGV Traffic Flow

The survey data presented in Figure 13.6 shows that heavy goods vehicle (HGV) traffic on Link 2. In the morning, southbound HGV traffic is noticeably higher than northbound, peaking around 60–69 no. vehicles per hour compared to 40–46 no. northbound. Again, this suggests a strong flow of heavy goods vehicles heading towards Dublin in the morning.

In the midday period, flows are more balanced, with both directions carrying around 55–60 no. vehicles per hour, showing steady two-way HGV traffic.

In the evening period the balance tips slightly in favour of northbound HGV movement. Volumes here are around 55–63 no. vehicles per hour northbound versus 30–40 no. southbound, reflecting return movements from the Greater Dublin Region later in the day.

The overall trend shows a clear southbound dominance in the morning, shifting to a northbound emphasis in the evening, with daytime flows remaining moderate and steady in both directions.

Comparing Link 1 and Link 2 it is clear that the morning flow is southbound dominant, with HGVs moving towards Dublin. By evening, the pattern reverses, and northbound flows dominate, showing return traffic. Link 2 to the south of Slane sees slightly higher morning southbound volumes (up to 69 no.), while north of Slane shows a somewhat stronger evening northbound peak (up to 63 no.). Across the day, flows are broadly comparable in scale between Link 1 and Link 2, with peaks typically between 55–70 no. vehicles per hour.

Link 3 – Total Traffic Flow

The section of the N2 to the south of Rathdrinagh Cross and the access junction serving Knockharley Landfill is referenced as **Link 3**. The following traffic flow data is derived from survey Site 3 – Knockharley Landfill access junction on the N2.

Traffic surveys undertaken on the N2 north of the landfill are summarised for total traffic flow in Figure 13.7. The average daily two-way flow is of the order of 7,776 no. vehicles per day. Across the hour-by-hour profile, southbound flows are consistently higher than northbound flows in the morning peak hour with a reversal in the evening. The pattern shows a clear tidal signature with a pronounced surge southbound during the morning commuting period and northbound in the evening peak.

The peak southbound flow occurs in the early morning, reaching just under or around 600 no. vehicles per hour with the highest point in the hour commencing 07:0hrs with 596 no. vehicles/hr. The corresponding northbound flow in the same period is in the order of 200-250 no. vehicles per hour. The peak northbound flow is higher than the morning southbound peak at a maximum of 643 no. vehicles per hour occurring in the hour commencing 17:00hrs. The corresponding southbound flow in the evening peak hour is of the order 270-285 no. vehicles.

Midday off-peak flows are well balanced by direction with roughly 250–280 no. vehicles per hour in both directions.

Over the course of the day there is approximately 4% greater volume of traffic on Link 3 when compared with Link 2.

Link 3 – N2 North of Knockharley Landfill Junction (Northbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.655264, -6.521548
Note: North of Knockharley Landfill Junction at start of Right Turning Lane diverge taper

Link 3 – HGV Traffic Flow

The survey data presented in Figure 13.8 shows that heavy goods vehicle (HGV) traffic on Link 3.

Northbound and southbound HGV volumes are broadly balanced across the working day. A slight southbound bias is evident in the early morning ramp-up, while around the late-morning to early-afternoon plateau the two directions are very similar, with occasional marginal northbound lead. Both directions taper together through the late afternoon and evening.

Flows build quickly from early morning off-peak levels (around the 20–30 HGV per hour) to a steady daytime rate. The southbound direction tends to rise first and is slightly higher during this ramp which might be considered consistent with inbound servicing of the landfill from the nearby transfer facility at Rathdrinagh. The Beauparc Waste Transfer Facility, operated by Panda and Beauparc, is a facility located

in Rathdrinagh, Beauparc, Co. Meath. It accepts various types of waste including garden waste, general waste, recyclables, and bulky items. Traffic inbound to Rathdrinagh generally passes the landfill travelling northbound and residual wastes come to the landfill thus the marginally elevated HGV activity observed immediately north of Knockharley is reasonably considered to be associated with the adjacent waste transfer facility and landfill operations. Further north on Link 2, where the landfill facility HGV traffic diminishes, HGVs are less clustered around peak periods, indicating a reduced operational peaking effect from the waste transfer activities.

In the midday and early-afternoon, rather than a sharp spike, the graph shows a broad plateau, typically in the mid-60s to mid-70s HGV per hour in total per direction which is marginally higher than on Link 2. This extended peak suggests the differential between Link 2 and Link 3 may be in some part associated with scheduled daytime waste haul operations rather than commuter style peaking.

From mid-afternoon, HGV traffic in both directions decline steadily. By the evening, flows fall to roughly the 30s–40s HGV per hour, continuing downward toward late-evening off-peak levels in which the lowest volumes occur, generally in the low-to-mid-20s HGV per hour where directional differences are minimal during this period.

Link 4 – Total Traffic Flow

The section of the N2 to the south of Knockharley Landfill and north of O'Briens Cross (R150) is referenced as **Link 4**. The following traffic flow data is derived from survey Site 4 – O'Briens Cross N2/R150.

Link 4 – N2 South of Knockharley Landfill Junction (Southbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.654497, -6.520556
Note: South of Knockharley Landfill Junction at start of Right Turning Ghost Island taper

Traffic surveys undertaken on the N2 immediately south of Knockharley Landfill are summarised for total traffic flow in Figure 13.9. The survey data for the N2 Link 4 indicates a modestly higher overall traffic demand compared with the corresponding section of the N2 to the north of the landfill. The average daily

two-way flow is of the order of 7,862 no. vehicles per day, compared with approximately 7,776 no. vehicles per day on the section north of the landfill.

As per Link 3 and the N2 to the north, there is a strong southbound morning peak, with flows rising sharply between 07:00 and 09:00 and reaching a maximum of 581 no. vehicles per hour, compared with a lower northbound flow of around 199-260 no. vehicles per hour during the same period. Again, this tidal pattern reflects the significant commuter demand towards Dublin in the morning.

During the inter-peak period, both northbound and southbound flows remain relatively steady, typically within the range of 200–300 no. vehicles per hour per direction, with no pronounced midday spike.

The evening peak shows a reversal of the morning trend, with northbound flows rising substantially, reaching a maximum of 643 no. vehicles per hour, compared with 290 no. vehicles per hour southbound.

Link 4 – HGV Traffic Flow

The survey data presented in Figure 13.10 shows that heavy goods vehicle (HGV) traffic on Link 4. As per Link 3, northbound and southbound HGV volumes are broadly balanced across the working day. A slight southbound bias is evident in the early morning ramp-up, while around the late-morning to early-afternoon plateau the two directions are very similar, with occasional marginal northbound lead in the late afternoon. Both directions taper together through the late afternoon and evening.

Flows build quickly from early morning to a steady daytime rate. The southbound direction tends to rise first and is slightly higher during this ramp. The marginal differential between the HGV volumes on Link 3 and Link 4 (1,337 no. per day two-way on Link 3 , and 1,429 no. two-way per day on Link 4) might reasonably be considered, in part at least, to be associated with the operation of the existing landfill since the N2 is the primary haul route with most residual wastes arriving from the south. As discussed above, the overwhelming majority of HGV entering the landfill from the north is arriving from the nearby waste transfer facility at Rathdrinagh and not from further afield.

In the midday and early-afternoon, rather than a sharp spike, the graph shows a broad plateau, typically in the low to mid-70s HGV per hour in total per direction which is marginally higher than on Link 3. This extended peak suggests that the differential between Link 3 and Link 4 may, in part at least, be associated with daytime waste haulage operations.

From mid-afternoon, HGV traffic in both directions decline steadily. By the evening, flows fall to roughly the 30s–40s HGV per hour, continuing downward toward late-evening off-peak levels in which the lowest volumes occur, generally in the low-to-mid-20s HGV per hour where directional differences are minimal during this period.

Link 5 – Total Traffic Flow

The section of the N2 to the south of O'Briens Cross (R150) and north of Balrath Cross (R153) is referenced as **Link 5**. The following traffic flow data is derived from survey Site 6 – Balrath Cross N2/R153.

Traffic surveys undertaken on the N2 between O'Briens Cross and Balrath Cross are summarised for total traffic flow in Figure 13.11. The survey data for the N2 Link 5 indicates a modestly higher overall traffic demand compared with the corresponding section of the N2 to the north of O'Briens Cross. The average daily two-way flow is of the order of 8,169 no. vehicles per day, compared with approximately 7,862 no. vehicles per day on the Link 4 section north of Balrath Cross.

As per Link 3 and Link 4 and the N2 to the north, there is a strong southbound morning peak, with flows rising sharply between 07:00 and 09:00 and reaching a maximum of 651 no. vehicles per hour, compared with a lower northbound flow of around 245-300 no. vehicles per hour during the same period. Again, this tidal pattern reflects the significant commuter demand towards Dublin in the morning.

During the inter-peak period, both northbound and southbound flows remain relatively steady, typically within the range of 250–325 no. vehicles per hour per direction, with no pronounced midday spike.

The evening peak shows a reversal of the morning trend, with northbound flows rising substantially, reaching a maximum of 712 no. vehicles per hour, compared with 290 no. vehicles per hour southbound.

Link 5 – N2 North of Balrath Cross (Northbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.624484, -6.488625
Note: North of Balrath Cross at start of Right Turning Ghost Island taper

Link 5 – HGV Traffic Flow

The survey data presented in Figure 13.12 shows that heavy goods vehicle (HGV) traffic on Link 5.

As per Link 4, northbound and southbound HGV volumes are broadly balanced across the working day. Again, a slight southbound bias is evident in the early morning ramp-up, while around the late-morning to early-afternoon plateau the two directions are very similar, with occasional marginal northbound lead in the late afternoon. Both directions taper together through the late afternoon and evening.

In the midday and early-afternoon, rather than a sharp spike, the graph shows a broad plateau, typically in the low to mid-high-70s HGV per hour in total per direction which is marginally higher than on Link 4.

From mid-afternoon, HGV traffic in both directions decline steadily. By the evening, flows fall to roughly the 30s–40s HGV per hour, continuing downward toward late-evening off-peak levels in which the lowest volumes occur, generally in the low-to-mid-20s HGV per hour where directional differences are minimal during this period.

Link 6 – Total Traffic Flow

The section of the N2 to the south of Balrath Cross (R153) and north Kilmoon Cross (R152) is referenced as **Link 6**. The following traffic flow data is derived from survey Site 7 – Kilmoon Cross N2/R152.

Traffic surveys undertaken on the N2 between Balrath Cross and Kilmoon Cross are summarised for total traffic flow in Figure 13.13. The survey data for the N2 Link 6 indicates a modestly higher overall traffic demand compared with the corresponding section of the N2 to the north of Balrath Cross. The average daily two-way flow is of the order of 9,415 no. vehicles per day, compared with approximately 8,169 no. vehicles per day on the Link 5 section north of Balrath Cross.

There is a strong southbound morning peak, with flows rising sharply between 07:00 and 09:00 and reaching a maximum of 496 no. vehicles per hour, compared with a lower northbound flow of around 245-300 no. vehicles per hour during the same period. Again, this tidal pattern reflects the significant commuter demand towards Dublin in the morning, nevertheless is noted that the morning peak hour on Link 6 is not as pronounced as on the links of the N2 further north.

During the inter-peak period, both northbound and southbound flows remain relatively steady, typically within the range of 350–400 no. vehicles per hour per direction, with no pronounced midday spike. This mid-day flow is higher than on the links to the north.

The evening peak shows a reversal of the morning trend, with northbound flows rising substantially, reaching a maximum of 682 no. vehicles per hour, compared with 372 no. vehicles per hour southbound. This is a reduction in northbound flow but an increase in southbound flow compared to Link 5.

Link 6 – N2 South of Rathfeigh Cross N2/L1002 (Northbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.598126, -6.468536
Note: South of Rathfeigh Cross N2/L1002

Link 6 – HGV Traffic Flow

The survey data presented in Figure 13.14 shows that heavy goods vehicle (HGV) traffic on Link 6.

As per Link 5, northbound and southbound HGV volumes are broadly balanced across the working day. Again, a slight southbound bias is evident in the early morning ramp-up, while around the late-morning to early-afternoon plateau the two directions are very similar, with occasional marginal northbound lead in the late afternoon. Both directions taper together through the late afternoon and evening.

In the midday and early-afternoon, rather than a sharp spike, the graph shows a broad plateau, typically in the low to mid-high-70s HGV per hour in total per direction which is marginally higher than on Link 5.

From mid-afternoon, HGV traffic in both directions decline steadily. By the evening, flows fall to roughly the 30s–40s HGV per hour, continuing downward toward late-evening off-peak levels in which the lowest volumes occur, generally in the low-to-mid-20s HGV per hour where directional differences are minimal during this period.

Link 7 – Total Traffic Flow

The section of the N2 to the south of Kilmoon Cross (R153) is referenced as **Link 7**. The following traffic flow data is derived from survey Site 7 – Kilmoon Cross N2/R152.

Link 7 – N2 South of Kilmoon Cross N2/R152 (Northbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.571750, -6.448855
Note: South of Kilmoon Cross N2/R152

Traffic surveys undertaken on the N2 at Kilmoon Cross are summarised for total traffic flow in Figure 13.15. The survey data for the N2 Link 7 indicates a significantly higher overall traffic demand compared with the corresponding section of the N2 to the north of Kilmoon Cross. The average daily two-way flow is of the order of 17,104 no. vehicles per day, compared with approximately 9,415 no. vehicles per day

on the Link 6 section north of Kilmoon Cross. To put this traffic flow in context it is more than double the volume of daily traffic passing the access junction to Knockharley Landfill site approximately 9.5km further north along the N2.

There is a strong southbound morning peak, with flows rising sharply between 07:00 and 09:00 and reaching a maximum of 918 no. vehicles per hour, compared with a lower northbound flow of around 530-550 no. vehicles per hour during the same period. Again, this tidal pattern reflects the significant commuter demand towards Dublin in the morning.

During the brief inter-peak period, both northbound and southbound flows reduce to 550-600 no. vehicles per hour per direction which is practically double the off-peak flows on the N2 to the north of Kilmoon.

The evening peak shows a reversal of the morning trend, with northbound flows rising substantially, reaching a maximum of 1,300 no. vehicles per hour, compared with 718 no. vehicles per hour southbound. This is a significant increase in both directions of flow when compared to Link 6. The northbound evening peak hour flow is more than double that of Link 6.

Link 7 – HGV Traffic Flow

The survey data presented in Figure 13.16 shows that heavy goods vehicle (HGV) traffic on Link 6.

As per Link 5, northbound and southbound HGV volumes are broadly balanced across the working day. Again, a slight southbound bias is evident in the early morning ramp-up, while around the late-morning to early-afternoon plateau the two directions are very similar, with occasional marginal northbound lead in the late afternoon. Both directions taper together through the late afternoon and evening.

In the midday and early-afternoon, rather than a sharp spike, the graph shows a broad plateau, typically in the low to mid-high-70s HGV per hour in total per direction which is marginally higher than on Link 5.

From mid-afternoon, HGV traffic in both directions decline steadily. By the evening, flows fall to roughly the 30s–40s HGV per hour, continuing downward toward late-evening off-peak levels in which the lowest volumes occur, generally in the low-to-mid-20s HGV per hour where directional differences are minimal during this period.

13.10.4.1.2 Regional Road R150 – Link 8 & Link 9

The R150 is a regional road running in an east–west direction and connecting Laytown on the east coast with the towns of Julianstown, Duleek, and Kentstown, ultimately linking with the R153 which provides access to Navan.

The section of the R150 between Kentstown and Duleek, to the south of where the proposed development site is located, acts as a secondary distributor route, connecting rural communities and towns to the M1 motorway via Julianstown and M1 Junction J8 and the N2 via Duleek and beyond.

The road is comprised of single carriageway with typical carriageway widths of 6.0 to 7.0 metres.

Link 8 – Traffic Flows

The section between N2 and Kentstown is **Link 8** and is subject to 80km/h speed limit reducing to 60km/h on the westbound approach to Kentstown National School and reducing further to 50km/h in the centre of the village.

Figure 13.17 shows that traffic on Link 8 displays similar characteristics to those recorded on Link 9 with modest increase in traffic flow in the morning and evening with no dominant direction of travel. The morning peak in both eastbound and westbound traffic occurs in the hour commencing 08:00hrs and a corresponding, more evening peak starts in the hour commencing 16:00hrs.

The data populating Figure 13.17 is derived from the turning count at Site 4 which is the staggered crossroad junction of the N2 and R150 known as O'Briens Cross. In total the surveys recorded 1,389 no. vehicles travelling eastbound between 07:00-19:00hrs and 1,362 no. travelling westbound. The average hourly flow was 116 no. eastbound and 114 no. westbound. The morning peak hour total traffic flows in the period 08:00-09:00hrs were recorded as 165 no. eastbound and 148 no. westbound and in the evening peak hour period 17:00-18:00hrs the flows were 128 no. eastbound and 162 no. westbound.

Figure 13.18 shows the profile of HGV traffic on Link 8 and shows a relatively steady flow of HGV in both directions between the hours of 08:00 and 16:00hrs with a modest intensification in the mid-afternoon. Flows tend to trail off between mid and late afternoon. The surveys recorded a total of 156 no. HGV travelling westbound between 07:00-19:00hrs and 150 no. travelling eastbound. The average hourly HGV flow was 13 no. eastbound and 13 no. westbound. The morning peak hour HGV traffic flows in the period 08:00-09:00hrs were recorded as 12 no. eastbound and 15 no. westbound and in the evening peak hour period 17:00-18:00hrs the HGV flows were 8 no. eastbound and 11 no. westbound.

Link 8 – R150 to East of Kentstown National School (Westbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.633762, -6.522474
Note: Westbound approach to traffic calming associated with Kentstown National School

The original grant of permission conditions the site operator to provide a traffic management plan. The traffic management plan includes provisions for prohibiting traffic directly associated with the landfill from travelling along the R150 between its junctions with the N2 and the R153 in Kentstown.

After the opening of the landfill site it was found at subsequent planning forums that the traffic management system of prohibiting landfill traffic by means of a contracted arrangement functions successfully and to the satisfaction of the Planning Authority. It should be noted nonetheless that other HGVs including waste industry related vehicles generated by nearby waste treatment facilities are not prohibited from using the R150 and this is borne out in the traffic survey data.

Link 9 – Traffic Flows

The section between Duleek and N2 is **Link 9** and has an improved alignment and high-quality surfacing due to past upgrade works. This section is subject to 80km/h speed limit save for within the environs of Duleek centre where the limit is 50km/h increasing to 60km/h in the suburban area. To the east of Duleek the R150 crosses the R152 at a staggered crossroad and continues to Julianstown and on to Laytown.

Based upon weighbridge data the existing site currently accepts traffic that is generated from the Indaver plant at Carranstown. This traffic uses Link 9. Irrespective of the current and proposed development at the Knockharley site it can be appreciated that the Indaver plant produces materials that require treatment and/or disposal/re-use. The materials leaving the Inadaver plant are required to be delivered to an appropriate facility. The R150 through Duleek was clearly identified in the planning stages of the Indaver facility as one of the 5 main haul routes to and from that facility under Planning Reg. Ref. 01/4014 (ACP Case PL.17.126307). The proposed development impact can reasonably be categorised as neutral with respect to traffic on the R150 Link 9 and through Duleek since traffic from the Indaver plant is already on the road network and using the R150 and may very possibly be using this route regardless of whether or not Knockharley Landfill were accepting waste or by-product from that plant. Given the capacity of Knockharley Landfill to accept the disposal/treatment of Indaver waste, and the identification of R150 through Duleek as one of the 5 primary hauls routes to/from Indaver it is reasonable in the planning of these facilities to have foreseen the current interrelationship.. The applicant has little or no control over the haul routes used/permitted for Indaver. If trying to avoid travelling through Duleek, Indaver traffic has the option to undertake a more circuitous journey to and from Knockharley Landfill using the R152. The applicant in this case has however no authority or control over the logistics and transportation arrangements of Indaver.

Link 9 – R150 to West of Duleek (Eastbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.653394, -6.435752
Note: West of Duleek Change in Speed Limit from sub-urban 60km/h to rural 80km/h

Figure 13.19 shows a relatively steady total two-way daily traffic flow during the off-peak times between 10:00-14:00hrs. There is a morning peak in both eastbound and westbound traffic in the hours commencing 07:00 and 08:00hrs and a corresponding, more intense evening peak which starts in the hour commencing 15:00hrs. There are peaks in traffic travelling in both directions with the predominant flow being eastbound toward Duleek in both the morning and evening peak.

The data populating Figure 13.19 is derived from the turning count at Site 4 which is the staggered crossroad junction of the N2 and R150 known as O'Briens Cross. In total the surveys recorded 2,389 no. vehicles travelling eastbound between 07:00-19:00hrs and 2,091 no. travelling westbound. The average hourly flow was 174 no. eastbound and 199 no. westbound. The morning peak hour total traffic flows in the period 08:00-09:00hrs were recorded as 258 no. eastbound and 212 no. westbound and in the evening peak hour period 17:00-18:00hrs the flows were 287 no. eastbound and 234 no. westbound.

Figure 13.20 shows the profile of HGV traffic on Link 9 and shows a relatively steady flow of HGV in both directions between the hours of 08:00 and 16:00hrs with a modest intensification in the mid-afternoon. Flows tend to trail off between mid and late afternoon. The surveys recorded a total of 313 no. HGV travelling eastbound between 07:00-19:00hrs and 297 no. travelling westbound. The average hourly HGV flow was 26 no. eastbound and 25 no. westbound. The morning peak hour HGV traffic flows in the period 08:00-09:00hrs were recorded as 29 no. eastbound and 29 no. westbound and in the evening peak hour period 17:00-18:00hrs the HGV flows were 17 no. eastbound and 15 no. westbound.

The R150 accommodates a mix of private cars, agricultural vehicles, local commercial traffic, and HGVs, particularly those serving local industry, construction, and quarry operations. It serves as a commuter corridor for residents accessing employment and services in Slane, Duleek, Ashbourne, and Dublin, and provides onward connectivity to the M1 corridor. Seasonal and event-based traffic fluctuations can occur on the sections proximate to the coast at Laytown/Bettystown.

The development site, located north of this corridor, will continue to accept materials generated by the existing Indaver facility which is expected to continue to interact directly with the R150. This traffic assessment considers the existing road function and condition, baseline traffic flows and junction performance characteristics of the R150 to evaluate the impact of the proposed development and identify appropriate mitigation measures if required.

13.10.4.1.3 Regional Road R153 – Link 10 & Link 11

The R153 is an east–west regional connector linking Navan and the N2 corridor via Kentstown/Balrath, providing a key intermediate route between the M3 and R147 (former N3) at Navan and the Ashbourne/Kilmoon Cross area on the N2/M2 network.

It serves mixed trip purposes with commuter travel between Navan, Ashbourne and the Dublin and whilst it also provides access to employment, education and services in intermediate settlements. It accommodates goods movements including agricultural, construction, and local HGV traffic.

Principal settlements served by R153 include Navan (west), Balrath/Kentstown corridor, and the N2 junction area at/near Kilmoon Cross (Ashbourne). The route is approximately 25–30 km in length. The surrounding land use is predominantly rural with ribbon development and scattered residential and field/farm accesses, interspersed with village main streets and local commercial and industrial sites.

Cross-section is predominantly single carriageway with typical carriageway width varying between 6.0–7.0m. The route alignment is generally good on newer sections but retains some legacy constraints such as localised narrow verges, accesses and limited forward visibility through bends and villages. The speed limit is mainly 80 km/h, reducing to 60-50 km/h in settlement approaches and through main streets. Junctions along the route are mainly priority T-junctions with numerous private accesses and field/agricultural accesses. Key connections include local regional ties via R150 toward Duleek and eastward to Julianstown it is linked to the M1/N2/M2/M3 corridors via regional roads.

Link 10 – Total Traffic Flow

The section of the R153 between Kentstown and Balrath Cross (N2/R153) is referenced as **Link 10**. The following traffic flow data is derived from survey Site 6 – Balrath Cross N2/R153.

Link 10 – R153 to West of Balrath Cross (Westbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.625618, -6.524550
Note: At Junction of Minister's Hill L10133

Traffic surveys undertaken on R153 are summarised for total traffic flow in Figure 13.21. The survey data for the Link 10 indicates an average daily two-way flow is of the order of 4,469 no. vehicles per day, which compares with approximately 4,480 no. vehicles per day on Link 9 which is the R150 between the N2 and Duleek.

There is a modest morning peak which favours neither direction of flow, with eastbound flows rising gently between 07:00 and 09:00 and reaching a maximum of 215 no. vehicles per hour, compared with a lower westbound flow of around 180 no. vehicles per hour during the same period.

During the brief inter-peak period, both directions of flow reduce to approx. 150 no. vehicles per hour per direction.

The evening peak shows a reversal of the morning trend, with westbound flows rising substantially, reaching a maximum of 304 no. vehicles per hour, compared with 198 no. vehicles per hour eastbound.

Link 10 – HGV Traffic Flow

The survey data presented in Figure 13.22 shows that heavy goods vehicle (HGV) traffic on Link 10.

In total Link 10 was recorded to carry a daily two-way HGV flow in the order of 400 no. vehicles. Eastbound and westbound HGV volumes are broadly balanced across the working day. HGV flows rise gently over the course of the morning with a sustained flow in both directions in the 20s no. vehicles per hour.

Link 11 – Total Traffic Flow

The section of the R153 to the west of Kentstown is referenced as **Link 11**. The following traffic flow data is derived from survey Site 5 – Kentstown R150/R153.

Link 11 – R153 Navan Road to West of Kentstown (Westbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.629607, -6.544708
Note: At rural speeds limit and western gateway signing to Kentstown

Traffic surveys undertaken on R153 are summarised for total traffic flow in Figure 13.23. The survey data for the Link 11 indicates an average daily two-way flow is of the order of 5,785 no. vehicles per day, which is approx. 20% higher than on Link 10 to the east of Kentstown.

There is a modest morning and evening peaks indicating commuter traffic, this favours the eastbound direction in the morning with a maximum of 338 no. vehicles opposed by 238 no. travelling westbound.

During the inter-peak period between 10:00-15:00hrs, both directions of flow reduce to approx. 200 no. vehicles per hour per direction.

The evening peak shows a reversal of the morning trend, with westbound flows rising to a peak and reaching a maximum of 364 no. vehicles per hour, compared with 276 no. vehicles per hour eastbound.

Link 11 – HGV Traffic Flow

The survey data presented in Figure 13.24 shows that heavy goods vehicle (HGV) traffic on Link 11.

In total Link 11 was recorded to carry a daily two-way HGV flow in the order of 411 no. vehicles. Eastbound and westbound HGV volumes are broadly balanced across the working day. HGV flows rise gently over the course of the morning with a sustained flow in both directions in the mid-20s no. vehicles per hour.

13.10.4.1.4 National Secondary Road N51 – Link 12 & Link 13

The N51 is an east–west national secondary route providing a key cross-county link between the N52 at Delvin and the M1 at Drogheda, serving Athboy, Navan, Slane, and the Boyne Valley area. It connects major national corridors: N52 (Midlands), M3/N3 (via Navan), N2 (at Slane), and M1 (at Drogheda).

The corridor carries mixed demand: commuter trips including Navan, Drogheda and Greater Dublin regional goods movements relating to agriculture, quarry/construction, local industry, and significant tourism traffic to the Boyne Valley.

Route follows (west to east) Delvin (N52) – Athboy – Navan (links to M3) – Slane (crossing the N2 and the River Boyne) – Donore/Oldbridge area – Drogheda (connection to M1).

The N51 is comprised of predominantly rural single carriageway with village main streets in Athboy, Navan environs, Slane, and settlements east of Slane. Cross-section is mostly single carriageway typically varying in width between 6.0–7.0m wide with intermittent narrow hard strips and verges. The speed limit is generally 80km/h in rural areas reducing to 60/50km/h at settlement gateways and through towns and villages. Priority junctions predominate. Key nodes along the route include N51/N2 in Slane (signal controlled), N51/M3 at Navan (M3 Junction 9), and N51/M1 at Drogheda (M1 Junction 10). Traffic flows on the N51 are moderate to high for a national secondary road, with pronounced AM and PM commuter peaks oriented to Navan/M3 and M1/Drogheda. Inter-peak is flatter with commercial/service trips. HGVs are present in the traffic flow throughout the day due to local industry, agriculture, and construction. HGV proportions can rise outside peak commuter periods. Tourist season increases coach/car flows east of Slane. Directionality, traffic flow has the characteristics of a tidal commuter pattern with morning flows biased toward employment/education hubs (Navan/Drogheda/Greater Dublin) and evening reversals.

To the west of Slane on Link 12, a national road improvement on the N51 between Navan and Slane has been completed, the scheme known as *N51 Dunmoe Phase 2 Realignment Scheme* involved works located in the Dunmoe area, approximately 4–6 km east of Navan, in proximity to Dunmoe Castle and the River Boyne valley. The scheme completes the upgrade of a substandard length of the N51 addressed in an earlier phase and forms part of a programme of safety and operational improvements on the Navan–Slane section. The scheme Address a history of road safety issues associated with sharp horizontal curves, poor forward visibility, and variable carriageway widths on this section of the N51. The scheme provides a road cross-section and alignment consistent with current TII standards for rural national roads, improving journey time reliability between Navan and Slane and supporting regional connectivity. In brief, the scheme involved an offline/online realignment of approximately 1.5–3.0 km of single carriageway, tying back into the existing N51 at both ends. The preferred route largely follows greenfield land to smooth substandard bends and improve vertical alignment, with short online sections where appropriate. The carriageway cross-section is typical rural single carriageway comprising a 7.0 m carriageway (2 x 3.5 m lanes), 0.5 m hard strips, and verges generally 2.5–3.0 m wide. The anticipated outcome of the scheme is a reduction in collision frequency and severity on this section of the N51 together with improved journey time consistency and road user comfort between Navan and Slane.

Link 12 – Total Traffic Flow

The section of the N51 to the west of Slane is referenced as **Link 12**. The following traffic flow data is derived from survey Site 1 – Slane Crossroads N2/N51.

Traffic surveys undertaken on the N51 at Slane Crossroads are summarised for total traffic flow in Figure 13.25. The survey data for the N51 Link 12 to the west of Slane indicates a higher overall traffic demand compared with the corresponding section of the N51 to the east of Slane. The average daily two-way flow is of the order of 8,395 no. vehicles per day, compared with approximately 5,161 no. vehicles per day on the Link 13 section to the east between Slane and Drogheda.

Hourly traffic flows are sustained throughout the day with a strong eastbound morning peak, with flows rising sharply between 07:00 and 09:00 and reaching a maximum of 436 no. vehicles per hour, compared with a lower westbound flow of around 235-355 no. vehicles per hour during the same period. Again, this tidal pattern reflects a commuter demand towards Drogheda and Dublin in the morning, nevertheless is noted that the morning peak hour on Link 12 is not a pronounced uplift from inter-peak flows which are approximately 25% lower than the morning peak.

During the inter-peak period, both eastbound and westbound flows remain relatively steady, typically within the range of 300–350 no. vehicles per hour per direction, with no pronounced midday spike.

The evening peak shows a reversal of the morning trend, with westbound flows rising substantially, reaching a maximum of 481 no. vehicles per hour, compared with 352 no. vehicles per hour eastbound.

Link 12 – N51 Navan Road to West of Slane (Eastbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.693441, -6.608948
Note: At entrance to Stackallan House

Link 12 – HGV Traffic Flow

The survey data presented in Figure 13.26 shows that heavy goods vehicle (HGV) traffic on Link 12.

Eastbound and westbound HGV volumes are broadly balanced across the working day. A slight eastbound bias is evident in the late afternoon, while around the late-morning to early-afternoon flows plateau in both directions were flows are very similar with typically 45-55 no. HGV in both directions throughout most of the day. Both directions taper together through the late afternoon and evening.

From mid-afternoon, HGV traffic in both directions decline steadily. By the evening, flows fall to roughly the 20s–30s HGV per hour.

Link 13 – Total Traffic Flow

The section of the N51 to the east of Slane is referenced as **Link 13**. The following traffic flow data is derived from survey Site 1 – Slane Crossroads N2/N51.

Traffic surveys undertaken on the N51 at Slane Crossroads are summarised for total traffic flow in Figure 13.27. The survey data for the N51 Link 13 to the east of Slane shows a lower overall traffic demand compared with the corresponding section of the N51 to the west of Slane. The average daily two-way flow is of the order of 5,161 no. vehicles per day, compared with approximately 8,395 no. vehicles per day on Link 12on the Navan side of Slane.

As per Link 12, hourly traffic flows are sustained throughout the day but are approximately 40% lower order. There is a modest eastbound morning peak, with flows rising between 07:00 and 09:00 and reaching a maximum of 268 no. vehicles per hour, compared with a lower westbound flow of around 220 no. vehicles per hour during the same period. Again, this tidal pattern reflects a commuter demand.

During the inter-peak period, both eastbound and westbound flows remain relatively steady, typically within the range of 180–230 no. vehicles per hour per direction, with no pronounced midday spike.

The evening peak shows a reversal of the morning trend, with westbound flows rising substantially, reaching a maximum of 295 no. vehicles per hour, compared with 202 no. vehicles per hour eastbound.

Link 13 – N51 Drogheda Road to East of Slane (Eastbound)



Source: Google Street View August 2024, Google Maps Co-ordinates 53.726288, -6.416650
Note: At L16014/L2321 crossroad near Battle of the Boyne Visitor Centre

Link 13 – HGV Traffic Flow

The survey data presented in Figure 13.28 shows that heavy goods vehicle (HGV) traffic on Link 13.

Eastbound and westbound HGV volumes are broadly balanced across the working day. Around the late-morning to early-afternoon flows plateau in both directions were flows are very similar with typically 25-35 no. HGV in both directions throughout most of the day. Both directions taper together through the late afternoon and evening. From mid-afternoon, HGV traffic in both directions declines steadily. By the evening, flows fall to roughly the 10s–20s HGV per hour.

13.10.4.1.5 Knockharley Landfill Access Junction N2

Figure 13.29 shows the total traffic flow to/from the existing landfill site over the course of the traffic surveys on 08-April-2025. Figure 13.30 shows HGV traffic entering and leaving the site.

In the context of the assessment of baseline for established or ongoing industrial operations such as landfill sites, it is important to distinguish between the purposes and applications of different types of traffic data. Traffic surveys, including classified junction turning movement counts, are typically used to understand the general characteristics of the surrounding road network. These typically include traffic volumes, vehicle classifications, peak hour flows, turning patterns, and queue lengths.

Such surveys are essential in providing a baseline understanding of network operation, particularly at key junctions or access points, and to inform capacity assessments and reviews. However, traffic surveys are not expressly intended to determine traffic generation from a specific development.

In the case of an existing landfill operation, the more accurate and representative data source for site related traffic is derived from weighbridge records. These records offer a comprehensive, long-term, and verifiable dataset detailing; Inbound and outbound vehicle movements, including exact times and dates; Vehicle types, particularly distinguishing between HGVs, rigid and articulated trucks; material types and quantities transported, enabling correlation with waste acceptance rates; and seasonal and project driven variations in traffic volumes.

For this development, detailed weighbridge records spanning a 3-year period have been analysed to establish actual traffic generation characteristics. This includes daily and hourly profiles, peak periods of activity, and variations associated with specific contracts or market demand. This approach ensures a high degree of accuracy and reliability in the prediction of future traffic associated with the continuation or intensification of quarry operations.

Accordingly, while traffic surveys remain important in assessing network conditions and background traffic, the use of weighbridge data provides a robust and evidence-based foundation for quantifying development-generated traffic in this assessment. This ensures that traffic impact assessments are grounded in site specific operational realities, rather than estimates or assumptions based on standard generation rates.

Notwithstanding the foregoing, the light traffic flows generated at the existing site access on the day of the survey are summarised in Figure 13.15 whilst HGV traffic flows are shown in Figure 13.16. The survey data is a snapshot of the operation.

The existing landfill is permitted to receive 435,000 tonnes per annum of non-hazardous waste and there will be no increase in the permitted annual acceptance. By later reference to weighbridge data, it will be shown that the traffic generated by the site on the day of the traffic count is representative of a generation rate higher or upper value and equivalent to the 97% percentile of daily traffic flows typically observed.

The traffic survey data shows that the existing site generates a relatively low volume of light traffic with an hourly average of 14 no. vehicle trips per hour. The graph shows 24 no. light vehicles entering the site in the period 07:00-08:00hrs and this spike is generated by staff arrivals. There is no corresponding peak in outbound light vehicles which dissipate throughout the afternoon before the typical evening commuter peak hour.

Figure 13.30 shows that on the day of the survey the existing site generated a relatively consistent volume of HGV traffic over the course of the day between 08:00-14:00hrs and dropping off in the hour commencing 15:00hrs which is considered typical at landfill sites. It is noted that the traffic survey picks up 1 no. HGV departing in the hour commencing 07:00hrs. Cross-reference with weighbridge data confirms that this traffic is generated in the last minutes of the hour and not throughout the hour. Based solely on the traffic survey data it could be concluded that the hour periods commencing 09:00hrs is the peak hour for the existing development.

As set out above, the existing and forecast traffic generation characteristics of the development will be derived from detailed weighbridge data and not the network traffic survey. The data is important nonetheless in the derivation of a baseline where the existing quarry traffic can be removed from the network to yield a network traffic scenario in which no traffic is generated by the existing operational landfill development site.

13.11 The 'Do Nothing' Scenario

In the 'Do Nothing' scenario it is expected that the traffic environment will remain as per the baseline in which operational traffic generated by the existing development ceases when the current planning permission is due to expire.

Landfill gas will continue to be produced in the landfill many years after closure. The management and maintenance of the landfill gas utilisation plant will be on the basis of a specialist contract with an approved service provider. Traffic generation will be limited to occasional visits by maintenance staff.

Throughout the aftercare period, leachate within the landfill would be maintained at or below the levels required by licence. To achieve this, leachate would continue to be pumped to the leachate lagoon before being disposed off-site by tanker. Since it is planned that leachate would be treated on site to allow for use in the IBA Facility, this would be expected to consume approximately 90% of the treated leachate with the remainder being tankered off site for disposal or else recirculated. The resultant traffic generation will not be significant and is estimated to be equivalent to less than one tanker per week.

Regular maintenance of all relevant infrastructure will continue in the aftercare phase including the maintenance of drainage ditches, internal roads, fencing, CCTV including intruder alarm, gates, etc.

In the 'Do Nothing' scenario, traffic flows on the public road network can be assumed to grow in accordance with the latest growth factors published by Transport Infrastructure Ireland (TII) in October 2021 in the document PE-PAG-02017 *'Project Appraisal Guidelines: Unit 5.3 Travel Demand Projections'*.

Since the proposed development would not progress, the development would give rise to no increased traffic on the receiving roads and so would have no significant effect on local traffic conditions, on capacity, on queues, on delays or on the level of service of the receiving road network in the study area.

13.12 Potential Significant Effects

13.12.1 Characteristics of Proposed Development

A full description of the proposed development is set out in Chapter 2 *'Description of the Proposed Development'* of this EIAR and so is not repeated here but those elements directly affecting traffic generation to the public road network are set out in brief below.

Permission is being sought for the following development at the existing permitted landfill site:

- The expansion of the existing landfill by construction of an additional active void space of 3.38 million m^3 for landfilling (with further void space of 807,000 m^3 for the 'Piggyback Cell').
- The proposed expanded landfill body will have a final post settlement contour height of 85mOD (aligning with the existing permitted post settlement contour height of the active landfill).
- Permission is sought for the acceptance of waste until the expanded landfill void is full.
- There will be no increase in the permitted annual acceptance of up to 435,000 tonnes per annum of non-hazardous wastes. Which comprises up to 150,000 tonnes of incinerator bottom ash (IBA), as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, construction and demolition (C&D) wastes and baled recyclables. In addition, the acceptance of up to 5,000 tonnes per annum of stable non-reactive hazardous waste.
- Relocation of an existing 220kV overhead ESB powerline that traverses the site to the western boundary of the site so to accommodate development of the expanded landfill void.
- Diversion of the existing Knockharley Stream to the outer extent of the expanded landfill void. The diverted stream will not be culverted with the exception of existing access road crossings.
- Amendment and extension of 10m high permitted screening berms (ABP Ref: 303211) along the western planning boundary to revise the berm profile and extend the extent of berm.

13.12.2 Proposed Development Traffic Generation – Operational Phase

13.12.2.1 Estimating Existing and Proposed HGV Trip Attraction

In the context of estimating trip attraction assessment methodologies that are commonly used and are considered appropriate in various scenario, these are:

- First Principles
- Comparison with similar existing developments
- Complex Models

The first principles method of trip estimation involves using simple assumptions about the development, its users and their behaviour. Some of the assumptions may be based on survey data or based upon the prospective users knowledge of the operation.

The most relevant application of this method is where the type of development is bespoke or unfamiliar by direct comparison to existing developments and so the assessment method is required to evaluate trip estimates based upon basic operating criteria in terms of the number of workers, customers, visitors and services provided.

In its simplest for the comparison method involves comparing the proposed development with a similar existing development and applying survey information from that site to the proposed development. Some criticism can be directed at the appropriateness of relying on data from a single site although this can be justified in some particular cases.

Trip attraction databases such a TRICS provide data on a larger number of sites for a range of land uses and these databases are often referenced since they provide a more comprehensive source of data. Databases typically contain site specific data for a number of land uses with key related parameters

identified for example, floor area, number of employees etc. which can be used to apply to the proposed development. The TRICS database provides some survey data for amenity sites and landfills but none considered representative of the type of development proposed.

In the context of this Chapter it can be appreciated that records of the established or ongoing landfill operations are available from weighbridge data.

The traffic surveys undertaken in April 2025 include manual classified counts and these are typically employed to understand the general characteristics of the surrounding road network. Such surveys are essential in providing a baseline understanding of network operation, particularly at key junctions or access points, and to inform capacity assessments and safety reviews.

However, traffic surveys are not expressly intended to determine traffic generation from the existing development. In the case of an existing landfill operation, the most accurate and representative data source for site-related traffic is derived from weighbridge records. These records offer a comprehensive, long-term, and verifiable dataset detailing:

- Inbound and outbound vehicle movements, including exact times and dates,
- Vehicle types, particularly distinguishing between HGVs, rigid and articulated trucks,
- Material types and quantities transported, enabling correlation with acceptance rates,
- Seasonal and project-driven variations in traffic volumes.

Chapter 2 *'Description of the Proposed Development'* of this EAIR sets out in Section 2.2.2 *'Existing Landfill'* details of the existing landfill are set out in brief here.

The existing Knockharley Landfill facility and current ongoing development is as per the ABP Reg. Ref. 303211 permission and includes for the expanded landfill catering for c. 440,000 tonnes per year. The existing landfill is estimated as likely to be filled to capacity by 2029. The existing landfill facility currently consists of:

- 26 No. landfill cells across 7 No. linear Phases for current landfilling and capping upon reaching capacity (cell Nos. 1 – 14 have been capped to date);
- Incinerator Bottom Ash (IBA) Cells (Cells 27, 28, 29) (currently under construction) for storage of up to 150,000 tonnes of IBA until recovery outlets are identified.
- IBA Process Building (currently under construction) for the future recovery of the IBA – is located in at the corner of Cell 29 to the east of landfill cell Nos. 24 and 26;
- IBA Cell 30 is the allowed future "piggy back" cell for the IBA facility, which bridges between IBA cell 29 and the existing waste landfill cells.
- A landfill gas treatment compound located to the southeast of the landfill;
- 2 no. waste leachate lagoons (L1 and L3) located east of landfill cells no. 10 and 12, 3 no. 25m^3 bunded above ground tanks, 2 no. IBCs, 1 no. containerised Reverse Osmosis plant units (C1) on one reinforced concrete bunded slab (Plant Bund) and 6 additional storage tanks on a second reinforced concrete bunded slab;
- A surface water management system; including surface water attenuation pond and wetland to the south of the landfill cells, and surface attenuation pond, wetlands and a holding pond to the northeast of the cells;
- An administration and maintenance buildings (including site office and weighbridge) to the east of the landfill
- North-south running 220kV ESB line close to the western site boundary;
- 2 no. ESB Substations, one importing power to Administration and maintenance buildings, with the other exporting from gas treatment compound;
- Existing site access via the N2 from the east;
- Screening Berms up to maximum height of 10 metres at the eastern and western boundaries and up to a maximum height of 6 metres at the northern boundary (total berm footprint of 11.3ha); and
- Car park to the administrative area of the facility.

Under the current proposal there will be no increase in the permitted annual acceptance of up to 435,000 tonnes per annum of non-hazardous wastes and no change in the composition of waste. Since, the proposed development involves providing additional capacity at the existing landfill, but does not seek to increase the permitted waste acceptance tonnage. Accordingly, the traffic implications are best understood by reference to the actual operational traffic patterns experienced at the facility in recent years.

This is best done by direct measurement of activity based upon weighbridge records that provide an accurate log of all vehicle movements associated with waste deliveries to the site. This data captures real-world operational traffic rather than theoretical estimates, making it the most robust source of evidence for assessment purposes.

For the purposes of the traffic assessment provide in this Chapter a representative sample period of 3 years has been selected. Analysis over a three-year period ensures that the dataset incorporates seasonal, annual and operational variations in waste inputs and traffic generation. This timeframe is sufficiently long to filter out anomalies in waste flows that may arise in any single year.

The proposed development aims for continuity and stability in permitted waste acceptance and so since no increase in the permitted waste intake is proposed, the historic traffic levels provide the best predictor of future traffic levels. The weighbridge data directly reflects the current permitted throughput, and is therefore aligned with the operational ceiling of the site.

From the weighbridge records, it is possible to calculate:

- Average daily traffic generation, representing typical operational conditions.
- Peak/upper values, representing the busiest periods of operation within the permitted envelope.
- These values provide a robust basis for developing the traffic model scenarios required in the assessment (average case and reasonable worst case).

Weighbridge data is both reliable and traceable since weighbridge records are a statutory and auditable dataset, maintained to regulatory standards. It is reasonable to expect the accuracy and reliability of the data to exceed that of estimated traffic projections derived solely from waste tonnage or generic trip rates.

The use of the past three years of weighbridge data provides the most suitable and reliable basis for traffic modelling because it:

- directly measures actual site traffic,
- captures seasonal and operational variation,
- reflects the permitted intake (which will not change), and
- allows the development of both average and upper value traffic generation scenarios

In the preparation of this Chapter, detailed weighbridge records spanning 2022, 2023 and 2024, being the most recent complete years, have been analysed to establish actual traffic generation characteristics. This includes daily and hourly profiles, peak periods of activity and variations. As set out above, this approach ensures a high degree of accuracy and reliability in the prediction of future traffic associated with the continuation of intensification of quarry operations.

Accordingly, while traffic surveys remain important in assessing network conditions and background traffic, the use of weighbridge data provides a robust and evidence-based foundation for quantifying development-generated traffic in the EIAR. This ensures that traffic impact assessments are grounded in site-specific operational realities, rather than estimates or assumptions based on standard generation rates.

To inform the estimates of traffic generation associated with the proposed development, weighbridge data covering a three-year period (2022, 2023, and 2024) has been reviewed in detail. This dataset, derived

from the existing operational records of the landfill, provides a comprehensive and site-specific profile of waste related operational traffic activity.

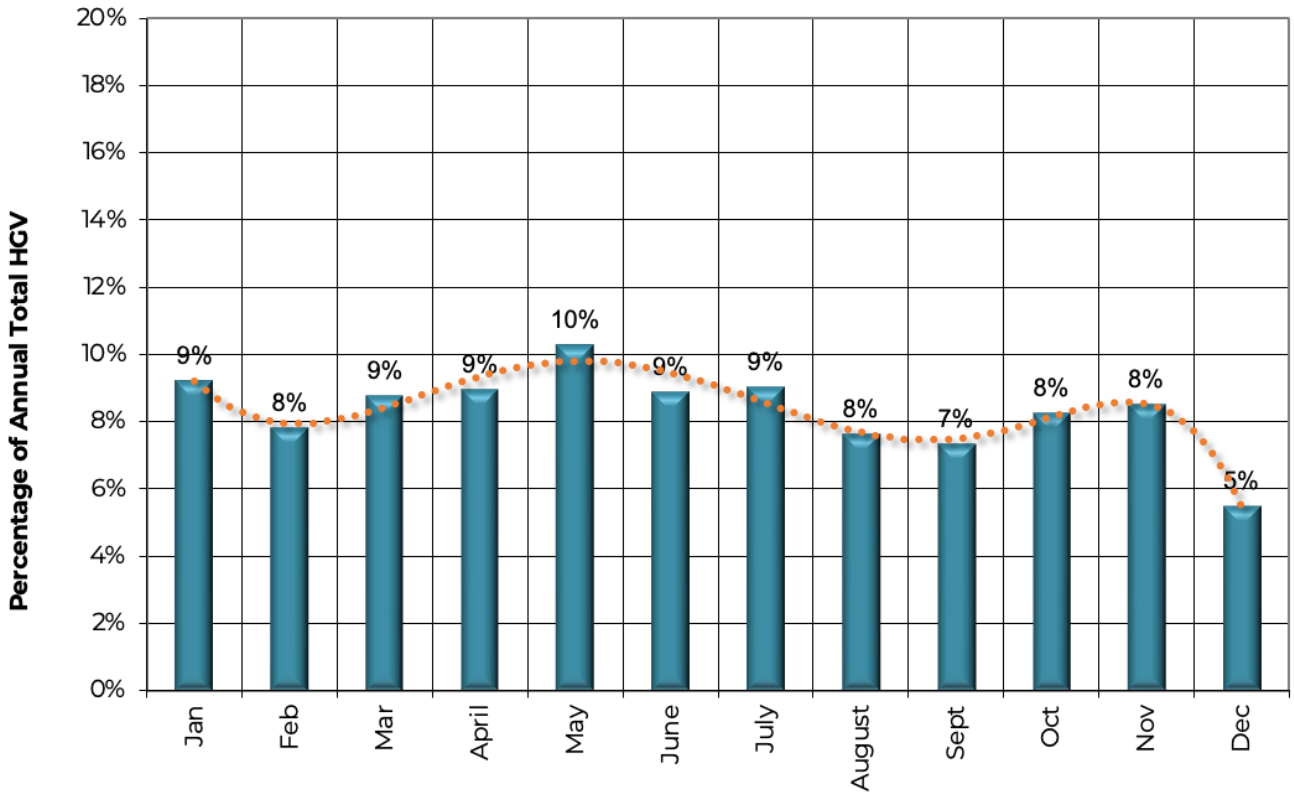
Unlike theoretical trip generation models or short-term traffic surveys, the use of weighbridge data allows for a granular and highly accurate assessment of actual vehicle movements associated with material imports over an extended timeframe.

The multi-year scope of the dataset enables the analysis of seasonal fluctuations, in addition, the records reveal day-to-day variability, highlighting typical weekday operational patterns. These patterns are important in assessing both the average daily traffic generation and the potential peak period impacts on the local road network.

By basing traffic generation estimates on weighbridge data, the assessment reflects real-world operating conditions and incorporates variability linked to market demand, project cycles, and material availability. This ensures that the EIAR traffic impact assessment is grounded in evidence-based data, capturing both the intensity and temporal distribution of site related traffic. It also facilitates a more accurate appraisal of potential cumulative effects and informs the design of mitigation measures where required.

There is little variation in the monthly profile and pattern of operational HGV traffic generation. Figure 13.31 shows the proportion of monthly traffic arising and is aggregated for the three evaluation years. To reveal typical seasonal fluctuations, the volume of traffic recorded in each calendar month is expressed as a percentage of the total for the year.

Figure 13-31. Existing Landfill HGV Traffic – Aggregated Monthly Statistics.



It can be seen from Figure 13.31 that when taken over the course of the month the data shows a relatively consistent flow of vehicles over the course of the year. The peak period is recorded in May with 10% of annual waste acceptance occurring in that calendar month. The maximum in any month is 10%, the minimum is 5% occurring in December and the average is 8% per month.

Figure 13-32. Existing Landfill HGV Traffic – Aggregated Weekly Statistics.

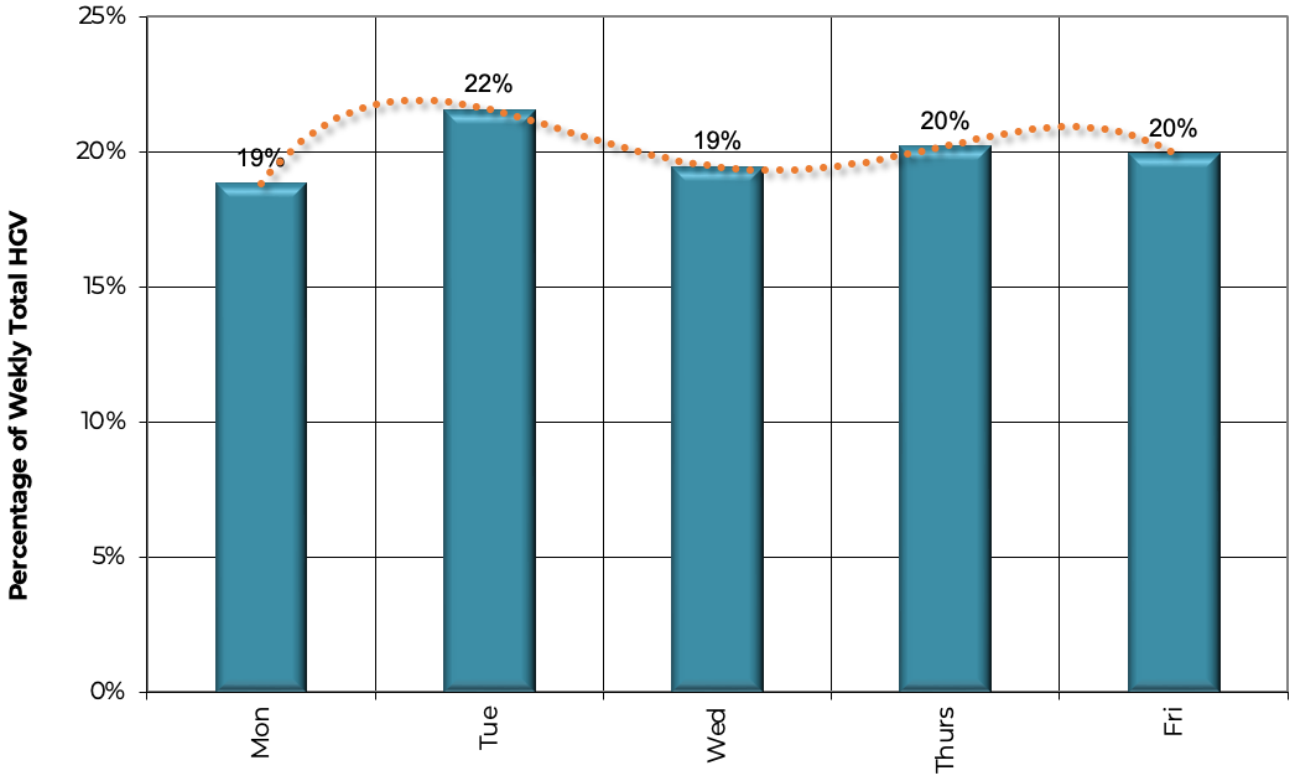


Figure 13-33. Existing Landfill HGV Traffic – Monthly Statistics.

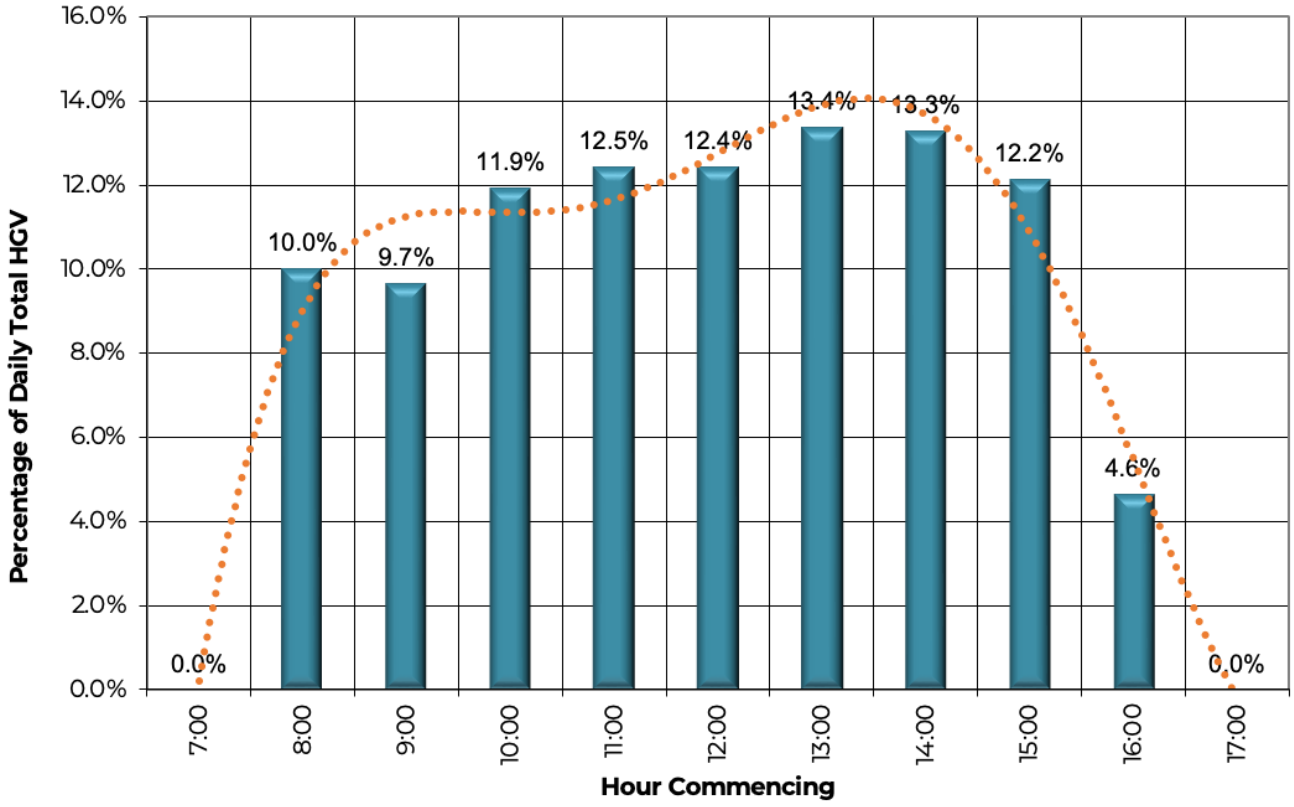


Figure 13-32 shows the aggregated data for the distribution of operational HGV traffic over the course of the working week. Data is available only for Monday to Friday and is expressed as a percentage of the weekly total. The data shows a consistent flow of vehicles over the course of the week. The maximum is 22%, the minimum is 19% occurring on Mondays and Wednesdays with the average being 20% as typically manifest on Thursday and Friday.

Based on the past three years of weighbridge data, the hourly profile typically displays a pronounced daytime operating window with a clear morning build-up, a mid-day plateau punctuated by a modest dip, and then a tapered afternoon run-down to a sharp evening cut-off. There is no activity recorded before 08:00hrs and effectively none after 17:00hrs (3 no. HGV crossed the weighbridge after 17:00hrs over the course of 3 years). So there is zero activity outside permitted hours, reflecting licensing and noise constraints common to landfill operations. The rise in inbound HGVs rarely spikes right at gate opening given the relatively remote setting, instead, volumes tend to ramp up through the early to mid-morning as vehicles dispatched from the Greater Dublin Area (GDA) work through the outbound leg of the journey to the landfill. This travel time shadow places the busiest inbound hour in the late morning and early afternoon rather than at first light. This is especially the case where the catchment comprises transfer stations and commercial collections clustered within the GDA. A modest lull around lunchtime is common and can be tied to driver breaks and weighbridge or plant crew rotations, followed by a secondary, early afternoon increase as operators complete round trips that still allow drivers to return to depots within hours of service limits and before peak urban congestion. The profile generally falls away decisively before closing time to leave space for housekeeping activities such as compaction and daily cover placement.

Inbound and outbound flows are closely coupled but slightly offset in time by on-site turnaround, with outbound empty returns trailing the inbound arrivals by the tipping and processing cycle. In cases where soils or cover materials are specifically imported, their movements can be more concentrated in specific hours or on particular days, but when averaged across three years their contribution typically smooths into the same daytime envelope. Because the site is remote from Dublin, early-morning volumes are muted, and the busiest period is compressed into a core band when transfer station bulks and commercial hauliers can complete a same day round trip. Late day arrivals diminish early for the same reason, producing a pronounced afternoon taper. The aggregated profile, being stable over a multi-year base, is well suited for modelling continued operations at the same acceptance rate. It provides a consistent hourly distribution to apply to daily totals in junction and link assessments, captures the operational realities of gate hours and driver behaviour, and implicitly accounts for the distance and network travel times between the GDA sources and the landfill.

The ability to increase output temporarily, up to a maximum, whilst remaining within the annual permitted tonnage, allows the landfill to meet waste acceptance obligations without the need for repeated amendments to the planning consent.

The distinction between average, 85th percentile and maximum daily, hourly waste acceptance rates, inherent in the permission is therefore an important and appropriate recognition of the operational realities of landfill facilities. It provides a clear framework for environmental impact assessment, particularly with respect to traffic, noise, and dust, by allowing assessments to consider both typical activity levels, upper activity levels and worst case peak scenarios.

The weighbridge records show that the average load entering the existing landfill is 24.5t per vehicle and shows that the total number of operational days per annum is 247 no. On this basis the average HGV traffic generation arising from an average 440,000t/a would be in the order of 73 no. HGV trips (73 no. arrivals and 73 no. departures) per day. Referring to Figure 13.33 this is an average of approximately 8 no. HGV trips per hour with an upper value of 10 no. HGV per hour in the early afternoon.

The weighbridge figures for 2024 show receipt of 423,000t of waste, which is a value close to the permitted annual cap in total receipts. Based upon actual traffic generation, the data for 2024 is used as a model

for the landfill operating at the permitted capacity. The following Figure 13-34 shows the traffic generation of the facility over the course of 2024.

Figure 13-34. Existing Landfill HGV Traffic Generation 2024.

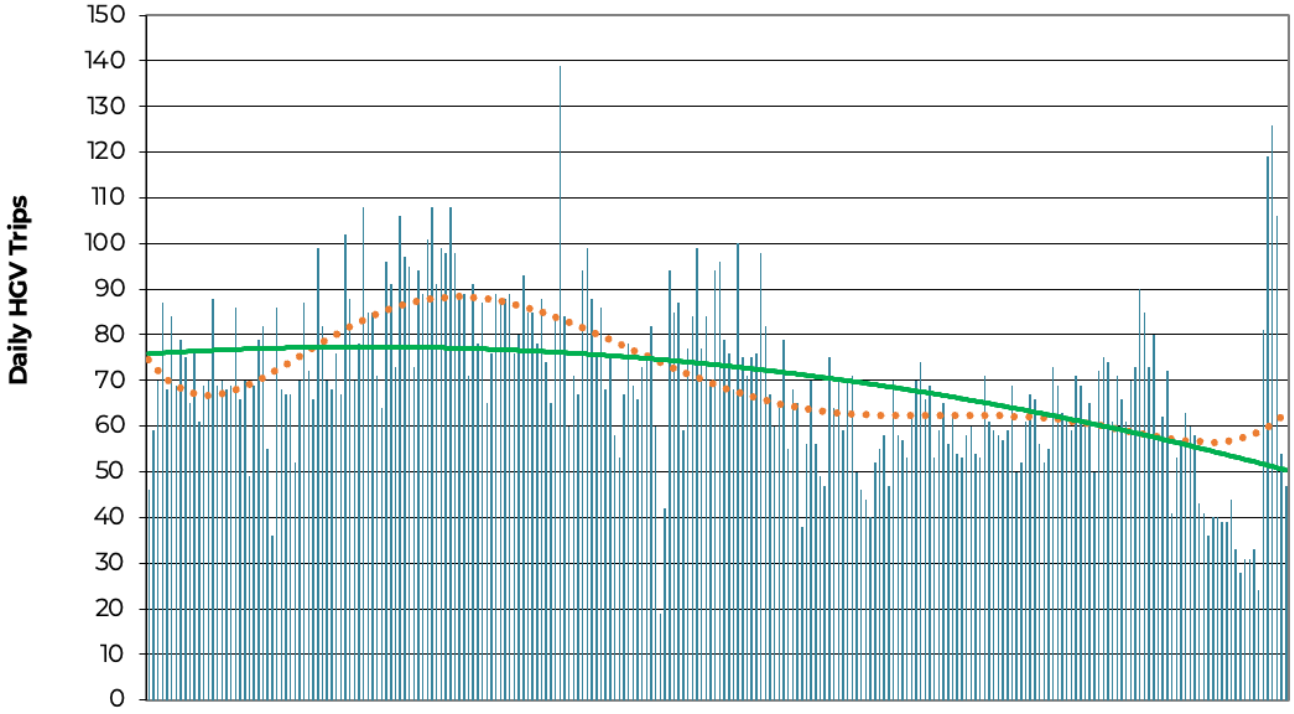


Figure 13.34 shows that save for some isolated spikes in activity traffic follows the profile seen in Figure 12.31 with greater overall activity in and around April-May generally tapering off in August-September before rebounding in December. The average traffic generation is recorded as 70 no. HGV trips per day. The maximum is 139 no. the minimum is 18 no. and the 85th percentile rate is 88 no. HGV trips per day.

When traffic generation rates are measured across a sample over time at one site, there is a distribution of trip rates. The 85th percentile trip rate is the point below which 85% of observed rates fall. Only 15% of comparable cases generate higher traffic volumes. In traffic capacity assessments, it is important not just to test average traffic generation, but also to consider a reasonable upper value. Using the 85th percentile rate captures the higher end of expected demand, ensuring that the road network and junctions are assessed under conditions that are challenging but still realistic. In capacity assessment the average rates may underestimate demand, risking congestion if actual trip generation is higher. Nevertheless, the average is an important consideration for assessment based upon AADT as used in noise assessment for instance. Maximum observed rates may reflect exceptional outliers and typically lead to unnecessary over design of infrastructure. The 85th percentile balances safety and practicality, providing a reasonable worst-case that is defensible in planning terms. Traffic assessments typically use both the average rate (to model typical conditions) and the 85th percentile rate (to model peak/upper conditions) and this has been best practice for over three decades as documented in the Institution of Highways and Transportation publication *'Traffic Impact Assessment Guidelines'* (1994). Similarly, Transport Infrastructure Ireland (TII) and local authorities often expect the 85th percentile test in traffic impact assessments to ensure robustness. In terms of junction and network capacity and mitigation, by testing the 85th percentile trip rate, the assessment demonstrates that junctions and road links can accommodate not only average but also higher-than-average levels of traffic.

The following Figure 13.35 illustrates the frequency of daily traffic generation rates within 10 no. vehicle trip ranges or bands.

Figure 13-35. Existing Landfill HGV Trips Rates 2024.

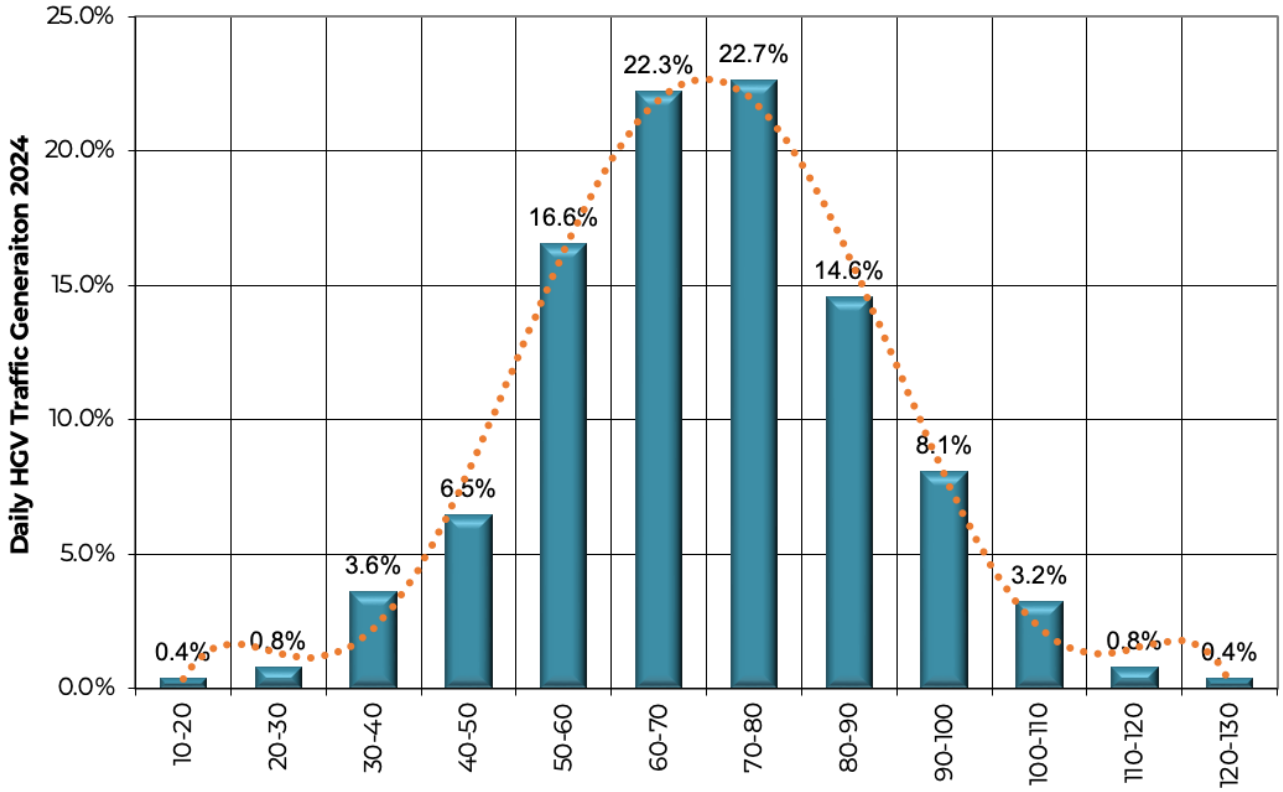


Figure 13-36. Existing Landfill HGV Trips Rates 2024 (Cumulative).

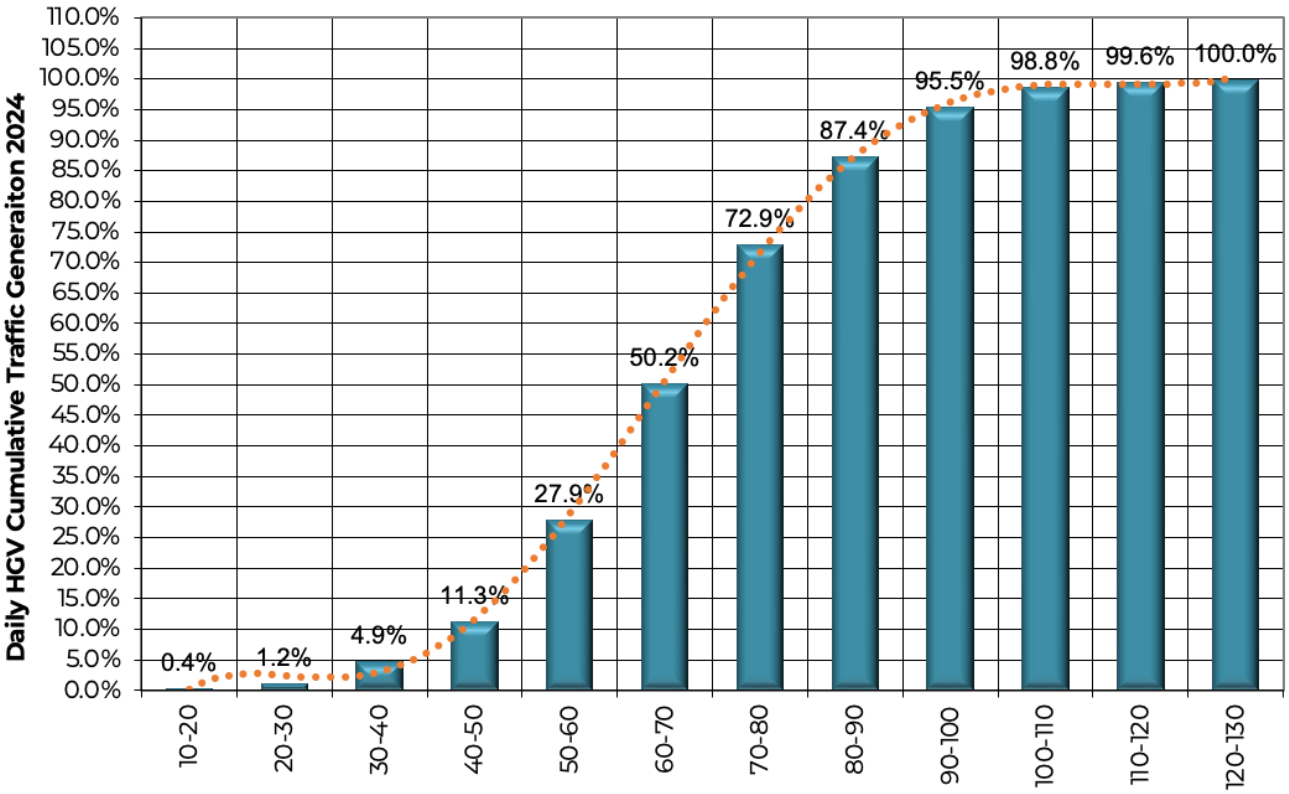


Figure 13-36 shows the same data as Figure 13-35 presented as a cumulative rate. Figure 13-36 serves to confirm that the average traffic generation rate for 2024 was 70 no, the 85th percentile rate was 88 no. and the peak was realistically 130 no. As previously set out, the landfill received 423,000t in 2024 accordingly, on a pro rata basis when operating at the permitted and proposed annual waste acceptance rate of 440,000t/a the average rate based upon the weighbridge records is estimated to be 73 no., the 85th percentile is 92 no. and the maximum is in the order of 144 no.

13.12.2.2 Existing and Proposed Traffic Distribution

Based upon the traffic surveys of April 2025 together with an assessment of weighbridge records of the origin of materials received by the existing landfill site, the volume of traffic generated by the facility on the day of the traffic surveys has been established and is set out in Volume 3, Appendix 13.2 of this EIAR in the following:

- Figure 4 'Surveyed 2025 Landfill Turing Traffic Flows – Day of Survey 07:00-19:00hrs'
- Figure 5 'Surveyed 2025 Landfill Turing Traffic Flows – AM Peak During Survey 08:00-09:00hrs'
- Figure 6 'Surveyed 2025 Landfill Turing Traffic Flows – PM Peak During Survey 17:00-18:00hrs'

Based upon an assessment of weighbridge data spanning 2022, 2023 and 2024 and examination of the records of the origin of materials received by the existing landfill development, the distribution of HGV arriving at the site has been established. The distribution of HGV traffic is shown in network flow diagram format in Volume 3, Appendix 13.2 of this EIAR in the following:

- Figure 7 *'Distribution of HGV Traffic – Weighbridge Analysis 2022, 2023 & 2024*'

It should be noted from the existing distribution of traffic visiting the landfill that there is an interaction with the nearby Materials Recovery Facility (MRF) at Beauparc, Rathdrinagh. A significant proportion of materials received at the landfill are from the MRF. Weighbridge records show that at present a total of 58.3% of HGV entering and leaving the landfill is associated with the MRF which means that that percentage of landfill traffic generation is confined to the 2.3 km section of the N2 between Rathdrinagh Cross (Site 2) and the existing landfill access junction (Site 3). This traffic is identified separately and is shown coloured 'blue' and in square brackets in Figure 7. The reason for separating this element of the traffic is that in the baseline scenario where the landfill is assumed to be closed, that traffic at the MRF currently transferring materials locally to the landfill would be required to head further afield to an alternative residual landfill site. With Knockharley hypothetically closed, the most proximate and operational alternatives for residual waste disposal would be either Ballynagran Residual Landfill in Wicklow or Drehid Waste Management Facility in Kildare. It is acknowledged that in the case of Drehid in particular there are alternative routes available to such traffic using lower order local roads. For the purposes of this assessment however, it is reasonably assumed that this traffic would principally use the N2 in which case the traffic to and from the MRF, instead of entering Knockharley on the southbound (outbound laden leg) would pass by the access junction to undertake a longer journey, 99 km in the case of Ballynagran (N2-M50-N/M11) and 84 km in the case of Drehid (N2-M50-M4), the return northbound (inbound unladen) journey would also pass by the exiting landfill access junction. In the baseline do-nothing scenario this MRF traffic would remain and is reassigned to the N2 to the south of the existing landfill access junction. The future scenarios in which the landfill is assumed to be granted permission and is thus operational, the MRF traffic is assumed to continue its association and interaction with the landfill at the same rates as manifest in the weighbridge data spanning 2022, 2023 and 2024. In summary therefore, when the landfill is assumed to be closed in the baseline and 'do nothing' scenarios, MRF traffic redistributes to the N2 to the south of the landfill access. In the future scenario where the proposed landfill extension is operational the interaction with the MRF is assumed to continue thus in these future scenarios 58.3% of landfill HGV will continue to traverse only the 2.3km section of the N2 between Site 2 and Site 3. In the future operational scenarios the baseline redistributed MRF traffic is removed from the N2 south of the landfill access junction at Site 3.

There are presently 25 no. staff working at the landfill on a daily basis. It is not proposed that his compliment of staff will increase as a direct result of the proposed development. The traffic surveys of April 2025 show that the existing site generated 60 no. inbound and 68 no. outbound movements by light vehicles. The light vehicle traffic associated with a landfill site on a typical day is generally limited and predictable in nature. It primarily consists of staff arrivals in the morning and departures in the evening, reflecting the standard working hours of site personnel. In addition, some intermittent staff movements occur during the day for purposes such as collecting supplies, travelling off site for lunch, or attending off-site meetings.

Other elements of light vehicle activity include visitors to the site, such as regulatory inspectors, consultants, or contractors attending for specific tasks, and day-to-day service vehicles, for example postal deliveries, couriers, or minor maintenance support. These trips are usually small in number and are dispersed throughout the working day, meaning they do not contribute significantly to peak traffic conditions and this is evidenced in the above referenced Figure 5 and Figure 6 in Volume 3, Appendix 13.2 of this EIAR.

In this context, the light vehicle traffic recorded entering and leaving the landfill is not directly linked to waste acceptance operations but rather reflects the routine activities needed to sustain the ongoing management, servicing, and operation of the site. It is considered unlikely that the day-to-day volume of light vehicle generation will change as a result of the proposed development accordingly, in the various analyses, the light vehicle traffic generation remains a constant for all assessment scenarios, save for the baseline or do nothing scenario in which all landfill traffic, light and heavy is removed from the network. Figure 4, Figure 5 and Figure 6 in Volume 3, Appendix 13.2 of this EIAR show both the light and heavy traffic generation of the site. When assessing development traffic on the surrounding road network, it is necessary to make reasonable and evidence based assumptions regarding how the additional vehicle trips will distribute between the available routes and junction turning movements. A common and accepted approach, in line with TII Traffic and Transport Assessment Guidelines (2014) and consistent with standard practice, is to assume that development generated trips distribute in proportions similar to those observed for existing traffic flows on the receiving network. This reflects the principle that road users generally follow the same patterns of travel as current users, being influenced by the existing settlement distribution, trip attractors, and available routes. The distribution of traffic at the site access is recorded, whereas the distribution to the wider network follows the above principles. The following network flow diagrams in Volume 3, Appendix 13.2 of this EIAR document the daily and peak hour distribution of light vehicles generated by the landfill site.

- Figure 8 '*Surveyed 2025 Daily Light Traffic Distribution 07:00-19:00hrs*'
- Figure 9 '*Surveyed 2025 Morning Peak Hour Light Traffic Distribution 08:00-09:00hrs*'
- Figure 10 '*Surveyed 2025 Evening Peak Hour Light Traffic Distribution 17:00-18:00hrs*'

The following network flow diagrams in Volume 3, Appendix 13.2 of this EIAR show the baseline traffic flows on the receiving road network in which all light and heavy traffic generated to the landfill site is removed from the receiving road network and that traffic associated with the operation of the nearby MRF at Rathdrinagh is redistributed to Ballynagran or Drehid landfills instead of Knockharley which is assumed to be closed for the purposes of establishing a baseline in which the landfill generates no traffic or only a nominal amount as part of the aftercare programme.

- Figure 11 '*2025 Baseline Network Daily Traffic Flows – Landfill Closed 07:00-19:00hrs*'
- Figure 12 '*2025 Baseline Network AM Peak Hour Traffic Flows – Landfill Closed 08:00-09:00hrs*'
- Figure 13 '*2025 Baseline Network PM Peak Hour Traffic Flows – Landfill Closed 17:00-18:00hrs*'

13.12.2.3 Assessment Value Development Traffic Generation

As previously set out, the landfill received 423,000t in 2024 accordingly, on a pro rata basis when operating at the permitted and proposed annual waste acceptance rate of 440,000t/a the average rate of HGV traffic generation based upon the weighbridge records is estimated to be 73 no., the 85th percentile is 92 no. and the maximum or worst case is in the order of 144 no. It should be noted from Figure 13-34 that the worst case is identified as a one day spike in the data and is used in the interest of satisfying the EAIR requirement to include a worst case scenario.

Based upon the distribution derived from the weighbridge data and existing light vehicle distribution set out above, the following network flow diagrams in Volume 3, Appendix 13.2 of this EIAR document the average, 85th percentile (upper value) and worst case scenario development traffic generation which includes for light vehicles, HGV associated with landfilling operations only.

- Figure 14 '*Forecast Average Daily Traffic Generation 07:00-19:00hrs*'
- Figure 15 '*Forecast Average Morning Peak Hour Traffic Generation 08:00-09:00hrs*'
- Figure 16 '*Forecast Average Evening Peak Hour Traffic Generation 17:00-18:00hrs*'
- Figure 17 '*Forecast Upper Value Daily Traffic Generation 07:00-19:00hrs*'
- Figure 18 '*Forecast Upper Value Morning Peak Hour Traffic Generation 08:00-09:00hrs*'
- Figure 19 '*Forecast Upper Value Evening Peak Hour Traffic Generation 17:00-18:00hrs*'
- Figure 20 '*Forecast Worst Case Daily Traffic Generation 07:00-19:00hrs*'
- Figure 21 '*Forecast Worst Case Morning Peak Hour Traffic Generation 08:00-09:00hrs*'
- Figure 22 '*Forecast Worst Case Evening Peak Hour Traffic Generation 17:00-18:00hrs*'

13.12.2.4 Other Sources of Traffic Generation

13.12.2.4.1 Leachate Removal

In addition to landfill operations the proposed development will also generate HGV traffic movements which will arise from the collection of leachate from the site. The volume of leachate required to leave the site will diminish over time. Current practice is that it is collected and tanked off site to a wastewater treatment plant. This process complies with environmental regulations and avoids direct contamination of local waterways or aquifers. At present there is demand for approximately 20 no. tankers of leachate to be removed from the site and this is considered representative of the maximum demand. Based upon site records, leachate tinkering is not typically carried out in the morning peak hour and is does not occur in the evening peak hour simply as a matter of logistics given the travel distance from Knockharley to a wastewater treatment plant. The site generates an average of 4 no. takers per day and these tend to arrive in the mid-morning to mid-afternoon. The proposed Reverse Osmosis system which is part of the development is estimated as likely to reduce the volume of leachate required to leave the site by approximately 75% thus reducing the associated traffic generation to approximately 1 no. HGV trips per day. Clearly this source of HGV traffic currently has little or no effect on the morning peak hour performance of the receiving road network and given the forecast reduction to 1 no. tanker per day would be practically imperceptible to existing users of the N2.

13.12.2.4.2 Incinerator Bottom Ash Processing

Approximately 150,000t/a of Incinerator Bottom Aash (IBA) is received at the existing landfill facility. This IBA is produced by a combination of the Indaver facility near Duleek and the Dublin Waste to Energy (DWE) facility located in Ringsend. Indaver consume about 200,000t/a of municipal solid waste and DWE about 600t/a so the relative ash generation is split generally along the same lines, i.e. circa 38,000t/a from Indaver and circa 128,000t/a from Ringsend.

Untreated IBA is accepted from both facilities and treated at the new IBA treatment plant located at the existing Knockharley Landfill site. The IBA is the remaining inert faction left over from combustion of Household and Commercial Waste or Municipal Solid Waste (MSW). It is rich in calcium, silica and other

minerals widely used in construction. The treatment plant functions to remove residual unburnt materials and metals from the IBA. The goal is to produce a clean ash that can be used as a partial replacement in several applications including cement manufacture, concrete production, and road construction.

The first stage in IBA treatment is the removal of large contaminants such as large metal components (e.g. gas canisters, large pieces of metal). The next stage is the removal of unburnt materials using a combination of density separation and QC picking. Once the unburnt materials are removed, the IBA is then passed through a sequence of magnets and eddy current to remove ferrous and non-ferrous metals. The metal removal is effective down to 5mm particles.

The treated IBA is stockpiled in monofil landfill cells where it is weathered overtime. Weathered and treated IBA is a mineral mixture with many of the same properties as natural aggregates used in cement and concrete manufacturing.

It is planned to backload treated IBA onto trucks used to transport untreated IBA to site. As the bulk of IBA deliveries will originate from Ringsend, via the N2, it is the Applicant's intention to backhaul treated IBA southward from Knockharley along the N2 to major aggregate suppliers and concrete producers along or close to the N2. Such producers include Kilsaran, Roadstone and Keegan Quarries.

As the chemical characteristics of the IBA will be unchanged in the processing of IBA at the existing facility, there is no significant risk of contamination of the finished product by using the same trucks.

13.12.3 Preliminary Scoping Assessment

13.12.3.1 Development Traffic and Surveyed 2025 Baseline Network Traffic

The following Table 13.4 is based upon the data presented in Table 13.1 that summarise the 2025 surveyed daily network traffic flows. Table 13.4 however removes from the survey the existing landfill traffic and redistributes the traffic from the nearby MRF (i.e. baseline 2025 with no existing landfill traffic and no allowance made for traffic growth).

Table 13.5 summarises the total daily network traffic subject to the forecast average daily operational traffic generation of the proposed development receiving 440,000 t/a. Table 13.6 shows the incremental increase in daily traffic arising from the development based upon the forecast average daily traffic generation.

Table 13-4. Surveyed 2025 Baseline

Road Link		Baseline Flows 12hrs 07:00-19:00hrs			AADT
		Total	Heavy	%HGV	
1	N2 North of Slane Crossroad	7,912	1,120	14.2%	10,001
2	N2 North of Rathdrinagh Crossroad	7,370	1,149	15.6%	9,316
3	N2 Between Rathdrinagh and Landfill Access	7,713	1,341	17.4%	9,750
4	N2 Between Landfill Access and O'Briens Cross (R150)	7,713	1,341	17.4%	9,750
5	N2 Between O'Briens Cross and Balrath Cross (R153)	8,024	1,276	15.9%	10,143
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	9,297	1,320	14.2%	11,752
7	N2 South of Kilmoon	16,986	2,461	14.5%	21,472
8	R150 West of O'Briens Cross (Kentstown)	2,749	306	11.1%	3,475
9	R150 East of O'Briens Cross (Duleek)	4,459	598	13.4%	5,637
10	R153 Between Balrath and Kentstown	4,461	397	8.9%	5,639
11	R152 West of Kentstown	5,775	408	7.1%	7,300
12	N51 Navan Road (Slane)	8,382	1,043	12.4%	10,596
13	N51 Drogheda Road (Slane)	5,156	557	10.8%	6,518
14	Knockharley Landfill Access	0	0	0%	0

Table 13-5. Surveyed 2025 Baseline + Forecast Average Daily Traffic Generation

Road Link		Baseline + Landfill 12hrs 07:00-19:00hrs			AADT
		Total	Heavy	%HGV	
1	N2 North of Slane Crossroad	7,933	1,121	14.1%	10,028
2	N2 North of Rathdrinagh Crossroad	7,429	1,153	15.5%	9,391
3	N2 Between Rathdrinagh and Landfill Access	7,804	1,365	17.5%	9,865
4	N2 Between Landfill Access and O'Briens Cross (R150)	7,772	1,339	17.2%	9,825
5	N2 Between O'Briens Cross and Balrath Cross (R153)	8,071	1,263	15.6%	10,202
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	9,324	1,304	14.0%	11,786
7	N2 South of Kilmoon	17,013	2,445	14.4%	21,506
8	R150 West of O'Briens Cross (Kentstown)	2,751	306	11.1%	3,477
9	R150 East of O'Briens Cross (Duleek)	4,479	609	13.6%	5,662
10	R153 Between Balrath and Kentstown	4,469	400	9.0%	5,649
11	R152 West of Kentstown	5,785	411	7.1%	7,313
12	N51 Navan Road (Slane)	8,397	1,045	12.4%	10,615
13	N51 Drogheda Road (Slane)	5,161	557	10.8%	6,524
14	Knockharley Landfill Access	274	146	53.3%	NA

Table 13-6. 2025 Baseline + Average Daily Traffic Generation Impact

Road Link		Difference 12hrs 07:00-19:00hrs			AADT
		Total	Heavy	%HGV	
1	N2 North of Slane Crossroad	+21 (+0.3%)	+1 (+0.1%)	-0.1%	+27 (+0.3%)
2	N2 North of Rathdrinagh Crossroad	+59 (+0.8%)	+4 (+0.3%)	-0.1%	+75 (+0.8%)
3	N2 Between Rathdrinagh and Landfill Access	+91 (+1.2%)	+24 (+1.8%)	+0.1%	+115 (+1.2%)
4	N2 Between Landfill Access and O'Briens Cross (R150)	+59 (+0.8%)	-2 (-0.1%)	-0.2%	+75 (+0.8%)
5	N2 Between O'Briens Cross and Balrath Cross (R153)	+47 (+0.6%)	-13 (-1.0%)	-0.3%	+59 (+0.6%)
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	+27 (+0.3%)	-16 (-1.2%)	-0.2%	+34 (+0.3%)
7	N2 South of Kilmoon	+27 (+0.2%)	-16 (-0.7%)	-0.1%	+34 (+0.2%)
8	R150 West of O'Briens Cross (Kentstown)	+2 (+0.1%)	+0 (+0.0%)	+0.0%	+2 (+0.1%)
9	R150 East of O'Briens Cross (Duleek)	+20 (+0.4%)	+11 (+1.8%)	+0.2%	+25 (+0.4%)
10	R153 Between Balrath and Kentstown	+8 (+0.2%)	+3 (+0.8%)	+0.1%	+10 (+0.2%)
11	R152 West of Kentstown	+10 (+0.2%)	+3 (+0.7%)	+0.0%	+13 (+0.2%)
12	N51 Navan Road (Slane)	+15 (+0.2%)	+2 (+0.2%)	+0.0%	+19 (+0.2%)
13	N51 Drogheda Road (Slane)	+5 (+0.1%)	+0 (+0.0%)	+0.0%	+6 (+0.1%)
14	Knockharley Landfill Access	+274 (NA)	+146 (NA)	NA	NA

Table 13.6 shows that the daily traffic generation arising from average traffic generation rates equating to an acceptance rate of 440,000 t/a during forecast typical operation is less than +1.0% on the public roads network save for the 3.2 km section of the N2 between the landfill access and the Rathdrinagh MRF to the north in which case the daily increase in traffic is estimated to be on average +1.2%. These are the forecast increases over a scenario in which the baseline assumes the landfill site is closed.

The forecast average increase in total daily traffic is on average +0.4% across the network. In the case of the N2 links (Link1 - Link 7) the average increase is in the order of +0.6%. In the case of the N51 (Link 12 and Link 13) the average is +0.1% and in the case of the regional road network (Link 8 – Link 11) the average increase is +0.2%.

The 10% threshold is not exceeded nor is the lower threshold value of 5% exceeded. The preliminary assessment figures for average daily traffic generation arising at the proposed development suggest that the impact of the proposed development will not give rise to capacity issues on the receiving road network.

Table 13-7. Surveyed 2025 Baseline AM Peak Hour

	Road Link	Baseline AM Peak 08:00-09:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	847	99	11.7%
2	N2 North of Rathdrinagh Crossroad	767	109	14.2%
3	N2 Between Rathdrinagh and Landfill Access	794	117	14.7%
4	N2 Between Landfill Access and O'Briens Cross (R150)	793	117	14.7%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	864	107	12.4%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	731	100	13.7%
7	N2 South of Kilmoon	1,434	205	14.3%
8	R150 West of O'Briens Cross (Kentstown)	305	36	11.8%
9	R150 East of O'Briens Cross (Duleek)	517	59	11.4%
10	R153 Between Balrath and Kentstown	423	39	9.2%
11	R152 West of Kentstown	585	53	9.1%
12	N51 Navan Road (Slane)	787	99	12.6%
13	N51 Drogheda Road (Slane)	470	59	12.6%
14	Knockharley Landfill Access	0	0	0%

Table 13-8. Surveyed 2025 Baseline + Forecast Average AM Peak Hour Traffic Generation

	Road Link	Baseline + Landfill AM Peak 08:00-09:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	853	99	11.6%
2	N2 North of Rathdrinagh Crossroad	776	109	14.0%
3	N2 Between Rathdrinagh and Landfill Access	808	121	15.0%
4	N2 Between Landfill Access and O'Briens Cross (R150)	809	123	15.2%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	876	112	12.8%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	740	104	14.1%
7	N2 South of Kilmoon	1,443	209	14.5%
8	R150 West of O'Briens Cross (Kentstown)	305	36	11.8%
9	R150 East of O'Briens Cross (Duleek)	520	61	11.7%
10	R153 Between Balrath and Kentstown	425	39	9.2%
11	R152 West of Kentstown	587	53	9.0%
12	N51 Navan Road (Slane)	788	99	12.6%
13	N51 Drogheda Road (Slane)	471	59	12.5%
14	Knockharley Landfill Access	29	10	34.5%

Table 13-9. 2025 Baseline + Average AM Peak Hour Traffic Generation Imapct

Road Link		Difference AM Peak 08:00-09:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	+6 (+0.7%)	+0 (+0.0%)	-0.1%
2	N2 North of Rathdrinagh Crossroad	+9 (+1.2%)	+0 (+0.0%)	-0.2%
3	N2 Between Rathdrinagh and Landfill Access	+14 (+1.8%)	+4 (+3.4%)	+0.3%
4	N2 Between Landfill Access and O'Briens Cross (R150)	+16 (+2.0%)	+6 (+5.1%)	+0.5%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	+12 (+1.4%)	+5 (+4.7%)	+0.4%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	+9 (+1.2%)	+4 (+4.0%)	+0.4%
7	N2 South of Kilmoon	+9 (+0.6%)	+4 (+2.0%)	+0.2%
8	R150 West of O'Briens Cross (Kentstown)	+0 (+0.0%)	+0 (+0.0%)	+0.0%
9	R150 East of O'Briens Cross (Duleek)	+3 (+0.6%)	+2 (+3.4%)	+0.3%
10	R153 Between Balrath and Kentstown	+2 (+0.5%)	+0 (+0.0%)	+0.0%
11	R152 West of Kentstown	+2 (+0.3%)	+0 (+0.0%)	-0.1%
12	N51 Navan Road (Slane)	+1 (+0.1%)	+0 (+0.0%)	+0.0%
13	N51 Drogheda Road (Slane)	+1 (+0.2%)	+0 (+0.0%)	-0.1%
14	Knockharley Landfill Access	+29 (NA)	+10 (NA)	NA

Table 13.9 shows that the morning peak hour traffic generation arising from average traffic generation rates equating to an acceptance rate of 440,000 t/a during forecast typical operation is less than +2.0% on the public roads network. This is the forecast increase over a scenario in which the baseline assumes the landfill site is closed.

The forecast average increase in morning peak hour traffic is on average +0.8% across the network. In the case of the N2 links (Link1 - Link 7) the average increase is in the order of +1.3%. In the case of the N51 (Link 12 and Link 13) the average is +0.2% and in the case of the regional road network (Link 8 – Link 11) the average increase is +0.3%.

The 10% threshold is not exceeded nor is the lower threshold value of 5% exceeded. The preliminary assessment figures for average morning peak hour traffic generation arising at the proposed development suggest that the impact of the proposed development will not give rise to capacity issues on the receiving road network.

Table 13-10. Surveyed 2025 Baseline PM Peak Hour

	Road Link	Baseline PM Peak 17:00-18:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	824	70	8.5%
2	N2 North of Rathdrinagh Crossroad	909	81	8.9%
3	N2 Between Rathdrinagh and Landfill Access	925	85	9.2%
4	N2 Between Landfill Access and O'Briens Cross (R150)	925	85	9.2%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	998	82	8.2%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	1,049	101	9.6%
7	N2 South of Kilmoon	2,013	136	6.8%
8	R150 West of O'Briens Cross (Kentstown)	290	19	6.6%
9	R150 East of O'Briens Cross (Duleek)	519	32	6.2%
10	R153 Between Balrath and Kentstown	501	19	3.8%
11	R152 West of Kentstown	639	23	3.6%
12	N51 Navan Road (Slane)	827	56	6.8%
13	N51 Drogheda Road (Slane)	497	29	5.8%
14	Knockharley Landfill Access	0	0	0%

Table 13-11. Surveyed 2025 Baseline + Forecast Average PM Peak Hour Traffic Generation

	Road Link	Baseline + Landfill PM Peak 17:00-18:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	824	70	8.5%
2	N2 North of Rathdrinagh Crossroad	910	81	8.9%
3	N2 Between Rathdrinagh and Landfill Access	926	85	9.2%
4	N2 Between Landfill Access and O'Briens Cross (R150)	933	85	9.1%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	1,004	82	8.2%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	1,054	101	9.6%
7	N2 South of Kilmoon	2,018	136	6.7%
8	R150 West of O'Briens Cross (Kentstown)	290	19	6.6%
9	R150 East of O'Briens Cross (Duleek)	521	32	6.1%
10	R153 Between Balrath and Kentstown	502	19	3.8%
11	R152 West of Kentstown	640	23	3.6%
12	N51 Navan Road (Slane)	827	56	6.8%
13	N51 Drogheda Road (Slane)	497	29	5.8%
14	Knockharley Landfill Access	9	0	0%

Table 13-12. 2025 Baseline + Average PM Peak Hour Traffic Generation Imapct

Road Link		Difference PM Peak 17:00-18:00hrs		
		Total	Heavy	%HGV
1	N2 North of Slane Crossroad	+0 (+0.0%)	+0 (+0.0%)	+0.0%
2	N2 North of Rathdrinagh Crossroad	+1 (+0.1%)	+0 (+0.0%)	+0.0%
3	N2 Between Rathdrinagh and Landfill Access	+1 (+0.1%)	+0 (+0.0%)	+0.0%
4	N2 Between Landfill Access and O'Briens Cross (R150)	+8 (+0.9%)	+0 (+0.0%)	-0.1%
5	N2 Between O'Briens Cross and Balrath Cross (R153)	+6 (+0.6%)	+0 (+0.0%)	+0.0%
6	N2 Between Balrath Cross and Kilmoon Cross (R152)	+5 (+0.5%)	+0 (+0.0%)	+0.0%
7	N2 South of Kilmoon	+5 (+0.2%)	+0 (+0.0%)	-0.1%
8	R150 West of O'Briens Cross (Kentstown)	+0 (+0.0%)	+0 (+0.0%)	+0.0%
9	R150 East of O'Briens Cross (Duleek)	+2 (+0.4%)	+0 (+0.0%)	-0.1%
10	R153 Between Balrath and Kentstown	+1 (+0.2%)	+0 (+0.0%)	+0.0%
11	R152 West of Kentstown	+1 (+0.2%)	+0 (+0.0%)	+0.0%
12	N51 Navan Road (Slane)	+0 (+0.0%)	+0 (+0.0%)	+0.0%
13	N51 Drogheda Road (Slane)	+0 (+0.0%)	+0 (+0.0%)	+0.0%
14	Knockharley Landfill Access	+9 (NA)	+0 (+0.0%)	+0.0%

Table 13.12 shows that the evening peak hour traffic generation arising from average traffic generation rates equating to an acceptance rate of 440,000 t/a during forecast typical operation is less than +1.0% on the public roads network. This is the forecast increase over a scenario in which the baseline assumes the landfill site is closed.

The forecast average increase in evening peak hour traffic is on average +0.2% across the network. In the case of the N2 links (Link1 - Link 7) the average increase is in the order of +0.3%. In the case of the N51 (Link 12 and Link 13) the average is +0.0% and in the case of the regional road network (Link 8 – Link 11) the average increase is +0.2%.

The 10% threshold is not exceeded nor is the lower threshold value of 5% exceeded. The preliminary assessment figures for average morning peak hour traffic generation arising at the proposed development suggest that the impact of the proposed development will not give rise to capacity issues on the receiving road network.

13.12.3.2 Traffic and Transport Assessment Guidelines - Thresholds

A Traffic and Transport Assessment or Traffic Impact Assessment must accompany all planning applications for developments which could potentially generate significant traffic volumes. A Traffic and Transport Assessment should be carried out if the proposed development exceeds the following thresholds:

- Development traffic exceeds 10% of the traffic flow on the adjoining road.
- Development traffic exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive.
- Residential development in excess of 200 dwellings.
- Retail and leisure development in excess of 1,000sq.m.
- Office, education and hospital development in excess of 2,500sq.m.
- Industrial development in excess of 5,000sq.m.
- Distribution and warehousing in excess of 10,000sq.m.

Relevant thresholds for Traffic Assessment where the development has the potential to affect national roads are as follows:

a) 100 trips in / out combined in the peak hours for the proposed development
b) Development traffic exceeds 10% of turning movements at junctions with and on National Roads.
c) Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive.
d) Industrial development in excess of 5,000sq.m.
e) Distribution and warehousing in excess of 10,000sq.m.
f) 100 on-site parking spaces.

Sub threshold criteria for Traffic Assessment are as follows:

g) The character and total number of trips per day is such that as to cause concern.
h) Location of the site is not consistent with national guidance or local plan policy or accessibility criteria contained in the Development Plan.
i) The development is part of incremental development that will have significant transport implications.
j) The development may generate traffic at peak times in a heavily trafficked/ congested area or near a junction with a main traffic route.
k) The development may generate heavy vehicles in a residential area.
l) There are concerns over the development's potential effects on road safety.
m) The development is in a tourist area with potential to cause congestion.
n) The planning authority considers that the proposal will result in a material change in trips patterns or raises other significant transport implications.

The following sets out the forecast traffic generation and preliminary assessment scenario results against the various threshold criteria.

a) The proposed development when fully developed and occupied is forecast to generate an average of approximately 19 light vehicles and 10 HGV (two-way total) in the morning peak hour and 9 light vehicles in the evening peak. Neither exceeds the threshold value of 100 trips in/out.
b) The forecast peak hour traffic flows show that it is likely that development traffic will not exceed 10% of traffic flow and turning movements on the receiving road network either in the morning or the evening peak hours or over the course of the working day.
c) Based upon the preliminary assessment it can reasonably be concluded that development traffic at junctions with National Roads will not exceed 5% of existing turning movements. The forecast increase in traffic on the receiving road network in the morning peak hour is 2.0% and 1.0% in the evening peak hour, it follows that the increase in the case of the closest national road junction and

national road will be in the order of less than 2.0%. The proposed development will have no significant impact on national roads and will be virtually imperceptible to existing users of the N2.

d) The proposed development comprises no buildings that exceed the development threshold value of 1,000sq.m.
e) The development involves no distribution and warehousing land uses.
f) The threshold value of 100 on-site parking spaces is not exceeded.

Sub threshold criteria for Traffic Assessment are as follows:

g) The lands are subject of an extant permission and the character and total number of trips in/out combined per day is such that it should not reasonably give cause for concern. This is evidenced by the determination of the extant permission under ACP Reference ABP-303211-18.
h) The location of the site is considered to be consistent with national guidance and local plan policy and is consistent with the accessibility criteria in the Development Plan.
i) The operation of the development is not considered likely to have significant transport implications.
j) The development will generate traffic volumes at peak times that do not exceed the standard thresholds.
k) The development will not generate heavy vehicles in a residential area.
l) The site is appropriately subject of an extant permission and the receiving roads have been designed to cater for traffic with the characteristics of the proposed development accordingly no concerns should arise with respect to the potential effects on road safety.
m) The development is not located in a tourist area. The numerical increase in traffic flows in the peak hours are modest so the development is not considered likely to have the potential to cause congestion.
n) The traffic arising from the proposed development will have similar characteristics to the traffic currently generated at the existing landfill site. There is no proposed increase in the average rate of material received so no increase in average traffic is expected. Notwithstanding the extension in the duration of the permission, on balance the proposed development will not give rise to significant material change in trip patterns nor should it give rise to significant transport implications.

Given the forecast peak hour traffic generation, it can reasonably to concluded that the impact of the proposed development on the capacity and operation of the receiving road network is not likely to be significant. None of the threshold criteria set out in the guidelines are exceeded on the receiving road network.

The likely traffic impact arising from the proposed development does not exceed the markers that typically trigger the need for detailed capacity assessment and the forecast impact would ordinarily not warrant further investigation with respect to the potential impact upon the capacity and operation of the junctions in the study area.

In the interest of a comprehensive assessment nonetheless further evaluation of traffic flows are provided as per the guidance provided in TII-PE-PDV-02045 *'Traffic and Transport Assessment Guidelines'* (2014).

13.12.4 Assessment of Traffic Effects of Proposed Development

13.12.4.1 Forecast Future Network Traffic (Without Proposed Development)

The capacity of any road network is dictated by the operation of the links and junctions within that network. Traffic flow and capacity assessments of the key links and junctions in the vicinity of the site are modelled for base and future year scenarios in order to provide a comparative basis upon which to evaluate the incremental impact of the proposed development and to appraise the overall performance of the road network under future assumed network traffic flow criteria.

Regarding the choice of appropriate assessment years, the Transport Infrastructure Ireland (TII) *'Traffic and Transport Assessment Guidelines'* (2014) TII-PE-PDV-02045 advise that the assessment should

incorporate an analysis of the road network traffic flows for the base year, opening year and forecast scenarios.

The preliminary scoping assessment provided in Table 13.4 through Table 13.12 provide an initial provisional evaluation of development traffic based upon the 2025 traffic surveys from which the traffic generated by the operation of the existing landfill site has been subtracted to derive a base assessment scenario.

The applicant aspires to having the proposed development operational by the end of 2027. For the purposes of this traffic assessment the year 2027 has therefore been selected as the opening year for the assessment of traffic effects. In line with the guidance provided in the *'Traffic and Transport Assessment Guidelines'*, modelling analyses of the capacity of the receiving road network have been carried out for the following:

- Opening Year (Assumed 2027)
- Opening Year +5yrs (2032)
- Opening Year +15yrs (Design Year 2042).

The assessment of traffic impacts is based upon the receiving road network as presented in the tables set out in this Chapter and in the corresponding network flow diagrams provided in Volume 3, Appendix 13.2 of this EIAR. The following junctions and the link roads that intersect them have been included in the scope of the assessments

- Site 1: Slane Crossroads N2/N51- Signalised Crossroad
- Site 2: Rathdrinagh Crossroads N2/L1013/L1613 - Ghost Island Staggered Crossroad
- Site 3: Knockharley Landfill Site Access - Ghost Island Junction
- Site 4: O'Briens Cross N2/R150 - Ghost Island Staggered Crossroad
- Site 5: Kentstown R152/R150 – Simple Priority Junction
- Site 6: Balrath Cross N2/R153/L1610 - Ghost Island Staggered Crossroad
- Site 7: Kilmoon Cross N2/R152 - Ghost Island Junction

The following sets out the methodology for the application of traffic growth rates in the forecast of future network traffic flows on the receiving road network.

In accordance with Transport Infrastructure Ireland's (TII) Project Appraisal Guidelines (PAG), particularly *'Project Appraisal Guidelines: Unit 5.3 Travel Demand Projections'* and the relevant TII technical documentation (e.g., PE-PAG-02017), traffic growth rates are applied to base-year traffic flows to estimate future traffic volumes on the road network. This ensures robust transport planning that accounts for natural background growth, economic trends, and land-use development.

TII provides default national and regional traffic growth rates by vehicle type (e.g., cars, LVs, HGVs) in its National Road Traffic Forecasting documentation. These growth rates are based on Central Statistics Office (CSO) population projections, economic forecasts (e.g., GDP, employment), and transport demand modelling.

TII growth rates cover economic development where the TII provided growth rates implicitly capture traffic changes resulting from, national and regional economic growth (e.g. GDP increase, employment), changes in vehicle ownership and usage, and freight movement trends aligned with trade and logistics forecasts. These are built into the rates using long-term economic projections from the ESRI, from the Department of Finance and from CSO demographic and labour market trends.

While the background growth rates reflect historic and predicted trends in population and economic activity, they do not account for site-specific developments local to the proposed development unless incorporated explicitly. This includes: new housing estates, commercial centres, educational or healthcare

facilities, and major industrial or logistics parks. Typically, these developments are treated as committed developments and added through a separate trip assignment process.

For the purposes of the traffic assessment, traffic generation arising directly from the proposed development has been assumed not to grow over time since the forecast traffic generation rates are based upon evidence based weighbridge data and are not proposed to change. Background traffic flows on the public road network have been assumed to grow in accordance with the latest growth factors published by Transport Infrastructure Ireland (TII) in October 2021 in the document PE-PAG-02017 *'Project Appraisal Guidelines: Unit 5.3 Travel Demand Projections'*.

Central growth rate factors have been used in the derivation of the future traffic flows from the surveyed February 2025 flows.

The TII forecast central growth rate factors for Meath assume traffic growth rates of 1.73% per annum for light vehicles and 3.65% for heavy vehicles between 2016 and 2030 and 0.7% per annum for light vehicles and 1.86% for heavy vehicles between 2030 and 2040. After 2040 the rates are 0.59% per annum for light vehicles and 2.0% for heavy vehicles. The growth indices used to derive Opening Year (2027) and; Opening Year +5ys (2032) and Opening Year +20yrs (2047) flows from the surveyed (2025) flows are as follows.

National Primary Road Central or Medium Growth Rates (Applied to All Roads)

- 2025-2027 (Opening Year) 1.0349 (Cars) 1.0743 (HGV)
- 2025-2032 (Opening Year +5yrs) 1.1049 (Cars) 1.2412 (HGV)
- 2025-2042 (Opening Year +15yrs) 1.1808 (Cars) 1.5017 (HGV)

TII growth factors have been applied directly to peak hour traffic data. Growth factors are not always directly applicable to peak hour periods as they tend to spread out as opposed to intensify. Ignoring this factor and applying growth rates directly to the peak hour generally results in robust calculations favoured by traffic experts. In the assessments of all future year scenarios, it is assumed that the entire development will be operating at capacity in 2027. The application of TII growth rates to the receiving network is considered likely to account for the cumulative traffic arising as a result of economic growth and development locally over the specified assessment period.

The scope of future year assessments focuses on the operation of the N2, N51, R150 and R152. It is noted however the turning traffic flows at the junction of these roads are forecast not to exceed either the 10% threshold value, or the lower 5% threshold values of TII-PE-PDV-02045 when evaluated based upon the average traffic generation rates for the proposed development.

The assessments aim to confirm that the infrastructure provided by the receiving road network including the strategic network is suitable to accommodate the forecast traffic arising from the proposed development. The various 'do-nothing' and 'do-something' traffic flow scenarios have been assessed for the Opening Year 2027, Opening Year +5yrs and for the Design Year of 2047.

The future year assessments include for scenarios both with and without the proposed development so that the incremental impact of development traffic can be evaluated. The 'do-nothing' scenario assumes no development to occur at the development site whilst the receiving road network is assumed to experience traffic growth in line with the TII growth indices for national roads. The 'do something' scenarios include for the forecast assessment value development traffic flows being added to the forecast network flows derived from the 2025 traffic surveys factored as set out above.

It is acknowledged that the existing landfill may still be operational in 2027 however in the interest of simplicity it is assumed for the purposes of assessment of the proposed development that the baseline is with the landfill generating no traffic.

13.12.4.2 Future Network Traffic – Assessment of Traffic Effects on Network

The forecast network turning traffic flows for each of the assessment years is shown in network flow diagram format Volume 3, Appendix 13.2 of this EIAR, as follows:

- Figure 23 'Baseline 2027 Opening Year AM Peak – Do-Nothing'
- Figure 24 '2032 Opening Year +5yrs AM Peak - Do-Nothing'
- Figure 25 '2042 Opening Year +20yrs AM Peak - Do-Nothing'
- Figure 26 'Baseline 2027 Opening Year PM Peak - Do-Nothing'
- Figure 27 '2032 Opening Year +5yrs PM Peak - Do-Nothing'
- Figure 28 '2042 Opening Year +15yrs PM Peak - Do-Nothing'

The forecast peak hour network turning traffic flows for each of the assessment years for the average, upper value and wort case traffic generation of 73 no., 92 no. and 144 no. HGV per day are shown in network flow diagram format in Volume 3, Appendix 13.2 of this EIAR, as follows:

- Figure 29 '2027 AM Peak - Do-Something - Proposed Development Average Value'
- Figure 30 '2032 AM Peak - Do-Something - Proposed Development Average Value'
- Figure 31 '2042 AM Peak - Do-Something - Proposed Development Average Value'
- Figure 32 '2027 PM Peak - Do-Something - Proposed Development Average Value'
- Figure 33 '2032 PM Peak - Do-Something - Proposed Development Average Value'
- Figure 34 '2042 PM Peak - Do-Something - Proposed Development Average Value'
- Figure 35 '2027 AM Peak - Do-Something - Proposed Development Upper Value'
- Figure 36 '2032 AM Peak - Do-Something - Proposed Development Upper Value'
- Figure 37 '2042 AM Peak - Do-Something - Proposed Development Upper Value'
- Figure 38 '2027 PM Peak - Do-Something - Proposed Development Upper Value'
- Figure 39 '2032 PM Peak - Do-Something - Proposed Development Upper Value'
- Figure 40 '2042 PM Peak - Do-Something - Proposed Development Upper Value'
- Figure 41 '2027 AM Peak - Do-Something - Proposed Development Worst Case Value'
- Figure 42 '2032 AM Peak - Do-Something - Proposed Development Worst Case Value'
- Figure 43 '2042 AM Peak - Do-Something - Proposed Development Worst Case Value'
- Figure 44 '2027 PM Peak - Do-Something - Proposed Development Worst Case Value'
- Figure 45 '2032 PM Peak - Do-Something - Proposed Development Worst Case Value'
- Figure 46 '2042 PM Peak - Do-Something - Proposed Development Worst Case Value'

The forecast network turning traffic flows for each of the assessment years and for the future forecast traffic flows on the link roads between junctions on the road network within the study scope are summarised in the following tables relating to the Proposed Development average and upper value traffic generation scenario assessments:

- Table 13.13 Link 1 – N2 North of Slane Crossroad
- Table 13.14 Link 2 – N2 North of Rathdrinagh Crossroad
- Table 13.15 Link 3 – N2 Between Rathdrinagh and Landfill Access
- Table 13.16 Link 4 – N2 Between Landfill Access and O'Briens Cross (R150)
- Table 13.17 Link 5 – N2 Between O'Briens Cross and Balrath Cross (R153)
- Table 13.18 Link 6 – N2 Between Balrath Cross and Kilmoon Cross (R152)
- Table 13.19 Link 7 – N2 South of Kilmoon
- Table 13.20 Link 8 – R150 West of O'Briens Cross (Kentstown)
- Table 13.21 Link 9 – R150 East of O'Briens Cross (Duleek)
- Table 13.22 Link 10 – R153 Between Balrath and Kentstown
- Table 13.23 Link 11 – R152 West of Kentstown
- Table 13.24 Link 12 – N51 Navan Road (Slane)
- Table 13.25 Link 13 – N51 Drogheda Road (Slane)

Table 13-13. Link 1 – N2 North of Slane Crossroad

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		880	106	12.1%	856	75	8.8%
	2032		949	123	12.9%	920	87	9.4%
	2042		1032	149	14.4%	996	105	10.6%
Do Something Average Scenario 73 no. HGV/day	2027		886	106	12.0%	857	75	8.8%
	2032		955	123	12.9%	921	87	9.4%
	2042		1038	149	14.3%	997	105	10.5%
Do Something Upper Value Scenario 92 no. HGV/day	2027		886	106	12.0%	857	75	8.8%
	2032		955	123	12.9%	921	87	9.4%
	2042		1038	149	14.3%	997	105	10.5%
Incremental Difference Average Scenario	2027	No.	+6	+0	-0.1%	+1	+0	0.0%
		%	+0.7%	+0.0%		+0.1%	+0.0%	
	2032	No.	+6	+0	0.0%	+1	+0	0.0%
		%	+0.6%	+0.0%		+0.1%	+0.0%	
	2042	No.	+6	+0	-0.1%	+1	+0	-0.1%
		%	+0.6%	+0.0%		+0.1%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+6	+0	-0.1%	+1	+0	0.0%
		%	+0.7%	+0.0%		+0.1%	+0.0%	
	2032	No.	+6	+0	0.0%	+1	+0	0.0%
		%	+0.6%	+0.0%		+0.1%	+0.0%	
	2042	No.	+6	+0	-0.1%	+1	+0	-0.1
		%	+0.6%	+0.0%		+0.1%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-14. Link 2 – N2 North of Rathdrinagh Crossroad

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		798	117	14.7%	944	87	9.2%
	2032		863	135	15.7%	1016	101	9.9%
	2042		941	164	17.4%	1100	122	11.1%
Do Something Average Scenario 73 no. HGV/day	2027		807	117	14.5%	945	87	9.2%
	2032		871	135	15.5%	1016	101	9.9%
	2042		950	164	17.2%	1100	122	11.1%
Do Something Upper Value Scenario 92 no. HGV/day	2027		807	117	14.5%	945	87	9.2%
	2032		871	135	15.5%	1016	101	9.9%
	2042		950	164	17.2%	1100	122	11.1%
Incremental Difference Average Scenario	2027	No.	+9	+0	-0.2%	+1	+0	+0.0%
		%	+1.1%	+0.0%		+0.1%	+0.0%	
	2032	No.	+8	+0	-0.2%	+0	+0	+0.0%
		%	+0.9%	+0.0%		+0.0%	+0.0%	
	2042	No.	+9	+0	-0.2%	+0	+0	+0.0%
		%	+1.0%	+0.0%		+0.0%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+9	+0	-0.2%	+1	+0	+0.0%
		%	+1.1%	+0.0%		+0.1%	+0.0%	
	2032	No.	+8	+0	-0.2%	+0	+0	+0.0%
		%	+0.9%	+0.0%		+0.0%	+0.0%	
	2042	No.	+9	+0	-0.2%	+0	+0	+0.0%
		%	+1.0%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-15. Link 3 – N2 Between Rathdrinagh and Landfill Access

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		826	126	15.2%	961	91	9.5%
	2032		893	145	16.3%	1034	106	10.2%
	2042		975	176	18.0%	1119	128	11.4%
Do Something Average Scenario 73 no. HGV/day	2027		840	130	15.4%	962	91	9.5%
	2032		907	149	16.4%	1035	106	10.2%
	2042		989	180	18.2%	1121	128	11.4%
Do Something Upper Value Scenario 92 no. HGV/day	2027		841	131	15.5%	962	91	9.5%
	2032		908	150	16.5%	1035	106	10.2%
	2042		990	181	18.3%	1121	128	11.4%
Incremental Difference Average Scenario	2027	No.	+14	+4	+0.2%	+1	+0	+0.0%
		%	+1.7%	+3.2%		+0.1%	+0.0%	
	2032	No.	+14	+4	+0.1%	+1	+0	+0.0%
		%	+1.6%	+2.8%		+0.1%	+0.0%	
	2042	No.	+14	+4	+0.2%	+2	+0	+0.0%
		%	+1.4%	+2.3%		+0.2%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+15	+5	+0.3%	+1	+0	+0.0%
		%	+1.8%	+4.0%		+0.1%	+0.0%	
	2032	No.	+15	+5	+0.2%	+1	+0	+0.0%
		%	+1.7%	+3.4%		+0.1%	+0.0%	
	2042	No.	+15	+5	+0.3%	+2	+0	+0.0%
		%	+1.5%	+2.8%		+0.2%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-16. Link 4 – N2 Between Landfill Access and O'Briens Cross (R150)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		826	126	15.2%	961	91	9.5%
	2032		893	145	16.3%	1034	106	10.2%
	2042		974	176	18.0%	1120	128	11.4%
Do Something Average Scenario 73 no. HGV/day	2027		841	132	15.7%	969	91	9.5%
	2032		908	151	16.7%	1042	106	10.2%
	2042		990	182	18.4%	1128	128	11.4%
Do Something Upper Value Scenario 92 no. HGV/day	2027		843	134	15.9%	969	91	9.4%
	2032		910	153	16.8%	1042	106	10.1%
	2042		992	184	18.5%	1128	128	11.3%
Incremental Difference Average Scenario	2027	No.	+15	+6	+0.5%	+8	+0	+0.0%
		%	+1.8%	+4.8%		+0.8%	+0.0%	
	2032	No.	+15	+6	+0.4%	+8	+0	+0.0%
		%	+1.7%	+4.1%		+0.8%	+0.0%	
	2042	No.	+16	+6	+0.4%	+8	+0	+0.0%
		%	+1.6%	+3.4%		+0.7%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+17	+8	+0.7%	+8	+0	-0.1%
		%	+2.1%	+6.3%		+0.8%	+0.0%	
	2032	No.	+17	+8	+0.5%	+8	+0	-0.1%
		%	+1.9%	+5.5%		+0.8%	+0.0%	
	2042	No.	+18	+8	+0.5%	+8	+0	-0.1%
		%	+1.8%	+4.5%		+0.7%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-17. Link 5 – N2 Between O'Briens Cross and Balrath Cross (R153)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		898	115	12.8%	1036	88	8.5%
	2032		969	133	13.7%	1114	102	9.1%
	2042		1054	161	15.2%	1205	123	10.2%
Do Something Average Scenario 73 no. HGV/day	2027		910	120	13.2%	1042	88	8.5%
	2032		981	138	14.0%	1120	102	9.1%
	2042		1067	166	15.5%	1211	123	10.2%
Do Something Upper Value Scenario 92 no. HGV/day	2027		911	121	13.3%	1042	88	8.5%
	2032		982	139	14.1%	1120	102	9.1%
	2042		1068	167	15.6%	1211	123	10.2%
Incremental Difference Average Scenario	2027	No.	+12	+5	+0.4%	+6	+0	+0.0%
		%	+1.3%	+4.3%		+0.6%	+0.0%	
	2032	No.	+12	+5	+0.3%	+6	+0	+0.0%
		%	+1.2%	+3.8%		+0.5%	+0.0%	
	2042	No.	+13	+5	+0.3%	+6	+0	+0.0%
		%	+1.2%	+3.1%		+0.5%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+13	+6	+0.5%	+6	+0	+0.0%
		%	+1.4%	+5.2%		+0.6%	+0.0%	
	2032	No.	+13	+6	+0.4%	+6	+0	+0.0%
		%	+1.3%	+4.5%		+0.5%	+0.0%	
	2042	No.	+14	+6	+0.4%	+6	+0	+0.0%
		%	+1.3%	+3.7%		+0.5%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-18. Link 6 – N2 Between Balrath Cross and Kilmoon Cross (R152)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		760	107	14.1%	1090	109	10.0%
	2032		821	124	15.1%	1173	125	10.7%
	2042		895	150	16.8%	1271	152	11.9%
Do Something Average Scenario 73 no. HGV/day	2027		769	111	14.5%	1095	109	10.0%
	2032		830	128	15.4%	1178	125	10.7%
	2042		904	154	17.1%	1276	152	11.9%
Do Something Upper Value Scenario 92 no. HGV/day	2027		771	113	14.7%	1095	109	9.9%
	2032		832	130	15.6%	1178	125	10.6%
	2042		906	156	17.2%	1276	152	11.9%
Incremental Difference Average Scenario	2027	No.	+9	+4	+0.4%	+5	+0	0.0%
		%	+1.2%	+3.7%		+0.5%	+0.0%	
	2032	No.	+9	+4	+0.3%	+5	+0	0.0%
		%	+1.1%	+3.2%		+0.4%	+0.0%	
	2042	No.	+9	+4	+0.3%	+5	+0	0.0%
		%	+1.0%	+2.7%		+0.4%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+11	+6	+0.6%	+5	+0	-0.1%
		%	+1.4%	+5.6%		+0.5%	+0.0%	
	2032	No.	+11	+6	+0.5%	+5	+0	-0.1%
		%	+1.3%	+4.8%		+0.4%	+0.0%	
	2042	No.	+11	+6	+0.4%	+5	+0	+0.0%
		%	+1.2%	+4.0%		+0.4%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-19. Link 7 – N2 South of Kilmoon

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		1492	220	14.8%	2089	146	7.0%
	2032		1612	254	15.8%	2243	169	7.5%
	2042		1759	308	17.5%	2421	204	8.4%
Do Something Average Scenario 73 no. HGV/day	2027		1501	224	14.9%	2094	146	7.0%
	2032		1621	258	15.9%	2248	169	7.5%
	2042		1768	312	17.6%	2426	204	8.4%
Do Something Upper Value Scenario 92 no. HGV/day	2027		1503	226	15.1%	2094	146	7.0%
	2032		1623	260	16.0%	2248	169	7.5%
	2042		1770	314	17.7%	2426	204	8.4%
Incremental Difference Average Scenario	2027	No.	+9	+4	+0.1%	+5	+0	+0.0%
		%	+0.6%	+1.8%		+0.2%	+0.0%	
	2032	No.	+9	+4	+0.1%	+5	+0	+0.0%
		%	+0.6%	+1.6%		+0.2%	+0.0%	
	2042	No.	+9	+4	+0.1%	+5	+0	+0.0%
		%	+0.5%	+1.3%		+0.2%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+11	+6	+0.3%	+5	+0	+0.0%
		%	+0.7%	+2.7%		+0.2%	+0.0%	
	2032	No.	+11	+6	+0.2%	+5	+0	+0.0%
		%	+0.7%	+2.4%		+0.2%	+0.0%	
	2042	No.	+11	+6	+0.2%	+5	+0	+0.0%
		%	+0.6%	+1.9%		+0.2%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-20. Link 8 – R150 West of O'Briens Cross (Kentstown)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		317	39	12.2%	300	20	6.8%
	2032		341	45	13.1%	322	24	7.3%
	2042		371	54	14.6%	348	29	8.2%
Do Something Average Scenario 73 no. HGV/day	2027		317	39	12.2%	301	20	6.8%
	2032		342	45	13.1%	323	24	7.3%
	2042		372	54	14.5%	348	29	8.2%
Do Something Upper Value Scenario 92 no. HGV/day	2027		317	39	12.2%	301	20	6.8%
	2032		342	45	13.1%	323	24	7.3%
	2042		372	54	14.5%	348	29	8.2%
Incremental Difference Average Scenario	2027	No.	+0	+0	+0.0%	+1	+0	+0.0%
		%	+0.0%	+0.0%		+0.3%	+0.0%	
	2032	No.	+1	+0	+0.0%	+1	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	
	2042	No.	+1	+0	-0.1%	+0	+0	+0.0%
		%	+0.3%	+0.0%		+0.0%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+0	+0	+0.0%	+1	+0	+0.0%
		%	+0.0%	+0.0%		+0.3%	+0.0%	
	2032	No.	+1	+0	+0.0%	+1	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	
	2042	No.	+1	+0	-0.1%	+0	+0	+0.0%
		%	+0.3%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-21. Link 9 – R150 East of O'Briens Cross (Duleek)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		537	63	11.8%	539	34	6.4%
	2032		579	73	12.6%	578	40	6.9%
	2042		629	89	14.1%	623	48	7.7%
Do Something Average Scenario 73 no. HGV/day	2027		540	65	12.1%	540	34	6.4%
	2032		582	75	12.9%	580	40	6.8%
	2042		632	91	14.3%	625	48	7.7%
Do Something Upper Value Scenario 92 no. HGV/day	2027		540	65	12.1%	540	34	6.4%
	2032		582	75	12.9%	580	40	6.8%
	2042		632	91	14.3%	625	48	7.7%
yIncremental Difference Average Scenario	2027	No.	+3	+2	+0.3%	+1	+0	+0.0%
		%	+0.6%	+3.2%		+0.2%	+0.0%	
	2032	No.	+3	+2	+0.3%	+2	+0	-0.1%
		%	+0.5%	+2.7%		+0.3%	+0.0%	
	2042	No.	+3	+2	+0.2%	+2	+0	+0.0%
		%	+0.5%	+2.2%		+0.3%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+3	+2	+0.3%	+1	+0	+0.0%
		%	+0.6%	+3.2%		+0.2%	+0.0%	
	2032	No.	+3	+2	+0.3%	+2	+0	-0.1%
		%	+0.5%	+2.7%		+0.3%	+0.0%	
	2042	No.	+3	+2	+0.2%	+2	+0	+0.0%
		%	+0.5%	+2.2%		+0.3%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-22. Link 10 – R153 Between Balrath and Kentstown

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		440	42	9.5%	519	20	3.9%
	2032		473	48	10.2%	556	24	4.2%
	2042		512	59	11.4%	598	29	4.8%
Do Something Average Scenario 73 no. HGV/day	2027		441	42	9.5%	520	20	3.9%
	2032		475	48	10.2%	557	24	4.2%
	2042		514	59	11.4%	599	29	4.8%
Do Something Upper Value Scenario 92 no. HGV/day	2027		441	42	9.5%	520	20	3.9%
	2032		475	48	10.2%	557	24	4.2%
	2042		514	59	11.4%	599	29	4.8%
Incremental Difference Average Scenario	2027	No.	+1	+0	+0.0%	+1	+0	+0.0%
		%	+0.2%	+0.0%		+0.2%	+0.0%	
	2032	No.	+2	+0	+0.0%	+1	+0	+0.0%
		%	+0.4%	+0.0%		+0.2%	+0.0%	
	2042	No.	+2	+0	+0.0%	+1	+0	+0.0%
		%	+0.4%	+0.0%		+0.2%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+1	+0	+0.0%	+1	+0	+0.0%
		%	+0.2%	+0.0%		+0.2%	+0.0%	
	2032	No.	+2	+0	+0.0%	+1	+0	+0.0%
		%	+0.4%	+0.0%		+0.2%	+0.0%	
	2042	No.	+2	+0	+0.0%	+1	+0	+0.0%
		%	+0.4%	+0.0%		+0.2%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-23. Link 11 – R152 West of Kentstown

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		607	57	9.4%	662	25	3.7%
	2032		654	66	10.1%	709	29	4.0%
	2042		708	80	11.2%	761	35	4.5%
Do Something Average Scenario 73 no. HGV/day	2027		610	57	9.3%	663	25	3.7%
	2032		656	66	10.0%	710	29	4.0%
	2042		710	80	11.2%	763	35	4.5%
Do Something Upper Value Scenario 92 no. HGV/day	2027		610	57	9.3%	663	25	3.7%
	2032		656	66	10.0%	710	29	4.0%
	2042		710	80	11.2%	763	35	4.5%
Incremental Difference Average Scenario	2027	No.	+3	+0	-0.1%	+1	+0	+0.0%
		%	+0.5%	+0.0%		+0.2%	+0.0%	
	2032	No.	+2	+0	-0.1%	+1	+0	+0.0%
		%	+0.3%	+0.0%		+0.1%	+0.0%	
	2042	No.	+2	+0	+0.0%	+2	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+3	+0	-0.1%	+1	+0	+0.0%
		%	+0.5%	+0.0%		+0.2%	+0.0%	
	2032	No.	+2	+0	-0.1%	+1	+0	+0.0%
		%	+0.3%	+0.0%		+0.1%	+0.0%	
	2042	No.	+2	+0	+0.0%	+2	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-24. Link 12 – N51 Navan Road (Slane)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		818	106	13.0%	858	60	7.0%
	2032		883	123	13.9%	921	70	7.5%
	2042		961	149	15.5%	994	84	8.5%
Do Something Average Scenario 73 no. HGV/day	2027		819	106	13.0%	858	60	7.0%
	2032		884	123	13.9%	921	70	7.5%
	2042		962	149	15.5%	994	84	8.5%
Do Something Upper Value Scenario 92 no. HGV/day	2027		819	106	13.0%	858	60	7.0%
	2032		884	123	13.9%	921	70	7.5%
	2042		962	149	15.5%	994	84	8.5%
Incremental Difference Average Scenario	2027	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.1%	+0.0%		+0.0%	+0.0%	
	2032	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.1%	+0.0%		+0.0%	+0.0%	
	2042	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.1%	+0.0%		+0.0%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.1%	+0.0%		+0.0%	+0.0%	
	2032	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.1%	+0.0%		+0.0%	+0.0%	
	2042	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.1%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-25. Link 13 – N51 Drogheda Road (Slane)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2027		488	63	13.0%	515	31	6.0%
	2032		527	73	13.9%	553	36	6.5%
	2042		574	89	15.4%	596	44	7.3%
Do Something Average Scenario 73 no. HGV/day	2027		490	63	12.9%	515	31	6.0%
	2032		528	73	13.9%	553	36	6.5%
	2042		575	89	15.4%	596	44	7.3%
Do Something Upper Value Scenario 92 no. HGV/day	2027		490	63	12.9%	515	31	6.0%
	2032		528	73	13.9%	553	36	6.5%
	2042		575	89	15.4%	596	44	7.3%
Incremental Difference Average Scenario	2027	No.	+2	+0	-0.1%	+0	+0	+0.0%
		%	+0.4%	+0.0%		+0.0%	+0.0%	
	2032	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.2%	+0.0%		+0.0%	+0.0%	
	2042	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.2%	+0.0%		+0.0%	+0.0%	
Incremental Difference Upper Value Scenario	2027	No.	+2	+0	-0.1%	+0	+0	+0.0%
		%	+0.4%	+0.0%		+0.0%	+0.0%	
	2032	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.2%	+0.0%		+0.0%	+0.0%	
	2042	No.	+1	+0	+0.0%	+0	+0	+0.0%
		%	+0.2%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

The above detailed assessment of baseline and forecast future network traffic flows confirm that results of the preliminary peak hour scoping assessments summarised in Table 13.7, Table 13.8 and Table 13.9 for the morning peak hour and in Table 13.10, Table 13.11 and Table 13.12 for eh evening peak hour.

The incremental increase in traffic arising from the proposed development in the morning and evening peak hours is significantly sub-threshold on all link roads both north and south of the existing access junction serving Knockharley Landfill from the N2. This is the case for both the average daily traffic flows of the development set against the average daily network traffic flows. It is also the case with respect to the upper value or robust assessment traffic generation forecast of the site set against the average network traffic flows.

The assessment tables provide a comparison between the forecast traffic associated with the proposed development (average and upper value peak hour generation) which are based upon examination of three years of weighbridge data from which is derived the existing average and upper value traffic generation arising from the existing development. Since the proposed development, from the perspective of traffic generation, is effectively a continuation of use it stands to reason the existing operation is a reliable model for the forecasting of the traffic characteristics of the proposed development.

Examination of the tabulated data confirms that the traffic generated by the proposed development will be imperceptible over the existing scenario on the receiving road network. The incremental impact of development traffic on all links does not exceed the typical threshold value of 10% or the lower 5% threshold for sensitive or congested networks which usually triggers the need for further assessment and detailed junction/network capacity assessments.

It should be noted that where the threshold percentage values are not exceeded, the increase in the percentage of HGV includes percentage values in the order of 5%, nevertheless in each of these cases the numerical increase in HGV traffic flows are not significant.

It is evident from the assessment of link flows that the impact arising from an average total site generation of 73 no. HGV under the Average Generation Scenario and 92 no. HGV under the Upper Value Scenario will not give rise to significant adverse effects on the capacity, delay, journey times or the general operation of the receiving road network link roads.

Further to the network link capacity assessments it is noted that turning traffic at junctions have the greatest effect on network capacity. Transport Infrastructure Ireland (TII) Publication TII-PE-PDV-02045 *'Traffic and Transport Assessment Guidelines'* (May 2014) provides advisory thresholds for Traffic and Transport Assessment where national roads are affected. Having regard to those advisory thresholds the following Table 13.26 summarises the increase in traffic flow turning movements on the receiving road junctions in the study area under the Average Generation Scenario.

Site 1 is the N2/N51 Signal Controlled Crossroad in Slane, Site 2 is the N2/L1613/L1013 priority controlled Rathdrinagh Cross, Site 4 is the N2/R150 O'Brien's Cross and Site 6 is the N2/R153 stagger crossroad at Balrath. This numbering corresponds with the numbering system used in the traffic surveys presented Volume 3, Appendix 13.1 of this EIAR and is consistent with the labelling convention used in the corresponding network flow diagrams provided Volume 3, Appendix 13.2 of this EIAR. Site 3 is the existing Knockharley Landfill site access junction which is excluded from the turning count assessment.

Table 13.26 shows that, based upon the Average Generation Scenario the increase in the total turning traffic flows (not total junction throughput) at any of the junctions on the receiving national road network in the morning peak hour is generally less than +1.0% at all junctions but for the Rathdrinagh crossroad where the vale is a maximum of 3.7%. These values are lower than the lower threshold value advised in TII-PE-PDV-02045 typically triggering the need for detailed traffic modelling analysis of development traffic impact in congested or sensitive locations. The forecast increase in junction turning traffic arising from the proposed development is approximately multiples lower than the typical threshold value of 10%.

Table 13-26. Forecast Uplift in Turning Flows – Average Traffic Generation Scenario

Year		AM Peak 08:00-09:00hrs							
		Site 1		Site2		Site 4		Site 6	
2027	Do Nothing	599		237		344		396	
	Do Something	602		246		348		398	
	Difference	+3	+0.5%	+9	+3.7%	+4	+1.1%	+2	+0.5%
2032	Do Nothing	645		256		371		427	
	Do Something	648		265		375		429	
	Difference	+3	+0.5%	+9	+3.5%	+4	+1.0%	+2	+0.5%
2042	Do Nothing	701		278		404		464	
	Do Something	704		287		408		466	
	Difference	+3	+0.5%	+9	+3.2%	+4	+1.0%	+2	+0.4%
Year		PM Peak 17:00-18:00hrs							
		Site 1		Site2		Site 4		Site 6	
2027	Do Nothing	653		281		409		431	
	Do Something	654		281		411		432	
	Difference	+1	+0.1%	+0	+0.0%	+2	+0.4%	+1	+0.2%
2032	Do Nothing	700		303		439		461	
	Do Something	701		303		441		462	
	Difference	+1	+0.1%	+0	+0.0%	+2	+0.4%	+1	+0.2%
2042	Do Nothing	754		329		472		495	
	Do Something	755		329		474		496	
	Difference	+1	+0.1%	+0	+0.0%	+2	+0.4%	+1	+0.2%

It is reasonably concluded from the above analyses that the effect of development traffic on the capacity of the receiving road network warrants no further detailed analysis with respect to the potential effects of the proposed development on junction and network capacity and delay.

13.12.4.3 Need for Computer Modelling of Development Effects on Junction Capacity

As recommended by the TII, the Transport Research Laboratory (TRL) computer modelling program *'Junctions 10/11'* is typically used to assess the existing and future performance of the junctions in isolation. Junctions 10/11 is primarily intended as a means of assessing junction performance. The output provides performance indicators for roads designers and planners with regards to capacity, queuing and delay at junctions including priority junctions. Junctions 10/11 is a widely accepted analytical tool used to assess priority and roundabout junction performance, typically through the calculation of 'Degree of Saturation' (DoS), queue lengths, delays and reserve capacity.

The accuracy and validity of these capacity assessment models is dependent upon reliable baseline traffic data, representative future traffic forecasts and a meaningful change in volume or demand. The subject development results in a change in turning movement flows of generally less than 1.0% at all of the junctions in question save for the Rathdrinagh Cross. This change equates to fewer than 3 no. vehicles per hour which is within the margin of error for typical traffic survey data (often ±2–5%) and therefore

does not materially alter the traffic composition or queueing behaviour on the receiving road network. In the case of Rathdrinagh Cross the maximum increase is in the order of 3.7% totaling 9 no. turning vehicles which is again considered to fall within the typical margin of error for traffic survey data.

The numerical resolution of the Junctions 10/11 model (particularly ARCADY and PICADY components) is not sensitive to traffic changes of this magnitude. A sub 1.0-3.7% change in turning volumes will not alter the model outputs (DoS, delay, or queues) in a way that is statistically or operationally meaningful. Given the natural variability in traffic counts, daily and seasonal fluctuations often significantly exceed 3.7% variation. It is not best practice to model minor flow changes that are indistinguishable from background variability.

Junctions typically operate within performance thresholds where a 1.0-3.7% change would not affect, operational level of service (LoS), trigger points for mitigation or trigger the need for intervention or upgrade. Transport Infrastructure Ireland (TII) and other agencies (e.g., CIHT) advocate for proportionate analysis and recommend that detailed junction modelling should be reserved for material changes (typically ≥5–10%) in flow.

In conclusion, the proposed change in traffic turning movements represents a negligible fraction of total junction volume and does not warrant detailed modelling in Junctions 10/11. Such small variations do not materially affect junction performance, are unlikely to register in model outputs and are within normal survey tolerance and statistical noise. Accordingly, detailed junction modelling in this instance would not provide meaningful insights and would be inconsistent with the principle of proportionate assessment.

By reference to Table 13.11 the proposed development is calculated to generate an Average Value of 109 no. HGV trips per day, with an Upper Value volume of 150 no. HGVs per day during short duration peaks. This level of traffic generation has been assessed in accordance with Transport Infrastructure Ireland (TII) Traffic and Transport Assessment Guidelines (2014), which provide the standard thresholds for determining the requirement for further detailed impact analysis on the operation of junctions and the receiving road network.

The impact of the average value HGV traffic generation together with staff movements has been shown to be fivefold below the TII trigger thresholds, which typically apply when development traffic constitutes a material percentage (generally 5% or more in congested environments and 10% otherwise) of existing traffic flows on the receiving road network, or when development generates significant volumes in the peak hour commonly taken as 100 no. two-way movements.

By reference to Section 13.12.2.1 the average generation rate of 73 no. HGV trips per day translates to approximately 7-8 no. HGV trips per hour, assuming a 10 hour operational window. This volume of hourly traffic generation is considered very low and operationally negligible in the context of the receiving roads network. Similarly, based upon the Upper Value level of 92 no. HGV trips per day, and similarly an average of 9-10 no. HGV trips per hour, the increase in hourly movements remains marginal, with no practical effect on junction capacity, queue lengths, traffic delays or journey times on the receiving road network.

As set out above, detailed junction modelling software such as Junctions 10/11 (ARCADY, PICADY) is designed to assess capacity constraints and performance under meaningful levels of traffic stress. In scenarios where additional vehicle volumes are so low as to fall within the margin of error or sensitivity limits of the model, modelling is not only unnecessary but may produce unreliable or non-informative results due to the statistical insignificance of the input change. The difference between the Average Value and the Upper Value (i.e., 19 no. two-way vehicles per day) is so minor as not to register a perceptible operational impact, especially when spread over multiple hours.

Furthermore, the character of HGV traffic, often dispersed throughout the day due to operational scheduling (see Figure 13.33), reduces the likelihood of concentrated peak-hour impacts.

Consequently, no discernible difference in network performance would arise between Average Value and Upper Value traffic flow days, and the predicted traffic volumes do not meet the scale or threshold that would warrant a capacity-based assessment.

The volume of HGV traffic generated by the proposed development falls well below the threshold where junction capacity or performance would be adversely affected. Therefore, a detailed junction capacity analysis using modelling tools such as Junctions 10/11 is not required, and a qualitative assessment supported by empirical thresholds and professional judgement is considered fully appropriate. This is provided in the detailed traffic flow analyses provide in Table 13.13 through Table 13.26.

13.12.5 Assessment of Traffic Effects during Construction Phases

13.12.5.1 Forecast Construction Traffic and Assessment of Traffic Effects on Network

Permission is sought for the expansion of the existing landfill through the construction of an additional 3.38 million m³ of active void space, together with a further 807,000 m³ in the proposed Piggyback Cell. Waste acceptance would continue until this expanded capacity is fully used.

The proposal does not involve any increase in the current permitted annual intake of up to 435,000 tonnes of non-hazardous waste, which includes:

- Up to 150,000 tonnes of incinerator bottom ash (IBA),
- Household, commercial, and industrial waste,
- Residual fines, non-hazardous contaminated soils,
- Construction and demolition (C&D) waste, and
- Baled recyclables.

In addition, permission is sought to accept up to 5,000 tonnes per annum of stable non-reactive hazardous waste.

The expansion of the landfill will follow the below proposed sequence:

- Phase 1 (Years 0-2) – construction of Cell 31 and Cell 32, including a ramp for access
- Phase 2 (Years 3-4) - construction of Cell 33 and Cell 34, including a ramp for access
- Phase 3 (Years 6-7) - construction of Cell 35 and Cell 36; capping of Cell 31 and Cell 32.
- Phase 4 (Years 9-10) - construction of Cell 37 and Cell 38; capping of Cell 33 and Cell 34
- Phase 5 (Years 12-14) - construction of Cell 39; capping of Cell 35 and Cell 36
- Phase 6 (Years 16-17) - capping of Cell 37 and Cell 38. The original landfill area will be capped and Cell 40 will be created as a piggyback cell between the original landfill and the proposed landfill areas which are capped.
- Phase 7 (Years 18-21) – Cell 39 will be capped and Cell 40 (piggyback cell) will be extended southwards and subsequently capped.

Works will generally be confined to 08:00 to 18:30 Monday to Saturday. No work will be carried out on Sundays or bank holidays and the Site will remain secure when works are not taking place.

As has been the case for the life of the existing facility, landfill cell construction will occur on a phased basis throughout the lifetime of the landfill with each cell construction period typically lasting for up to two years. The following Table 13-27 shows the Project Phasing and construction and shows how landfill operations and cell construction is proposed to be coordinated over the life of the landfill facility.

Table 13-27. Project Phasing and Construction Activities

Calendar Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Project Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Phasing		1			2			3			4			5			6				7		
Existing Landfill Cells																							
Cell 15																							
Cell 16																							
Cell 17																							
Cell 18																							
Cell 19																							
Cell 20																							
Cell 21																							
Cell 22																							
Cell 23																							
Cell 24																							
Cell 25																							
Cell 26																							
Permitted IBA Facility / IBA Cells																							
IBA Facility Building																							
Permitted IBA Cell 27																							
Permitted IBA Cell 28																							
Permitted IBA Cell 29																							
Permitted IBA Cell 30																							
C&D Waste Facility																							
Leachate Lagoon																							
Ext. Atten. Lagoon																							
Proposed Project West Expansion																							
Site clearance																							
Screening Berms																							
Surface Water Inf.																							
Stream Diversion																							
ESB Line Diversion																							
Cells 31 - 32																							
Cells 33 - 34																							
Cells 35 - 36																							
Cells 37 - 38																							
Cell 39																							
Cell 40 Piggyback																							

Construction Operational Temp Capping Capping

Table 13-28. Project Phasing and Construction HGV Generation

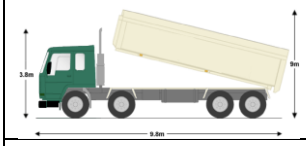
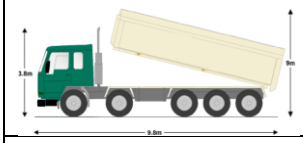
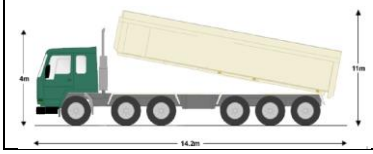
Calendar Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Phasing	1		2			3			4				5		6				7			
Materials to be Exported from Site																						
Volume of Clay HGV Capacity 20t	0		0			24,500			24,500				24,500		24,500				24,500			
Total Number of Loads	**0**		**0**			**1,225**			**1,225**				**1,225**		**1,225**				**1,225**			
Materials to be Imported to Site																						
Leachate Stone (m^3) 20t per load	10,784		9,840			9,783			11,308				5,439		4,900				0			
Drainage Stone (m^3) 20t per load	200		200			200			200				100		0				0			
HDPE Pipes (lin.m) 2,100 lin.m per load	5,084		2,825			3,786			1,894				1,434		1,478				1,000			
Geomembrane (m^2) 12,600m^2 per load	81,983		65,737			84,348			65,957				51,271		60,750				113,645			
Geotextile (m^2) 3,600m^2 per load	46,308		30,097			30,798			38,297				22,997		16,792				0			
Concrete (m^3) 8m^3 per load	56		56			56			56				28		0				0			
Total Number of Loads	**578**		**524**			**523**			**599**				**292**		**255**				**10**			

Imports required to be brought to site are as set out in Table 13-28. For clay export, the total volume required over the lifetime of the project is estimated at c. 367,065 m³. Clay export will not commence until Phase 3 (Year 6). All clay exports can be distributed over a 15-year period if the final year is excluded for completion works. In this regard the project will require approximately 220,000 m³ of clay stockpiled during Phases 6 and 7 to complete the final capping works. The greatest generation of surplus clay material will occur during Phases 3, 4, and 5, when the bulk of excavation activity takes place.

The generation of HGV traffic from the landfill will be in full loads since the volume of material transported by each vehicle leaving the site is not product dependent or commercially driven but leaves in the most economical loads which are full. A guide to the carrying capacity of typical HGVs used by the quarry and haulage industry to transport aggregates, construction materials, excess soil and/or C&D waste is provided in Table 13-29 below. The proposed facility will principally be served by 8-wheeled tippers and articulated tippers.

Each of the phases is forecast to generate 1,225 no. loads of clay and this is based upon the conservative assumption that the maximum load will be 20t. It can be appreciated that where all loads transported by articulated HGV the total number of loads would reduce to 845 no. Based upon weighbridge data at inert landfill sites receiving soils the typical split is 70% articulated vehicles and 30% rigid tippers in which case the total number of HGV traffic movements per phase would be in the order of 932 no. loads.

Table 13-29. Clay Haulage Typical Vehicle Characteristics

Vehicle Type	Length	Max Weight	Capacity
8 Wheel x 4 Axle Tipper (Eight Wheeler) 	9.8m	32t	20t
10 Wheel x 5 Axle Tipper (Ten Wheeler) 	9.8m	32t	22t
Articulated Tipper 	14.2m	44t	29t

On the conservative assumption that all clay in each phase would be exported from the site in the space of 6 months (125 no. working days) it is expected that this activity has the potential to generate approximately 7-10 no. loads per day with the lower number based upon the likely and realistic composition of articulated and rigid trucks and the higher figure based on all loads being transported by traditional 8-wheel tipper trucks.

Phase 3 will have the greatest concentration of exported and imported materials. It is forecast that materials being bought to site will generate a total of 523 no. loads. On the same basis of all imported materials arriving to the site in a 6-month period this has the potential to generate in the region of 4 no. loads per day. It can be appreciated that there may be occasional spikes in traffic generation but given that activities will be programmed and deliveries scheduled it is not expected that there would be prolonged peaks with spikes expected to be limited to activities such as concrete pouring.

On the basis of the above it is expected that the construction periods at the facility will give rise to additional HGV trips in the order of 15 no. per day or less. This is assuming that construction is condensed into a 6-month period. From discussions with the operator of the existing landfill it is estimated that the construction periods will give rise to an additional 10 no. operatives on site.

It is expected that construction staff traffic movements will not occur in the morning and evening commuter peak hours, nevertheless in the interest of a robust assessment and for the purposes of this assessment the forecast traffic generation during construction is applied to the peak hours following the same methodology as has been adopted in the analysis of operational traffic.

It is assumed that construction phase HGV traffic generation will be of significantly lower order to the operational scenario with typically 15 no. HGV trips per day. There may be very short-lived spikes associated with concrete pours for bases however these are not likely to be more frequent that 2-3 no. days of the construction phase. Such intensification in activity at the site will be coordinated with other site activities to ensure that the total HGV traffic generation of the site does not exceed that of the operational phase.

In the interest of a robust assessment, the arrival pattern of construction staff is assumed to be the same as for operational staff, including administration staff.

Table 13-30. Link 1 – N2 North of Slane Crossroad (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		949	123	12.9%	920	87	9.4%
Do Something Upper Value + Construction Traffic	2032		958	123	12.8%	921	87	9.4%
Incremental Difference	2032	No.	+9	+0	-0.1%	+1	+0	+0.0%
		%	+0.9%	+0.0%		+0.1%	+0.0%	

Table 13-31. Link 2 – N2 North of Rathdrinagh Crossroad (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		863	135	15.7%	1016	101	9.9%
Do Something Upper Value + Construction Traffic	2032		875	135	15.5%	1017	101	9.9%
Incremental Difference	2032	No.	+12	+0	-0.2%	+1	+0	+0.0%
		%	+1.4%	+0.0%		+0.1%	0.0%	

Table 13-32. Link 3 – N2 Between Rathdrinagh and Landfill Access (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		893	145	16.3%	1034	106	10.2%
Do Something Upper Value + Construction Traffic	2032		912	150	16.5%	1035	106	10.2%
Incremental Difference	2032	No.	+19	+5	+0.2%	+1	+0	+0.0%
		%	+2.1%	+3.4%		+0.1%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-33. Link 4 – N2 Between Landfill Access and O'Briens Cross (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		893	145	16.3%	1034	106	10.2%
Do Something Upper Value + Construction Traffic	2032		918	157	17.1%	1045	106	10.2%
Incremental Difference	2032	No.	+25	+12	+0.8%	+11	+0	+0.0%
		%	+2.8%	+8.3%		+1.1%	+0.0%	

Table 13-34. Link 5 – N2 Between O'Briens Cross and Balrath Cross (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		969	133	13.7%	1114	102	9.1%
Do Something Upper Value + Construction Traffic	2032		989	143	14.4%	1122	102	9.1%
Incremental Difference	2032	No.	+20	+10	+0.7%	+8	+0	+0.0%
		%	+2.1%	+7.5%		+0.7%	+0.0%	

Table 13-35. Link 6 – N2 Between Balrath Cross and Kilmoon Cross (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		821	124	15.1%	1173	125	10.7%
Do Something Upper Value + Construction Traffic	2032		838	134	16.0%	1178	125	10.7%
Incremental Difference	2032	No.	+17	+10	+0.9%	+6	+0	+0.0%
		%	+2.1%	+8.1%		+0.5%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-36. Link 7 – N2 South of Kilmoon (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		1612	254	15.8%	2243	169	7.5%
Do Something Upper Value + Construction Traffic	2032		1629	264	16.3%	2250	169	7.5%
Incremental Difference	2032	No.	+17	+10	+0.5%	+7	+0	+0.0%
		%	+1.1%	+3.9%		+0.3%	+0.0%	

Table 13-37. Link 8 – R150 West of O'Briens Cross (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		341	45	13.1%	322	24	7.3%
Do Something Upper Value + Construction Traffic	2032		342	45	13.1%	323	24	7.3%
Incremental Difference	2032	No.	+1	+0	+0.0%	+1	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	

Table 13-38. Link 9 – R150 East of O'Briens Cross (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		579	73	12.6%	578	40	6.9%
Do Something Upper Value + Construction Traffic	2032		583	75	12.9%	581	40	6.8%
Incremental Difference	2032	No.	+4	+0	+0.0%	+3	+0	+0.0%
		%	+0.7%	+0.0%		+0.5%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-39. Link 10 – R153 Between Balrath and Kentstown (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		473	48	10.2%	556	24	4.2%
Do Something Upper Value + Construction Traffic	2032		475	48	10.2%	558	24	4.2%
Incremental Difference	2032	No.	+2	+0	+0.0%	+2	+0	+0.0%
		%	+0.4%	+0.0%		+0.4%	+0.0%	

Table 13-40. Link 11 – R152 West of Kentstown (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		654	66	10.1%	709	29	4.0%
Do Something Upper Value + Construction Traffic	2032		656	66	10.0%	711	29	4.0%
Incremental Difference	2032	No.	+2	+0	+0.0%	+2	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	

Table 13-41. Link 12 – N51 Navan Road (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		883	123	13.9%	921	70	7.5%
Do Something Upper Value + Construction Traffic	2032		885	123	13.9%	921	70	7.5%
Incremental Difference	2032	No.	+2	+0	+0.0%	+0	+0	+0.0%
		%	+0.2%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-42. Link 13 – N51 Drogheda Road (Construction)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		527	73	13.9%	553	36	6.5%
Do Something Upper Value + Construction Traffic	2032		529	73	13.9%	553	36	6.5%
Incremental Difference	2032	No.	+2	+0	+0.0%	+0	+0	+0.0%
		%	+0.4%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

A common and accepted approach, in line with TII Traffic and Transport Assessment Guidelines (2014) and consistent with standard practice, is to assume that development generated trips distribute in proportions similar to those observed for existing traffic flows on the receiving network. This reflects the principle that road users generally follow the same patterns of travel as current users, being influenced by the existing settlement distribution, trip attractors, and available routes. The distribution of light construction traffic at the site access and to the wider network follows the above principles. The following network flow diagrams in Volume 3, Appendix 13.2 of this EIAR document the daily and peak hour distribution of light vehicles generated by the landfill site and light construction vehicles.

- Figure 8 '*Surveyed 2025 Daily Light Traffic Distribution 07:00-19:00hrs*'
- Figure 9 '*Surveyed 2025 Morning Peak Hour Light Traffic Distribution 08:00-09:00hrs*'
- Figure 10 '*Surveyed 2025 Evening Peak Hour Light Traffic Distribution 17:00-18:00hrs*'

It is expected that the soils removed from the site will be transported to existing inert landfill sites and to inert landfills that will come into operation over the lifetime of the landfill expansion project. In general these facilities are located to the south of Knockharley accordingly this HGV traffic is assumed to use the N2. Based upon the previous construction periods at the existing landfill, it is expected that the vast majority of imported materials will be sourced from manufacturing facilities to the south and so HGV associated with importing materials for construction, including construction of landfill cells are assumed for the purposes of this assessment to arrive from the south via the N2.

The following network flow diagrams in Volume 3, Appendix 13.2 of this EIAR show the forecast construction traffic flows on the receiving road network.

- Figure 47 '*Forecast Construction Traffic Daily Traffic Generation 07:00-19:00hrs*'
- Figure 48 '*Forecast Construction Traffic Morning Peak Hour Traffic Generation 08:00-09:00hrs*'
- Figure 49 '*Forecast Construction Traffic Evening Peak Hour Traffic Generation 17:00-18:00hrs*'

The above Table 13-30 through Table 13-42 show the forecast morning and evening peak hour link traffic flows during the construction period of Phase 3. Phase 3 is representative of the most intensive construction traffic period, and the analyses combines construction traffic with the Upper Value operational traffic generation of the landfill and so the assessments can reasonably be considered robust. Importantly the tables show that the short-term forecast increase in traffic during the construction phase when combined with Upper Value operational traffic will be less than the lower threshold value of 10% on the receiving road network in the study area. As per the operational phase, the threshold value of 10% is not exceeded so for the same reasons set out for the assessment of operational phase traffic effects, the

traffic arising during the construction periods of the current proposed development will not give rise to capacity issues at the existing development access or on the adjoining receiving road network.

13.12.6 Development Access

13.12.6.1 Access Layout and Geometry

The original planning permission 01/5006 included works to construct a new entrance layout, new access road and road widening of National Road (N2). The existing site is served by direct vehicular access to the N2 National Primary Road at a ghost island priority layout. The ghost island provides easy access for right turning vehicles from the north. This is complimented with an auxiliary left turn deceleration lane to facilitate vehicles coming from the south. The turning facilities are incorporated in the interest of improving road safety and preserving the through-flow of traffic on the N2 National Primary Road. The access geometry was thoroughly scrutinised by Meath County Council and the former National Roads Authority at the planning stages. The junction layout was agreed with Meath County Council at detailed design stages before the junction was constructed and again before the landfill site opened in December 2004. The junction has been designed and constructed in accordance with Design Manual for Roads and Bridges (NRA:DMRB) TD42 *'Geometric Design of Major/Minor Priority Junctions'* (superseded by TII DN-GEO-03060). In subsequent planning applications and grant of planning permissions at the site neither the NRA or Meath County Council expressed concern with respect to the layout, geometry, capacity or traffic operation of the landfill access junction.

The geometry of the access was designed to Design Manual for Roads and Bridges (DMRB):TD42 *'Geometric Design of Major/Minor Priority Junctions'* and constructed in accordance with the requirements of the NRA: DMRB for a 100kph Design Speed. The access was subject to independent Road Safety Audits, Stages 1 and 2 at the design stage and a Stage 3 Road Safety Audit was prepared upon completion of construction. All road safety auditing was carried out in accordance with NRA standard HD/19.

Table 13-43. Road Design Parameters

Design Parameter 100km/h Design Speed	Existing Junction	DMRB TD42/95	DN-GEO-03060 May 2023	
Hard Shoulder (Hard Strip)	0.9m	0.9m (Para. 7.89)	0.5m (Para. 5.6.5)	☑
Through Lane Width	3.65m	3.65-3.0m (Para. 7.20)	3.65-3.0m (Para. 5.6.9.3)	☑
Right Turn Lane Width	3.5m	3.5-3.0m (Para. 7.35)	3.5-3.0m (Para. 5.6.9.3)	☑
Left Turn Lane Width	3.0m	3.5-3.0m (as per para. 7.35)	Not to be provided on single c/way (Para. 5.7)	☒
Ghost Island Taper	1:30	1:30 (Table 7/3)	1:30 (Table 5.7)	☑
Turning Length	30m	Min 10m (Para. 7.32)	Min 10m (Para. 5.6.9.1)	☑
Deceleration Length	80m	80m (Table 7/5a)	80m (Table 5.9)	☑
Direct Taper Length	25m	25m (Table 7/4)	25m (Table 5.8)	☑

Table 13.43 shows the geometric parameters of ghost island junctions set out in standard NRA DMRB TD42 to which the junction was designed and constructed. Also provided in the Table 13.43 are the corresponding geometric parameters set out in the current TII Standard DN-GEO-03060.

Table 13.43 shows that the design parameters, save one relating to auxiliary left turn lanes, have not changed since the design and construction of the existing site access junction. It follows therefore that the existing layout and design of the junction meets with the requirement of TII Standard DN-GEO-03060 *'Geometric Design of Junctions'*. Save for the consideration of the left turn auxiliary lane, no changes are required to ensure that the junction layout complies with the current standard.

A geometric review of the ghost island junctions on the N2 within the study scope confirms that the various junctions including R152 Kilmoon Cross, R153 Balrath Cross and R150 O'Briens Cross have been retrofitted by the Roads Authority to remove the pre-existing left turn auxiliary turning lanes, this has been done by removing the bifurcation arrow and replacing the dashed white marking separating the ahead lane from the auxiliary lane with a yellow dashed marking. The modifications to the junction layouts effectively replaces the left turning lane and reinstates the hard shoulder. It is noted that the modifications to the N2 junctions includes the Knockharley Landfill access junction from which the left turning lane has been removed and so complies with the current geometric standard. The layout of the existing site access junction is compliant with the current roads design standard. The junction incorporates no left turning auxiliary lane which is consistent in character with the series of other N2 junctions with R150, R152 and R153 to the south. Sequences of junctions should provide drivers with layouts that have consistent standards that are not likely to confuse them, accordingly, it is not proposed to alter the existing site access junction. Given that there is no proposed amendment or permanent change to the site access junction there is no subject matter for further Road Safety Auditing and the junction should continue to operate satisfactorily.

13.12.6.2 Access Capacity

TII Standard DN-GEO-03060 at Section 4.2.2 presents the most appropriate junction types based on projected traffic flows on both the major road and minor road. These values are typically used for an initial assessment of the most appropriate junction type however it is noted that the final junction type will usually be subject to traffic analysis by the designer to assess the capacity based on the projected turning movements at the junction. The guidance advises that simple priority junctions are generally the most appropriate form of junction for accommodating local access onto single carriageway roads. For junctions serving lightly trafficked minor roads, the use of a simple priority junction is considered suitable where the forecast two-way Annual Average Daily Traffic (AADT) on both the major and minor roads falls below the thresholds set out in Table 4.1 of the standard. Where projected flows lie within the ranges specified in Table 4.1, a ghost island junction (with a dedicated right-turn lane) is generally recommended, as this layout provides additional safety and capacity benefits by separating turning traffic from through traffic.

DN-GEO-03060 Table 4.1. Flow Ranges – Ghost Island Junctions

Major Road AADT	Minor Road AADT	
< 5,000	> 600	< 5,000
5,000 – 10,000	> 450	< 3,000
> 10,000	> 300	< 1,500

The existing landfill access road is the minor road and has a daily traffic flows recorded in the traffic surveys to be in the order of 336 AADT which includes 32 no. light vehicles and 26 no. HGV turning right from the N2 into the minor road. The estimated AADT on the N2 at the existing junction is estimated to be 9,830-9,939. The current proposal seeks to receive

There is no proposed increase in the current permitted rate of annual acceptance of up to 435,000 tonnes per annum of non-hazardous wastes, which comprise up to 150,000 tonnes of IBA, as well as household, commercial and industrial wastes including residual fines, non-hazardous contaminated soils, (C&D) wastes and bailed recyclables together with the acceptance of up to 5,000 tonnes per annum of stable non-reactive hazardous waste. Accordingly there will be no resultant significant increase in minor road traffic which will close to the lower end of the 300-1,500 range.

The AADT on the N2 is likely to increase above 10,000 due to traffic growth as per the forecasts of TII Publication PE-PAG-02017 *'Project Appraisal Guidelines for National Roads Unit 5.3 Travel Demand Projections'* (Oct 2021). AADT may also be influenced by the construction of the Slane Bypass which may make the N2 a more attractive route for north-south traffic.

The traffic survey of the morning peak hour shows that turning movements at the landfill access junction are very limited, comprising 1 light vehicle and 8 HGVs turning onto the N2, and 18 light vehicles and 14 HGVs turning from the N2. For comparison, at O'Brien's Cross (the next junction to the south), the surveyed morning peak hour turning volumes are significantly higher, with 208 light vehicles and 27 HGVs entering the N2, and 129 light vehicles and 18 HGVs turning from the N2. This indicates that the R150 junction accommodates more than nine times the turning traffic volume of the landfill access junction.

It is evident from these observations that the level of turning traffic associated with the landfill access is very modest in scale and does not approach the thresholds that would give rise to operational concerns. Accordingly, without the need for detailed modelling using junction analysis software (e.g., Junctions 10/11), it is reasonable to conclude that the access junction will continue to operate with a substantial reserve capacity throughout the lifetime of the proposed development.

13.12.4 Cumulative Effects

13.12.4.1 Construction and Operational Phases

A number of minor developments have been granted permission within the surrounding area, these are typically associated with extensions or alterations to single buildings and will not have the potential for significant cumulative impact. Identified developments with the greater study area with potential for cumulative traffic impacts include the following which it is noted, for consistency and ease of Local Authority cross-check, are as presented in Appendix 2.1 of this EIAR.

The following listed projects have been assessed. Each project has been considered on a case-by-case basis for screening in or out of this part of the assessment based upon data confidence, effect and spatial and temporal scales involved. Projects were screened in to the Cumulative Impact Assessment where located within the zone of influence of the proposed development or where projects have the scope to potentially alter the traffic volumes and/or flows assessed in this chapter for the determination of traffic impact.

Table 13-44. Developments Considered in Cumulative Assessment (EIAR Vol.3, App. 16.1)

	Planning Ref. No.	Brief Description	Relative Location	Comment
1	2460842 Meath Co.Co.	The development will consist of a 10 year planning permission for 180 Megawatt gas fired peaking power plant on a site	Curraghtown, Brownstown,	Located < 0.5km South-west of existing landfill

	Planning Ref. No.	Brief Description	Relative Location	Comment
	Live Application	comprising 7.87 ha. All associated ancillary development, including upgrades to site access from the L-10132, upgrades to existing site access road, new site access road.	Navan, Co. Meath	See Planning File Reference Below
2	HA17.318573 (ABP) Live Case	Proposed N2 Slane Bypass to the east of Slane village comprising 3.5km of dual carriageway including a new bridge crossing of the River Boyne, along with N51 road realignments, and traffic management and public realm enhancements within Slane village.	Slane, County Meath	Located 6.5km North of existing landfill See Planning File Reference Below
3	23576 Meath Co. Co. Granted 14/11/2024	A ten year permission and 35 year operation life for a solar farm. The total site area for the proposed development is 188.9 hectares. Internal access tracks, 2 no. new site entrances along the L5608 local road, underground electrical and communications cabling for approximately 700m along the L5608 local road and all associated services and development works.	Towlands of Rathdrinagh, Sicily, Thomastown, Rahill, Drumman & Knockcommon, near the town of Duleek, Co Meath	Located 1.5km East of existing landfill See Planning File Reference Below
4	2460587 Meath Co. Co. Granted 14/11/2024	New upgraded synthetic grass pitch, with boundary fence around perimeter of pitch 4 No. of 12metre high floodlight poles with a max 250 lux lighting and associated site works Upgraded & extended parking area with associated site works.	Balrath Park Football Ground, Flemington, Balrath, Navan, Co. Meath, C15V 62W	Located 0.5km East of existing landfill See Note 1 No Significant cumulative traffic impact/effects
5	2460413 Meath Co.Co. Granted 14/11/2024	The development will consist of a new two-storey style dwelling with a single storey projection to the rear, detached domestic garage, domestic wastewater disposal system, domestic site entrance and all associated site works.	Rathdrinagh, Beauparc, Navan, Co. Meath	Located approx.0.5km north of development See Note 1 No Significant cumulative traffic impact/effects
6	2470 Meath Co.Co. Granted 19/10/2024	To construct a single storey extension to the side and rear of existing dwelling house, new wastewater treatment system and percolation area and all associated site development works.	The Cottage, Thurstianstown Beauparc Navan, Co Meath C15 F3CH	Located approx. 2km north of development See Note 1 No Significant cumulative traffic impact/effects
7	24270 Meath Co. Co. Granted 19/09/2024	The development will consist of the following: 1. Construction of a new detached, 2-storey dwelling. 2. Construction of a new garage. 3. New proprietary wastewater treatment system & percolation	Flemingstown, Kentstown, Co. Meath	Located approx. 1.3km South-east of development See Note 1

	Planning Ref. No.	Brief Description	Relative Location	Comment
		area. 4. New entrance to site. 5. All associated site works.		No Significant cumulative traffic impact/effects
8	231057 Meath Co. Co. Granted 29/02/2024	The permission for retention of extensions to the front and rear, retention of attic storage area, retention of 3no. Velux windows to front elevation, retention of alterations to all elevations, retention of garage and permission to construct a single storey extension to the rear and replace existing septic tank with a new wastewater treatment system and percolation area and all associated site development works.	Curraghtown, Brownstown, Navan, Co. Meath	Located approx. 1km west of development See Note 1 No Significant cumulative traffic impact/effects
9	22780 Meath Co. Co. Granted 30/01/2024	The development will consist of erecting a 27m high lattice telecommunications structure together with antennas, dishes and associated telecommunications equipment all enclosed by security fencing and extend existing access track.	Veldonstown, Kentstown , Navan, Co. Meath	Located approx. 1km south of development See Note 1 No Significant cumulative traffic impact/effects
10	2360331 Meath Co. Co. Granted 25/01/2024	1) construct a single storey domestic extension to the northern gable side of existing dwelling house, and 2) all associated site services.	Newtown, Beaupark, Navan, Co. Meath, C15 N2C2	Located approx. 2.5km north of development See Note 1 No Significant cumulative traffic impact/effects
11	2360296 Meath Co. Co. Granted 17/11/2023	Proposed uprate of the existing Louth – Woodland 220 kV overhead powerline (OHL). Approximately 38.5 km of the existing OHL circuit is located within the functional area of Meath County Council and approximately 23 km is within the functional area of Louth County Council. The Proposed Development works within the functional area of County Meath will comprise: the replacement ("restringing") of the existing overhead line circuit conductor with a new higher capacity conductor; the strengthening of up to 25 no. tower foundations; the replacement of hardware and fittings, such as insulators, insulator ha.	Townlands of Cardrath, Broomfield, Balrenny, Higginstown, Coalpits, Mooretown, Cashel, Crewbane, Ro In County Meath will take place in the townland of Cardrath and the end mast located at the 220 kV Woodland Substation in the townland of Woodland.	See Planning File Reference Below No Significant cumulative traffic impact/effects

	Planning Ref. No.	Brief Description	Relative Location	Comment
12	23458 (317568-23) Meath Co. Co. Granted 20/06/2023	The proposed development will consist of an upgrade of the existing Gorman to Platin 110 kV Overhead line (OHL)	Causetown, Platin, Co. Meath	See Planning File Reference Below No Significant cumulative traffic impact/effects
13	22537 Meath Co. Co. Granted 25/05/2023	The development will consist of; (1) the restoration of lands for the purposes of agricultural gain through importing and depositing of inert material comprising natural minerals of clay, silt, sand, gravel or stone and (2) all ancillary site development works. Natura impact statement (nis) will be submitted to the planning authority with the application. Significant further information/revised plans submitted on this application.	Painestown, Beauparc, Navan, Co. Meath	Located approx. 3.3km north-west of development See Planning File Reference Below No Significant cumulative traffic impact/effects
14	221203 Meath Co. Co. Granted 28/0.3/2023	Erection of a single storey, modular, multi-functional community facility with associated site works. Significant further information/revised plans submitted on this application.	Kentstown Village Park, Navan Road, Kentstown, Co Meath C15 EHT2	Located approx. 2km south of development See Planning File Reference Below No Significant cumulative traffic impact/effects
15	22451 Meath Co. Co. Granted 16/12/2022	The construction of 53 no. two storey houses together with all associated and ancillary works including works to the Veldonstown Road as the second phase of a permitted residential development at Veldonstown Road, Kentstown, Co. Meath. It is proposed to provide 109 no. car parking spaces comprising 106 no. allocated spaces and 3 no. visitor spaces. It is proposed to widen the Veldonstown Road to 5.5 metres and to provide footpaths along the full extent of the site frontage on the Veldonstown Road.	Veldonstown Road, Kentstown, Co. Meath	Located approx. 2km south of development See Planning File Reference Below No Significant cumulative traffic impact/effects
16	22691 Meath Co.Co. Granted 17/11/2022	Construction of a single storey style dwelling with detached domestic garage, install a proprietary sewage treatment system and form new entrance to public road.	Flemingstown, Kentstown, Co. Meath	Located approx. <1km south-east of development. See Note 1 No Significant cumulative traffic impact/effects
17	PA17.307433 (ABP)	Increase in annual total waste for treatment from currently permitted 235,000 tonnes to 250,000 tonnes, increase in annual amount	Carranstown, Duleek, Co. Meath	Located approx. 9.5km north-east of development

	Planning Ref. No.	Brief Description	Relative Location	Comment
	Granted 12/01/2022	of hazardous waste from currently permitted 10,000 tonnes to 25,000 tonnes, development of an aqueous waste tank farm, hydrogen generation unit, bottom ash storage building, development of a single storage warehouse, new concrete yard, weather canopy, demolition and rebuilding of an existing single storey modular office and ancillary site works.		See Planning File Reference Below No Significant cumulative traffic impact/effects
18	211347 Meath Co. Co. Granted 12/01/2022	Full planning permission to convert existing bungalow attic to habitable bedroom space and all associated site development works and services.	Flemingstown, Balrath, Co Meath C15 RF38	Located approx. 1.5km south of development See Note 1 No Significant cumulative traffic impact/effects
19	LB201327 Meath Co.Co. Granted 18/05/2021	Development will consist of the importation of 230,000 m^3 (345,000 tonnes) of uncontaminated soil and stone as a non-waste by product over a five year period to improve 12 hectares of agricultural lands where: The further use of the stone is certain and will be used to recontour and improve the agricultural lands.	Downestown, Duleek, Co. Meath	Located approx. 5km east of development See Planning File Reference Below No Significant cumulative traffic impact/effects
20	21795 Meath Co.Co.	The development will consist of refurbishment works to the practice area within the grounds of Knockharley Cricket Club to include replacement of the existing laid out artificial surface & surrounding netted cage comprising total area of 30 meters length x 8 meters width x 3.5 meters height.	Veldonstown, Brownstown, Navan, Co Meath	Located approx. 1.5km west of development No Significant cumulative traffic impact/effects

Meath P. Reg. Ref. 2460842

The proposed development, comprising a 10 year planning permission for 180 Megawatt gas fired peaking power plant on a site comprising 7.87 ha, will be accessed via an existing agricultural entrance on the L10132. The applicant has demonstrated available sightlines in excess of 90 metres to the nearside edge of the carriageway, which is considered acceptable at this location. The stated haul route for construction traffic will be from the N2 via the L5056 for approximately 2 km, before turning south onto the L10132 for 0.6 km to the site entrance. While the local roads are narrow, the applicant has identified the requirement for passing bays to accommodate development traffic. An Autotrack analysis of the haul route has also been submitted, highlighting specific areas where minor works to the verges are required to accommodate the wheel path of HGVs, including works at the N2 junction which lie within the application's red line boundary.

The Construction Environmental Management Plan (CEMP) confirms that a detailed Traffic Management Plan will be prepared by the Principal Contractor. Section 14 of the submitted Planning and Environmental

Report assesses traffic and transport impacts. It identifies that approximately 4,324 HGV loads will be delivered to the site over an 18-month construction period, resulting in a peak of 19–20 HGV trips per day over an 11-month period. Construction staff numbers are forecast to peak at 50, with most personnel transported by minibus and crew vehicles, resulting in an additional 10–15 LGV trips per day. The assessment concludes that traffic impacts during construction will constitute a slight negative effect of short-term duration, while operational traffic will be imperceptible.

In cumulative terms, the operation of the Knockharley Landfill already generates regular HGV activity on the local road network which it is proposed will continue. The incremental increase associated with the proposed power plant development, peaking at 19–20 HGV trips per day, represents a very small proportion of both baseline traffic and landfill related movements. While both developments use the same local road infrastructure, the additional traffic from the solar farm construction is modest in scale, temporary in duration, and readily mitigated by the provision of passing bays and implementation of a Traffic Management Plan. Accordingly, the combined traffic from both the landfill and the proposed development is not considered likely to give rise to significant cumulative capacity or safety impacts on the receiving road network.

Residual operational traffic associated with the solar farm will be negligible and will not materially add to cumulative effects with the landfill or other developments in the wider area. Overall, the cumulative traffic impact is assessed as slight, short-term, and not significant.

An Coimisiún Pleanála Case No. HA17.318573

The proposed development comprises the construction of the N2 Slane Bypass along with associated Public Realm Enhancement measures. Chapter 7, 'Traffic and Transport,' of the EIAR for the road scheme assesses traffic assignment to the proposed bypass, its impact on the N2 corridor as a whole, localised effects within Slane village, and wider network implications, including the M1 corridor.

In the Do-Minimum scenario without the bypass, EIAR Table 7-12 demonstrates substantial projected increases in both total traffic and HGV flows along the N2 corridor between the 2019 baseline and the 2041 design year. Traffic volumes around Slane are predicted to increase by between 13.3% (+1,220 vehicles/day south of Slane) and 13.8% (+1,060 vehicles/day north of Slane), with HGV flows rising by between 28.4% (+470 HGVs/day south) and 36.2% (+330 HGVs/day north). Traffic growth is similarly significant on the N51 (22.9–27.2% increases in daily flows) and on the M1 corridor (5.5–25% increase), with HGV traffic rising up to 45.8%. The N33 connecting the N2 and M1 is also projected to experience a 16.55% increase in total traffic and 27.5% increase in HGVs.

The scheme EIAR compares these Do-Minimum forecasts to the Do-Scheme scenario in the year 2041. The assessment confirms that the existing N2 through Slane constitutes a strategic bottleneck, constraining traffic flow. The bypass will remove this restriction, improving corridor efficiency and journey reliability. As a result, the attractiveness of the N2 increases as do traffic volumes on the N2 and these are forecast to increase over Do-Minimum levels, with the most relevant and significant increases south of Slane (+37.7%, c. 4,000 vehicles/day) and north of Slane (+33.4%, c. 3,000 vehicles/day). North of Ardee and south of the R150 junction, traffic increases are predicted to be negligible (EIAR Table 7-16).

In terms of cumulative assessment, the ongoing operation of the nearby Knockharley Landfill contributes approximately 1.6% of daily traffic along the N2 corridor, primarily HGV movements. While this represents a minor proportion of baseline flows, the cumulative assessment considers landfill related HGV traffic alongside forecasted increases due to the bypass. Even accounting for these movements, the N2 corridor is expected to accommodate the combined traffic demand without significant impact on safety or operational performance, due to the strategic improvements provided by the bypass. In this regard it is noted from the traffic surveys carried out in April 2025 that the AADT on the part of the N2 south of McGruders Cross is in the order of 9,389 vehicles (See Table 13-1 of this EIAR – Link 2) whilst to the south of Kilmoon Cross it was 21,622 (Link 7). The Slane Bypass forecasts that Link 2 will carry 10,420(1,770) vehicles in 2041 with no bypass and 14,350(2,2150) with the bypass.

Construction traffic has been carefully modelled and managed through the Traffic Management Plan (Chapter 5, Section 5.5.1 of the Slane Bypass EIAR). Worst-case forecasts indicate 366 HGV earthworks movements and 38 non-earthworks HGV trips along the existing N2, with 60 light vehicle movements associated with construction staff. At key locations such as McGruders Cross, combined daily construction traffic is forecast at 268 HGVs and 95 cars. This is estimated in the EIAR to represent less than 5% of existing baseline flows, confirming that temporary construction traffic, including any interaction with Knockharley Landfill HGVs, will not materially affect the N2 in terms of capacity or safety.

Operationally, the bypass will optimise traffic flows, reduce bottlenecks through Slane, and encourage HGV retention on the national primary route rather than diversion to sub-standard regional roads. The embedded operational mitigation measures, combined with the inherent improvements to corridor efficiency, result in an overall positive traffic impact, with no further mitigation required and this was the conclusion of the EIAR.

The EIAR's analysis of alternatives confirms that diverting HGVs from the N2 to lower standard roads would introduce unacceptable safety risks and is therefore inappropriate. Meath County Council maintains that strategic improvements to the N2 corridor, as provided by the bypass, represent the correct management approach for the area, ensuring that cumulative traffic effects, including those from the ongoing Knockharley Landfill, are effectively accommodated. It is noted that the traffic surveys underpinning the assessment of traffic effects arising from the bypass would have included the traffic generated by the landfill which was operational at that time so the bypass EIAR traffic assessment inherently includes for Knockharley Landfill traffic.

Given the relatively low volume of traffic generated by Knockharley Landfill on both a daily and hourly basis, together with the established temporal distribution of landfill HGV movements (refer to Figure 13-33 of this EIAR), it is reasonable to conclude, without recourse to complex traffic modelling, that the forecast increases in traffic associated with the construction of the Slane Bypass will not give rise to any significant adverse impact on the operation or safety of the existing landfill access junction with the N2 National Primary Road.

Meath P. Reg. Ref. 23576

The proposed development comprises the construction of a solar farm. The identified delivery route for transporting components is from Dublin Port via the M50, exiting at Junction 5 onto the N2, continuing for approximately 32 km, before turning right onto the R150, left onto the L5608, and proceeding for approximately 1 km to the site entrances.

According to the submitted Planning and Environmental Report, the installation phase is expected to generate approximately 12,442 two-way HGV trips over a 16-month construction period. This equates to an average of 40 HGV trips per day over a 12-month period, based on a worst-case assumption of a shorter, more concentrated programme. The construction workforce is expected to average 25 personnel, rising to 35 at peak periods, resulting in an estimated 35 LGV trips per working day and up to 38 trips during peak periods. In combination, average daily traffic associated with construction is forecast to increase by approximately 76 trips per day.

When assessed against existing flows on the N2, this represents an increase of only 1.2%. The applicant's assessment concludes that, with the implementation of the proposed mitigation measures and a detailed Traffic Management Plan, the additional traffic arising during construction will be readily accommodated within the capacity of the local and regional road network.

In cumulative terms, the construction traffic associated with the solar farm is modest in scale compared to existing baseline flows and to the heavier traffic demands generated by established commercial and industrial activities in the wider area, including HGV movements on the N2. The forecast increase represents a negligible proportion of overall daily volumes and will not materially affect network operation,

safety, or capacity. Accordingly, the cumulative traffic impact is assessed as temporary, short-term in duration, and slight in significance.

Meath P. Reg. Ref. 2360296

The proposed development consists of the uprate of the existing Louth – Woodland 220 kV overhead powerline (OHL). The following works are proposed, as set out in four categories:

- Strengthening of tower foundations, which requires the use of stays attached to tower legs while foundation strengthening Is undertaken. Soil is excavated from around the existing foundations of each tower leg. The exposed tower legs and original concrete foundations will be scabbled and reinforced with steel rods into the block and neck components. Steel mesh is inserted into the foundation and concrete is poured up to the top of block level. Once set, the remaining excavation is back-filled and reinstated. (A total of 51 towers were identified as potentially requiring foundation strengthening, subject to further investigation. A worst-case scenario of all 51 towers requiring foundation strengthening has been assumed for the purposes of environmental assessment.)
- Replacing the conductor, which involves re-stringing by pulling the conductor between the angle masts, with the main element of this work carried out at angle masts, with some work also carried out at strain and semi-strain locations during conductor stringing. A catenary stringing system (CSS) is required at major road crossings, crossings of lines 20 kV or greater (or an outage of lines 20 kV or greater), rivers and rail crossings.
- Replacement of crossarm, insulator and fittings at tower structures — replace fittings which involves removal of existing fittings followed by installation of new fittings and plumbing of insulators where required. These include smaller scale items such as brackets, insulators and clamps. This work typically takes one day per structure and involves access to the structures with a tracked vehicle and a mobile elevated work platform.
- Vegetation clearance (Approx. 25m overall for the Proposed Development).

The N2 national road is counted amongst the major roads in the vicinity of the transmission system

The applicant's Traffic Management Plan indicates that, at peak construction, between three and seven workers will be required at each structure location. Up to five site locations may operate concurrently within a given local area, with workforce arrivals and departures managed to minimise vehicle movements and reduce on-site parking demand. The principal peak in construction traffic is anticipated during foundation strengthening works, when concrete pours will necessitate a maximum of eight delivery truck movements per structure location per day, spread over several days. Outside of these activities, material deliveries for poles, fittings, and ancillary works will be infrequent and low in volume relative to existing baseline traffic flows. Accordingly, while short-term increases in construction traffic will arise during concrete pours, the overall impact on the surrounding road network is expected to be modest, temporary in duration, and not significant in either capacity or safety terms..

Meath P. Reg. Ref. 23458

The applicant proposes to replace the existing overhead lines together with 42 no. pole sets and 8 no. steel masts along the route between Gorman Substation and Platin Substation. During the peak construction phase, it is anticipated that between 3 and 7 construction workers will be required at each structure location at any one time. It is further envisaged that up to two site locations may be active concurrently.

A peak in construction traffic is expected during the pouring of concrete foundations, with an estimated requirement for one concrete delivery truck per angle mast location per day over several days. Other material deliveries, including wooden pole sets, fittings, mast components and limited volumes of access road material, will be infrequent and of low intensity relative to existing baseline traffic flows.

Accordingly, the overall traffic demand generated by the project will be modest, temporary in nature, and readily accommodated within the existing road network. The traffic impact is therefore not expected to be significant, either in isolation or cumulatively, and will be limited to the short-term duration of the construction works.

Meath P. Reg. Ref. 22537

The proposed development involves the importation of approximately 61,000m³ (c.100,000 tonnes) of inert soil and stones over a five-year period. A Traffic Impact Assessment submitted with the application confirms that existing traffic volumes on the L1013 access road are typically in the order of 1,700–1,950 vehicles per weekday, with a seven-day average of 1,574 vehicles per day (24-hour total). Against this baseline, the applicant has indicated that the development will generate only 4–5 HGV arrivals and 4–5 departures per day. Meath County Council's Transportation Section, in its internal report dated 10 June 2022, noted that this level of traffic equates to, at worst, one HGV arrival and one departure within any single peak hour, based on an 18-tonne payload assumption.

The applicant further clarified that the vehicles used during the five-year import period will be larger 18-tonne HGVs. While these are comparable in type to those already associated with the nearby Knockharley Landfill, the scale of additional movements is very modest. When considered cumulatively with existing landfill traffic, the incremental increase in HGV activity will be negligible relative to the overall daily traffic flows on the N2 and L1013. The impact on road capacity, safety, and network operation is therefore expected to be minor, temporary in duration, and not significant in the context of cumulative effects arising from other developments in the area.

Meath P. Reg. Ref. 221203

The development proposes the erection of a single storey modular multi-function community facility and is located in Kentstown Village and accessed directly from the R153 within the 50km/h speed limit. The proposed development comprises a modest, single-storey modular community facility. By its scale, nature, and intended use, it is not expected to generate significant traffic volumes. The traffic demand associated with the development will be predominantly car-based trips made by local residents attending scheduled community activities. These trips will be low in volume, dispersed throughout the day, and largely confined to off-peak periods. Importantly, the facility does not involve any commercial, industrial, or freight-generating activity, nor will it attract high levels of through-traffic from outside the immediate Kentstown catchment. The site is located directly on the R153 within the 50 km/h speed limit zone. This section of the R153 is designed to accommodate regular local and regional traffic movements and currently operates without capacity constraints in the village environment. The incremental increase in vehicle movements associated with the proposed facility will therefore be readily absorbed within the existing carriageway, junctions, and speed environment. In relation to cumulative impacts, the nearby Knockharley Landfill generates a distinct type of traffic demand, namely heavy goods vehicle (HGV) movements associated with waste disposal operations. The proposed community facility does not generate HGV traffic and its light-vehicle trip profile is entirely different in scale and pattern. As such, the development will not contribute to, or compound, the cumulative impact arising from landfill operations. Rather, the modest level of car trips anticipated will be negligible in comparison to existing daily traffic flows on the R153, and will not materially affect the overall operation or safety of the road network in Kentstown.

Meath P. Reg. Ref. 22451

The proposed development comprises the construction of 53 no. two-storey houses near Kentstown Village. A Traffic Statement accompanies the application, which assesses the performance of key junctions on the local road network during the morning peak period (08:15–09:15) and evening peak period (17:15–18:15). The analysis has been undertaken for the base year (2021), the development opening year (2022), the Residential Phase II opening year (2024), and fifteen years post-completion of both phases (2039).

For each future year scenario, junction operation has been assessed both with and without the development.

The results indicate that all junctions within the study area will be capable of accommodating the additional traffic generated by the proposed residential scheme and will continue to operate well within capacity throughout the assessment years.

In cumulative terms, the nearby Knockharley Landfill generates a distinct traffic profile, characterised primarily by HGV movements associated with waste disposal operations. The traffic generated by the proposed housing development will consist almost entirely of private car trips by residents, with some minor service and delivery activity. Given the different trip characteristics, peak times, and relatively modest scale of residential traffic compared to existing daily flows on the local and regional network, the cumulative effect when considered alongside landfill operations is not expected to be significant.

The additional residential traffic will be absorbed within the available capacity of the assessed junctions and will not materially alter the performance or safety of the local road network in combination with the proposed ongoing landfill traffic. Accordingly, the cumulative traffic impact is assessed as low in magnitude and not significant. Also see Note 1 below.

An Coimisiún Pleanála Case No. PA17.307433

The proposed development seeks an increase in the annual total waste permitted for treatment from 235,000 tonnes to 250,000 tonnes at the existing Indaver facility to the north-east of Duleek village, off the R152 Regional Road linking Drogheda and Duleek. The EIAR Traffic and Transportation Chapter (Section 7.6.4) concludes that, once operational, the additional traffic arising will have a negligible impact on the local road network, with typical increases forecast to be in the order of approximately 1% at the majority of assessed locations. While construction traffic is forecast to have a proportionately higher impact, this is a function of lower background traffic levels during the assessed morning and evening construction hours rather than a significant increase in absolute terms. Importantly, construction traffic will be temporary in duration, confined to the build-out phase, and scheduled between 07:00 and 19:00 hours, thereby avoiding overlap with existing network peak periods.

The Inspector for An Coimisiún Pleanála agreed with the findings of the submitted traffic assessment. The site location on the R152, to the east of Duleek, ensures that the likely cumulative impact on the N2 will be negligible.

In cumulative terms, when considered alongside the continuation of operations at the Knockharley Landfill, the additional traffic generated by the proposed increase in permitted annual tonnage remains small in scale relative to existing baseline volumes and established HGV activity associated with landfill operations. The combined traffic demand does not materially affect junction capacity, road safety, or network efficiency on either the R152 or the wider regional road network. As such, while there will be a minor and localised increase in HGV trips associated with the proposed development, the cumulative traffic impact in conjunction with Knockharley Landfill is assessed as negligible, short-term during construction, and not significant during operation.

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Development will consist of the importation of 230,000 m^3 (345,000 tonnes) of uncontaminated soil and stone as a non-waste by product over a five year period to improve 12 hectares of agricultural lands. The proposed development had commenced prior to the traffic surveys which underpin that analysis in this EIAR accordinaly the traffic generated by the development which is for five-years, is inherently included in the assessment of traffic provided in this EIAR.

Consideration of Cumulative Traffic: Note 1

In considering the cumulative traffic effects of the proposed development located with direct access onto the N2 between Slane and Kilmoon, it is necessary to assess the extent to which traffic generated by other permitted developments within a 5km radius may contribute to additional volumes on the receiving local road network. In respect of the above review, it is acknowledged that some element of traffic associated with these developments may use the N2, N51, R150 and R153 corridors, which form part of the designated haul route to the landfill, it is considered unlikely that the volumes of traffic generated would be significant. The principal traffic growth on the receiving road network arising from these developments, excluding the Slane Bypass, along with wider background growth, is considered to be robustly addressed through the application of Transport Infrastructure Ireland (TII) national traffic growth rate factors. The TII Project Appraisal Guidelines set out nationally consistent traffic growth rate factors derived from macroeconomic modelling, population projections, car ownership trends, employment growth and other economic indicators. These growth factors are periodically updated to reflect national and regional forecasts prepared by the Central Statistics Office, the ESRI, and other government bodies. By their nature, the TII growth factors incorporate the cumulative effect of general development and economic growth across the network, including housing, employment, retail and industrial schemes. Accordingly, applying these growth rates to baseline traffic flows on the network, as per the assessments in this EAIR Chapter, captures the expected additional traffic demand from both committed development and broader background trends, without the need to separately model every individual development within the study area. This ensures that cumulative effects are inherently accounted for in a consistent and non-duplicative manner. In some cases at least if traffic generated by specific cumulative developments were to be added explicitly to the baseline flows in addition to applying TII growth factors, there would be a significant risk of double counting. This is because the same development related traffic growth would already have been captured in the TII-derived factors. The result would be an artificial inflation of future-year traffic forecasts, leading to an overestimation of potential traffic impacts. Having reviewed the planning files for all of the developments listed in Table 13.27 excepting Slane Bypass, it is considered reasonable and appropriate to rely on the application of TII national traffic growth factors to the receiving regional road network in this case. This approach ensures that the cumulative traffic effects of permitted developments in the wider area, particularly those located in Drogheda, are appropriately reflected in the traffic assessment, while avoiding duplication or overestimation of impacts.

Accordingly, the permitted developments and other potential future developments set out in Table 13.27 that may give rise to the generation of new traffic on the receiving roads network is included for by the application of TII published growth rates to existing surveyed traffic flows on the receiving road in the study area. The additional traffic generation arising on the receiving road network assumed in this Chapter through the application of the TII growth rates which forecast the following increase in traffic flows on all the regional roads included in the traffic assessment:

- 2025-2027 (Opening Year) 1.0349 (Cars) 1.0743 (HGV)
- 2025-2032 (Opening Year +5yrs) 1.1049 (Cars) 1.2412 (HGV)
- 2025-2042 (Opening Year +15yrs) 1.1808 (Cars) 1.5017 (HGV)

The cumulative traffic arising from future economic growth and development resulting in traffic growth on the receiving network are included for in both the 'do-nothing' and 'do-something' road network assessment scenarios. It is reasonable to expect that traffic arising from the proposed development would

by definition be included, or at least included in part in the TII growth rates. This factor is disregarded in the traffic assessments which considers all future traffic to the proposed development as totally new to the road network for both the proposed construction and operational periods.

13.12.7 Summary

Table 13.28 summarises the identified likely significant effects during the construction phase of the proposed development before mitigation measures are applied.

Table 13-45. Summary of Construction Phase Traffic Effects in the Absence of Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
General Construction Traffic	Negative	Not Significant	Receiving Network	Likely	Short-term	Direct

The following Table 13.29 summarises the identified likely significant effects during the operational phase of the proposed development before mitigation measures are applied.

Table 13-46. Summary of Operational Phase Traffic Effects in the Absence of Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Traffic	Negative	Not Significant	Receiving Network	Likely	Long-term	Direct

13.13 Mitigation Measures

13.13.1 Construction Phase Mitigation

The proposed development has the potential to affect the local resident population in the area using the adjoining roads infrastructure including the N2 National Primary Road and R153 Regional Road. During the construction phase of the proposed development, the local residents will be affected by a range of temporary and short- term effects such as noise, dust, HGV construction traffic, disruption to residential and commercial properties and perhaps in some occasional cases increased journey times.

Construction phase effects will be short-term. It is expected that construction traffic will follow the same haul route as operational traffic which includes the N2 and R153. Whilst in use for the purposes of construction the existing entrance from the N2 will remain an all-movements ghost island priority arrangement which has sufficient capacity to accommodate construction traffic. The effects of construction traffic upon the capacity of the access are forecast not to be significant.

It is noted that the Applicant intends to utilise Regulation 27 of the European Communities (Waste Directive) Regulations 2011, as amended, (see Chapter 14 - Utilities and Waste) to manage excavated material on site. The Applicant has engaged with a potential End User, with respect of Regulation 27, however, no formal by-product notification has been registered with the EPA.

The following mitigation measures are proposed:

- A *Construction Traffic Management Plan* will be prepared, including measures to provide information to affected parties when appropriate, including advising land and property owners in advance of any diversions. Local access shall be maintained at all times. In addition, where considered necessary, and

in agreement with the Road Authority, it is proposed that temporary signage shall be put in place to minimise disruption and ensure all road users understand that construction works are in progress.
- A detailed *'Construction Environmental Management Plan'* (CEMP) which is included with the planning application and it details the allowable working day, construction traffic, parking arrangements and incorporates environmental protection measures.

The *Construction Traffic Management Plan* (CTMP) will be prepared and agreed with the local authority in advance of works commencing via compliance with a relevant condition in the event of a grant of permission. Construction HGV routes will be defined to avoid local residential areas and sensitive receptors, with access limited to designated haul routes which exclude the use of the R150 between Kentstown Village and O'Brien's Cross on the N2.

Construction deliveries will be scheduled to avoid local network peak hours where possible. Wheel-wash facilities will be used where necessary to prevent deposition of mud or debris on public roads. All construction vehicles will be required to comply with safety standards, including visible identification, reversing alarms, and, where relevant, banksmen assistance for manoeuvres.

13.13.2 Operational Phase Mitigation

13.13.2.1 General

HGV deliveries to the landfill will be spread evenly throughout the day, avoiding unnecessary clustering and reducing potential for congestion. Site access and internal circulation is designed to accommodate HGVs safely and efficiently. The landfill will continue to operate a delivery management system to monitor and manage HGV scheduling.

Regular road maintenance and inspection of the site entrance will continue to be conducted to ensure safety and cleanliness of the immediate road interface.

13.13.2.2 Proposed Driver Induction Training

When commencing the operational phase of the proposed development drivers that will be using the site will be required to attend a HGV driver induction lecture which the Applicant has initiated at this and other similar sites and considers a useful tool for ensuring that all new drivers are fully aware of the rules and expectations regarding safety, adherence to the haul route, speed limits, and courteous behaviour towards other road users. Set out below are some of the key elements that form part of the Driver Induction and continuous motoring and management that will be undertaken by the operators of the site.

13.13.2.3 Driver Induction Information

The induction lecture for new drivers will set clear expectations for drivers, reinforce the importance of safety, compliance, and courtesy, and ensure that drivers are aware of the operational and legal requirements associated with the new development and haul route in particular. By establishing these guidelines early, it helps create a safe, efficient, and respectful environment for both drivers and other road users. Some of the key elements of driver induction and haul route driver conduct and management are set out below:

Overview of Landfill Operations:
Brief drivers on the purpose of the development, materials being imported, and materials being exported. Highlighting in both cases the procedure for processing both and the procedures for handling of materials and preparation of vehicles including cleaning, sheeting etc.

Haul Route Overview:
Provide detailed information about the designated haul route, including:

- Identify specific roads and lanes to be used
- Identify any restricted areas or routes to avoid
- Locations of entry and exit points to and from the development.
- Identify the specified internal routes
- Supply each driver with maps of the haul route and highlight the key landmarks, turnings, and any signage to follow.

Importance of Dedicated Haul Route:
- Explain why the dedicated route has been established, such as protecting local infrastructure, and ensuring road safety.
- Emphasise that deviation from the designated haul route will not be tolerated and could lead to disciplinary action, as well as legal and safety consequences.
- Highlight the risks of damage to public roads not designed for HGVs.
- Make clear the relationship with local community.

Speed Limits on the Haul Route:
Clearly state the speed limits along various sections of the haul route, emphasising the need for strict compliance.
- Differentiate between speed limits within the application site, public roads, and sensitive areas like near schools or residential zones.
- Stress the importance of obeying speed limits for safety, vehicle control, and preventing wear and tear on local roads.
- Outline the consequences of speeding, including the use of speed monitoring systems (speed cameras), and the penalties for violations.

Driving Behaviour and Courtesy:
- Reinforce the importance of being courteous to other road users, particularly along the haul route.
- Encourage drivers to be mindful of smaller vehicles, cyclists, and pedestrians that may use parts of the haul route.
- Employ best practices for courteous driving by maintaining safe following distances, particularly in traffic or around vulnerable road users.
- Avoid aggressive driving behaviours, like tailgating or overtaking in dangerous conditions.
- Always signal intentions early and avoid abrupt manoeuvres.
- Give way to emergency vehicles and local traffic where appropriate.

Personal Safety:
Emphasise the importance of safety protocols within the development, including the use of high-visibility clothing, hard hats, and other required personal protective equipment (PPE).

Vehicle Safety Checks:
Stress the need for daily vehicle inspections (tires, brakes, lights, mirrors, and fluid levels) before starting the haul, to ensure vehicle safety and compliance with regulations.

Load Safety:
Ensure drivers understand how to secure their loads properly to prevent accidents, especially during transport on public roads.

Minimising Environmental Impact:
Remind drivers to be aware of the environmental implications of their work, such as reducing dust, preventing fuel spills, and minimising noise pollution.

Waste Disposal:

Instruct drivers on proper waste disposal practices at the development site and along the haul route, ensuring that no litter or waste material is discarded improperly.

Incident Reporting Procedures:

- Inform drivers of the procedures to follow in case of accidents or breakdowns, both within the quarry and along the haul route.
- Provide contact information for emergency services, roadside assistance, and plant management.
- Encourage the reporting of near misses and unsafe conditions to help identify and mitigate potential risks.

Legal Compliance and Licensing:

- Reaffirm that drivers must have the appropriate Heavy Goods Vehicle (HGV) licenses and certifications to operate.
- Emphasize that all drivers are expected to comply with local and national road traffic laws at all times.
- Remind drivers of the legal requirements for maintaining tachograph records and adhering to limits on driving hours and rest periods.

13.13.2.4 Proposed Road Maintenance

The developer will maintain the adjoining public road in a clean state, free from mud and debris caused by haulage associated with the site. The Applicant respectfully invites an appropriate condition in this regard.

13.13.2.5 Do Nothing Scenario Mitigation

The proposed development will have no effect on the receiving road network other than those already arising from current permitted development. No mitigation measures are considered necessary in the Do-Nothing Scenario.

13.13.2.6 Post – Operational Stage

The proposed development will have no effects on the receiving road network other than those already arising from the permitted development. No mitigation measures are considered necessary at the post-operational stage of the proposed development.

13.14 Monitoring

The contractor will be required to ensure construction activities operate within the parameters set out in the CEMP and the Construction Traffic Management Plan. There is no monitoring recommended for the operational phase of the development as impacts due to traffic generation are predicted to be not significant.

13.15 Residual Impact Assessment

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

13.15.1 Construction Phase

The following Table 13.30 summarises the identified likely significant effects during the construction phase of the proposed development after mitigation measures are applied.

Table 13-47. Summary of Construction Phase Traffic Effects after Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
General Construction Traffic	Negative	Not Significant	Receiving Network	Likely	Short-term	Direct

13.15.2 Operational Phase

The following Table 13.31 summarises the identified likely significant effects during the operational phase of the proposed development after mitigation measures are applied.

Table 13-48. Summary of Operational Phase Traffic Effects after Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Traffic	Negative	Not Significant	Receiving Network	Likely	Long-term	Direct

Table 13.30: Summary of Operational Phase Traffic Effects after Mitigation (Source: EIAR Table 13.15 to 13.20)

13.15.3 Cumulative Residual Effects

The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below. For details on all the developments considered refer to Chapter 2, Section 2.9 of this EIA Report.

Two projects of note in the proximity to the development are the proposed 180 Megawatt gas fired peaking power plant proposed to be located to the immediate southwest of the Proposed Development site, and a planned 165 ha solar farm in the vicinity of the Proposed Development site, however this has not yet within the planning system. The project is at non-statutory pre-planning community consultation stage.

Given the location of other permitted developments and the likely potential for traffic generation it is not considered likely that there will be a perceptible cumulative impact other than that arising from improvement and associated management of the national road network.

13.16 Risk of Major Accidents or Disasters

In accordance with the requirements of the EIA Directive (as amended), this section assesses the potential for the traffic associated with the proposed landfill development to give rise to, or be affected by, major accidents or disasters, including those linked to transportation.

The proposed development is forecast to generate an average of 73 no. HGV trips per day, primarily associated with the delivery of materials for disposal and the export of processed aggregates derived from IBA processing on site. These trips will be distributed throughout the working day and will be scheduled to avoid peak traffic hours where practicable. The development site is an established landfill, where HGV activity is common and the receiving road network is appropriately designed and constructed to accommodate such vehicle types.

The volume of traffic generated by the development is well below the threshold that would give rise to significant capacity or safety concerns on the receiving road network. The operational traffic impact assessment indicates that the proposed traffic volumes do not materially alter junction performance, nor do they introduce new or compounded risks of congestion-related incidents.

In relation to major accident risk, the following mitigating factors are relevant:

- The HGV traffic does not involve the transport of hazardous materials beyond standard residual waste classified as non-hazardous organic material and a small proportion of non-reactive hazardous waste.
- Vehicle movements are routed via designated regional roads and avoid sensitive receptors such as residential streets.
- The low frequency and evenly spaced nature of HGV movements reduces the risk of cumulative traffic stress or conflict on the network.

As such, there is no credible pathway by which development traffic could result in, or significantly contribute to, a major accident or disaster scenario. The associated risks are assessed as negligible and within the range of normal background industrial activity for the area. No further mitigation measures are deemed necessary beyond standard operational traffic management procedures.

13.17 Worst Case Scenario

In line with best-practice environmental assessment methodologies, a Worst Case Scenario has been considered to ensure the robustness of the traffic impact assessment. This scenario assesses the maximum foreseeable traffic demand, based on conservative assumptions relating to both HGV traffic and staff-related vehicle movements.

While the proposed development is expected to generate an average of 73 no. HGV trips per day, and an upper assessment value or 85th percentile of approximately 92 no. HGV trips per day, the worst-case traffic assessments account for operational variability by adopting an extreme worst case peak daily volume, which is calculated to be 144 no. HGV trips per day. This level of activity is derived from a single day spike in weighbridge recorded data for the year 2024 and accounts for a day in which there was an extraordinary increase in the deliveries of materials to the landfill. Although considered an isolated record and exceptionally rare, the EIAR considers this as the worst-case.

Assuming a 10-hour operational window, this equates to an upper value of approximately 15 no. HGV trips per hour, which remains well below the threshold defined by Transport Infrastructure Ireland (TII) for triggering junction capacity assessments or requiring detailed modelling (typically >100 two-way movements in the peak hour).

The site will continue to employ a total of 25 no. personnel, with staffing arranged in a single shift such that a maximum of 25 no. employees are present on site at any one time. Even under the conservative assumption that all staff commute solo and by private car and arrive and depart within a short time window, the peak hour staff related traffic would equate to a maximum of 25 no. one-way movements inbound in the morning and outbound in the evening. Staff traffic does not appreciably overlap with HGV traffic so this can still be considered to be a low level of traffic generation.

Notwithstanding the absence of an overlap, combining the Worst Case HGV volume with the peak staff turnover scenario, the worst case would result in:

- A peak hour of approximately 15 no. HGV trips, and
- 25 no. light vehicle movements associated with staff shift start.

The total traffic volume in this 'worst-case' hour would therefore be in the region of 15 no. two-way movements combined with 25 no. one-way movements, which is well within the capacity of the receiving road network and significantly below the TII thresholds for requiring junction capacity modelling analysis.

The development is located within a long-established landfill environment with suitable access roads and infrastructure that currently accommodate HGV and commercial vehicle movements. No major safety concerns or effects from the proposed development have been identified on the local network. The

continuity without increase, in vehicle activity, even under worst-case assumptions, is not expected to result in any measurable increase in queuing, delay, or collision risk.

The following series of tables considers the peak hour impact of the worst case (spike) equating to 144 no. HGV per day arising from landfill operational traffic and this is combined with construction traffic to provide a combined worst case. Notwithstanding that this level of operational traffic generation was an isolated single day recorded in the weighbridge data it is considered here for the derivation of the worst case scenario. In the interest of simplicity, the assessment is returned only for the 2032 scenario.

Table 13-49. Link 1 – N2 North of Slane Crossroad (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		949	123	12.9%	920	87	9.4%
Do Something Worst Case	2032		958	123	12.8%	921	87	9.4%
Incremental Difference	2032	No.	+9	+0	-0.1%	+1	+0	+0.0%
		%	+0.9%	+0.0%		+0.1%	+0.0%	

Table 13-50. Link 2 – N2 North of Rathdrinagh Crossroad (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		863	135	15.7%	1016	101	9.9%
Do Something Worst Case	2032		875	135	15.5%	1017	101	9.9%
Incremental Difference	2032	No.	+12	+0	-0.2%	+1	+0	+0.0%
		%	+1.4%	+0.0%		+0.1%	0.0%	

Table 13-51. Link 3 – N2 Between Rathdrinagh and Landfill Access (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		893	145	16.3%	1034	106	10.2%
Do Something Worst Case	2032		915	153	16.7%	1035	106	10.2%
Incremental Difference	2032	No.	+22	+8	+0.4%	+1	+0	+0.0%
		%	+2.5%	+5.5%		+0.1%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-52. Link 4 – N2 Between Landfill Access and O'Briens Cross (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		893	145	16.3%	1034	106	10.2%
Do Something Worst Case	2032		922	161	17.5%	1045	106	10.2%
Incremental Difference	2032	No.	+29	+16	+1.2%	+11	+0	+0.0%
		%	+3.2%	+11%		+1.1%	+0.0%	

Table 13-53. Link 5 – N2 Between O'Briens Cross and Balrath Cross (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		969	133	13.7%	1114	102	9.1%
Do Something Worst Case	2032		993	147	14.8%	1122	102	9.1%
Incremental Difference	2032	No.	+24	+14	+0.7%	+8	+0	+0.0%
		%	+2.5%	+10.5%		+0.7%	+0.0%	

Table 13-54. Link 6 – N2 Between Balrath Cross and Kilmoon Cross (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		821	124	15.1%	1173	125	10.7%
Do Something Worst Case	2032		842	138	16.4%	1180	125	10.7%
Incremental Difference	2032	No.	+21	+14	+1.3%	+7	+0	+0.0%
		%	+2.6%	+11.3%		+0.6%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-55. Link 7 – N2 South of Kilmoon (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		1612	254	15.8%	2243	169	7.5%
Do Something Worst Case	2032		1633	268	16.4%	2250	169	7.5%
Incremental Difference	2032	No.	+21	+14	+0.6%	+7	+0	+0.0%
		%	+1.3%	+5.5%		+0.3%	+0.0%	

Table 13-56. Link 8 – R150 West of O'Briens Cross (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		341	45	13.1%	322	24	7.3%
Do Something Worst Case	2032		342	45	13.1%	323	24	7.3%
Incremental Difference	2032	No.	+1	+0	+0.0%	+1	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	

Table 13-57. Link 9 – R150 East of O'Briens Cross (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		579	73	12.6%	578	40	6.9%
Do Something Worst Case	2032		583	75	12.9%	581	40	6.8%
Incremental Difference	2032	No.	+4	+0	+0.0%	+3	+0	+0.0%
		%	+0.7%	+0.0%		+0.5%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-58. Link 10 – R153 Between Balrath and Kentstown (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		473	48	10.2%	556	24	4.2%
Do Something Worst Case	2032		475	48	10.2%	558	24	4.2%
Incremental Difference	2032	No.	+2	+0	+0.0%	+2	+0	+0.0%
		%	+0.4%	+0.0%		+0.4%	+0.0%	

Table 13-59. Link 11 – R152 West of Kentstown (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		654	66	10.1%	709	29	4.0%
Do Something Worst Case	2032		656	66	10.0%	711	29	4.0%
Incremental Difference	2032	No.	+2	+0	+0.0%	+2	+0	+0.0%
		%	+0.3%	+0.0%		+0.3%	+0.0%	

Table 13-60. Link 12 – N51 Navan Road (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		883	123	13.9%	921	70	7.5%
Do Something Worst Case	2032		885	123	13.9%	921	70	7.5%
Incremental Difference	2032	No.	+2	+0	+0.0%	+0	+0	+0.0%
		%	+0.2%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

Table 13-61. Link 13 – N51 Drogheda Road (Worst Case)

Assessment Scenario	Year		AM Peak Hour 08:00-09:00			PM Peak Hour 17:00-18:00		
			Total	HGV	% HGV	Total	HGV	%HGV
Do Nothing	2032		527	73	13.9%	553	36	6.5%
Do Something Worst Case	2032		529	73	13.9%	553	36	6.5%
Incremental Difference	2032	No.	+2	+0	+0.0%	+0	+0	+0.0%
		%	+0.4%	+0.0%		+0.0%	+0.0%	

0-5% Increase in Total Flow 5-10% Increase >10% Increase

The *'worst case'* scenario analysis confirms that even under very conservative assumptions, including peak HGV deliveries and full staff shift start overlap, the volume of traffic generated by the proposed development remains low, with no material impact on the capacity, safety, or operational efficiency of the receiving road network. As such, the conclusions of the main traffic assessment remain valid and robust.

13.18 References

- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Housing, Planning & Local Government, 2018)
- *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report* (European Commission, 2017)
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022)
- *Meath County Development Plan 2021–2027*
- Transport Infrastructure Ireland (TII) Publication TII-PE-PDV-02045 *'Traffic and Transport Assessment Guidelines' (*May 2014).
- TII Publication PE-PAG-02017 *'Project Appraisal Guidelines for National Roads Unit 5.3 Travel Demand Projections'* (Oct 2021).
- TII Publication PE-PAG-02039 *'Project Appraisal Guidelines for National Roads Unit 16.1: Expansion Factors for Short Period Traffic Counts'* (Oct 2016);
- TII Publication PE-PAG-02016 *'Project Appraisal Guidelines for National Roads Unit 5.2 - Data Collection'* (Dec 2023).
- TII Publication DN-GEO-03060 *'Geometric Design of Junctions'* (May 2023)
- TII Publication DN-GEO-03031 *'Rural Link Design'* (May 2023)
- IEMA *'Environmental Assessment of Traffic and Movement'* (2023).

Chapter 14 – Material Assets – Utilities & Waste

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14. MATERIAL ASSETS – UTILITIES AND WASTE

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) evaluates the potential impacts that the Proposed Development may have on a range of Material Assets (built services / utilities and waste), as defined in the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU) and EPA Guidelines 'Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

The EPA Guidelines (EPA, 2022) specifically lists and provides sample headings and topics for material assets that include: Roads and Traffic, (Construction Phase, Operational Phase, Unplanned Events [i.e. Accidents]), Built Services (Electricity, Telecommunications, Gas, Water Supply Infrastructure, and Sewerage), Waste Management (Construction Waste, and Operational Waste).

The impact assessment presented in this chapter aims to identify potential impacts specifically related to built services / utilities and waste management. Traffic and Transportation (Chapter 13), and Architectural and Archaeological Heritage (Chapter 12) are assessed elsewhere in this EIAR.

WSP Ireland Consulting Ltd (WSP) has prepared a site-specific Resource & Waste Management Plan (RWMP) to deal with resource use and waste generation during the excavation and construction phases of the proposed development and is included as Appendix 14.1 to this chapter. The RWMP was prepared in accordance with the Environmental Protection Agency's (EPA) document 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021).

The purpose of this chapter is to identify and evaluate any potential significant impacts that the Proposed Development may have on these material assets, such as damage to infrastructure or disruptions to essential services, and to ensure the sustainable management of wastes arising at the development site in accordance with the legislative requirements and best practice standards. By conducting this assessment, appropriate mitigation measures can be developed and implemented to minimise any negative impacts and ensure that the development project is conducted in an environmentally responsible manner.

It should be noted that waste management is assessed with respect to the outgoing waste and resources during the construction and operational phases from the Proposed Development and does not consider incoming waste as part of general landfill operations.

14.1.1 Waste Legislation and Guidance

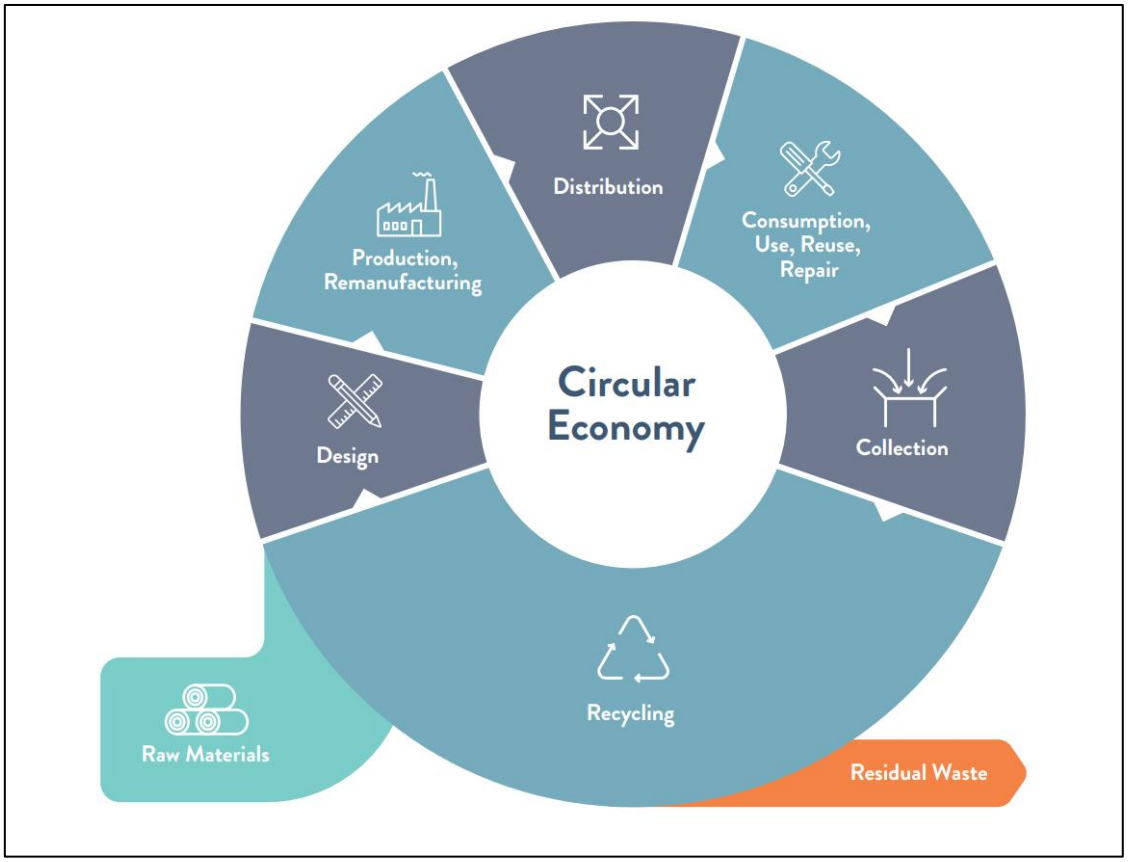
Waste management in Ireland is subject to EU, national and regional waste legislation, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the 'Waste Framework Directive (2008/98/EC)' as amended, which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the 'Waste Management Act 1996 (as amended)'. European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for re-use > recycling > recovery > disposal) (Figure 14-1).

Figure 14-1 Waste Hierarchy (Source: European Commission)



EU and Irish national waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (CE) is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products ().

Figure 14-2 Circular Economy (Source: EPA)



The Irish Government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of

waste. The policy document, 'Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland' (WAPCE), was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national targets is due to Irish and international waste context changing in the years since the launch of the previous waste management plan, 'A Resource Opportunity', in 2012.

One of the first actions to be taken from the WAPCE was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021.

The Circular Economy and Miscellaneous Provisions Act 2022 (as amended) was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, which retains the value of resources in our economy for as long as possible and that will significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste and streamlines the national processes for End-of-Waste and By-Products decisions.

The National Waste Management Plan for a Circular Economy 2024-2030 (2023) has been published and replaces the Regional Waste Management Plans. The Plan sets out a framework for the prevention and management of waste in Ireland for the period 2024 to 2030.

This Plan recognises Climate Change as a key driver for both behavioural change and improved waste management practices. The ambition of this Plan is 0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector. This ambition is underpinned with a comprehensive series of targets, policies, actions and a suite of key deliverables.

National End-of-Waste Decision EoW-N001/2023 establishes criteria determining when recycled aggregate resulting from a recovery operation ceases to be waste.

The strategy for the management of waste from the construction phase is in line with the requirements of the 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction and Demolition Projects' document, produced by the EPA in November 2021. The guidance document 'Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers' (FÁS & Construction Industry Federation 2002) was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including:

- The National Waste Management Plan for a Circular Economy 2024 – 2030 (NWMPCE) (2024),
- BS 5906:2005 Waste Management in Buildings – Code of Practice,
- Meath County Council (MCC) Waste Management (Segregation, Storage & Presentation of Household and Commercial Waste) Bye-Laws (2018),
- EPA National Waste Database Reports 1998 – 2020,
- The Circular Economy and National Waste Database Report 2021-2022 (2024) and
- The EPA National Waste Statistics Web Resource.

14.1.2 Waste Terminology

Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

- **Waste:** Any substance or object which the holder discards or intends or is required to discard.
- **Prevention:** Measures taken before a substance, material or product has become waste, which reduce:
  a. the quantity of waste, including through the re-use of products or the extension of the life span of products;
  b. the adverse impacts of the generated waste on the environment and human health; or
  c. the content of harmful substances in materials and products.

- **Reuse:** Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
- **Preparing for Reuse:** Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.
- **Treatment:** Recovery or disposal operations, including preparation prior to recovery or disposal.
- **Recovery:** Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.
- **Recycling:** Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.
- **Disposal:** Any operation which is not recovery even where the operation has, as a secondary consequence, the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations.
- **Circular Economy:** A model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible.

14.2 Methodology

14.2.1 Utilities

In this EIAR, the impacts on the utilities described in the above guidance have already been considered in the following chapters and therefore these aspects will not be addressed in specific detail within this chapter.

- Chapter 4 – Human Health and Populations;
- Chapter 5 – Land, Soils and Geology;
- Chapter 6 – Hydrology and Hydrogeology;
- Chapter 8 – Air Quality and Odour;
- Chapter 9 – Climate;
- Chapter 10 – Noise and Vibration;
- Chapter 11 – Archaeological, Architectural and Cultural Heritage;
- Chapter 12 – Landscape and Visual Impact; and
- Chapter 13 – Material Assets - Traffic and Transportation

This chapter assesses material assets major infrastructure and utilities which have not already been addressed elsewhere in this EIAR. The potential impacts, if any, are assessed in terms of the following:

- Land Use, Property, and Access.
- Power and Electrical Supply.
- Telecommunications.
- Surface water infrastructure.

- Foul drainage infrastructure.
- Potable Water infrastructure, and
- Natural Gas infrastructure

Detailed drainage design information is provided in the Site Drainage and SUDS Technical Memorandum and drawings prepared by WSP.

14.2.2 Waste Management

The assessment of the impacts of the Proposed Development, arising from the consumption of resources and the generation of waste materials, was carried out, taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management; including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports.

This chapter is based on the Proposed Development, as described in Chapter 2 (Description of Proposed Development) and considers the following aspects:

- Legislative context;
- Construction phase (including demolition, excavation and site preparation);and
- Operational phase.

A desktop study was carried out, which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction and operational phases of the Proposed Development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the Proposed Development on the environment during the construction and operational phases, to promote efficient waste segregation, and to reduce the quantity of waste requiring disposal. This information is presented in Section 14.6.

A detailed review of the existing ground conditions on a regional, local and site-specific scale is presented in Chapter 5 (Land, Soils and Geology). Chapter 5 also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the Proposed Development.

14.2.3 Difficulties Encountered

Until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

While it is possible to initially select a licensed waste facility for soil disposal, there is potential to encounter contaminated material or material with naturally occurring variations in minerals and chemicals that necessitates sending it to a different suitably licensed facility. The sampling and testing carried out in the

Site Investigation (SI) process provides spot samples, and further testing may be required during the excavation process, as the true condition of all excavated materials cannot be ascertained with certainty until this is undertaken.

There is a number of licensed, permitted and registered waste facilities in the Meath County region, in the surrounding counties, the eastern midlands waste region and in Ireland and Northern Ireland. However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which will be more beneficial from an environmental perspective.

Licensed waste facilities have annual limitations on material that they can import as part of their license agreements. Because of this it would not make it possible to commit to a singular specific receiving facility as it is not available throughout the excavation phase. It would not be viable to cease a development and wait until a receiving facilities annual receiving quotas are reset. In a normal development waste facilities would switch between facilities with available capacity.

The ultimate selection of waste contractors and waste facilities would be subject to appropriate selection criteria proximity, competency, capacity, serviceability, and cost.

In relation the utilities, there were no significant difficulties encountered in compiling the specified information for this EIAR chapter.

14.3 Receiving Environment

14.3.1 Land Use, Property, and Access

The existing Knockharley Landfill facility is located on a site of approximately 135.2 hectares and operates under an EPA-issued Industrial Emissions Licence (IEL), Licence Number W0146-04. The current ongoing development is being carried out under An Coimisiún Pleanála (ACP) permission Reg. Ref. 303211, which allows for an expanded landfill with a capacity of approximately 440,000 tonnes per year. Chapter 2 provides a detailed breakdown of the waste streams currently accepted at the site, as well as a description of all existing on-site infrastructure.

The Proposed Development site is located within the townlands of Knockharley, Flemingstown, and Tuitrath, Navan, Co. Meath, and is currently in use primarily as an active landfill. The site lies approximately 800 metres from the N2 National Primary Road and is accessed via a private entrance directly off the N2.

The site is surrounded on all sides by agricultural land, which is the predominant land use in the wider area. There are scattered residential properties in the vicinity, with the closest houses located along Knockharley Road, immediately north of the site, and along the Rathdrinagh/Flemingstown Road (L5056) to the east.

The Knockharley Stream (EPA Name: Flemingstown 08, EPA Code: 08F05) flows west to east through the northern portion of the site, continues along the eastern boundary, and then travels south/southeast where it joins the Nanny River (EPA Name: Nanny (Meath), EPA Code: 08_757) approximately 3 km downstream. The Knockharley Stream traverses or runs adjacent to the site's boundary for approximately 3 km. A portion of this stream to the north of the landfill was diverted as part of the permitted ABP-303211-18 development.

The Kentstown Stream (EPA Name: Kentstown 08, EPA Code: 08K18) flows along the southern boundary of the site for approximately 90 metres before turning south and joining the Knockharley Stream approximately 550 metres downstream.

14.3.2 Power and Electrical Supply

Existing overhead power lines are present at the following locations:

- 220 kVA running north south and adjacent to the western boundary of the existing landfill footprint.
- 20 kVA running north south on the eastern boundary parallel to the existing local road with spurs to:
  - An ESB substation exporting power from the landfill gas compound to a 20kVA line.
  - An ESB substation importing power to the administration building.

The 20 kV line provides electricity to the existing landfill site.

14.3.3 Telecommunications

The existing Knockharley Landfill facility is serviced by telecommunications infrastructure.

14.3.4 Surface Water Infrastructure

Surface water on the site is managed via an existing surface water pipeline network, swales and surface water attenuation ponds and wetlands.

Swales are vegetated channels over which flows are conveyed at low non-erosive velocities to store and convey run-off and remove any collected pollutants. The existing swales drain collected rainwater run-off from capped areas of the landfill and the perimeter of the landfill footprint, IBA cell footprint and embankments surrounding the cells. These swales are of approximate depth 600 mm with a bottom width of 1000 mm and side slopes of 1 in 3. The swales were constructed in accordance with CIRIA C698, Site Handbook for the Construction of SUDS. As the landfill cells develop further, the surface water swales will continue to be constructed around the landfill footprint and embankments.

Surface water from the landfill footprint is drained via the main landfill perimeter swale to a purpose-built storm water attenuation pond and constructed wetland to the south of the site – known as the southern attenuation pond and wetlands. Surface water runoff from roads and hard standing areas discharge to a surface water trunk main collection pipe. This surface water trunk is located on the eastern side of the perimeter access road and runs between the administration building to the southern surface water attenuation pond. This below ground pipe main varies from 225 mm diameter up to 750 mm diameter. There is also a 450 mm diameter spur from this pipe main to the north of the permitted C&D Fines Treatment Facility building which runs from east to west and turns north to receive runoff from the main site access road. The pipe discharges to an existing attenuation pond and wetland at the south of the site, via a Class 1 bypass proprietary oil/water separator. This petrol interceptor treats any accidental discharge of hydrocarbons within stormwater run-off prior to stormwater run-off discharging to the attenuation pond and further treatment provided by a wetland.

Surface water from the IBA cells and adjacent screening berm to the east is drained via the perimeter swales adjacent to these features to a purpose built attenuation pond, holding pond and wetlands to north of the IBA cells and to the northeast of the existing landfill footprint – known as the northern attenuation pond, holding pond and wetlands.

The attenuation ponds and wetlands were designed to manage the runoff from the development for up to a 1 in 100-year design return period storm event. The outflow from the southern attenuation pond and wetlands discharges into the local drainage network at the south-eastern corner of the site, while the outflow from the northern attenuation pond, holding pond and wetlands is to the local water course/drainage network at the north-eastern corner of the site.

The southern attenuation pond has a total storage volume of 20,369 m^3 - total dead storage volume of 13,481 m^3 and a total live storage volume of 6,888 m^3.

An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

The northern attenuation pond and holding pond have a total storage volume of 16,953 m^3 – total dead storage volume of 9,032 m^3 (7,047 m^3 and 1,985 m^3, respectively), and a live storage volume of 7,921 m^3 (6,317 m^3 and 1,604 m^3 respectively). The two ponds are hydraulicly connected, with a large diameter pipe, and function as a single attenuation system.

The outflow from the northern attenuation pond discharges at a maximum rate of 69 l/s and 109 l/s during a 1:1 and 1:100 AEP event, respectively.

An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

The storm water attenuation ponds (north and south) are lined with a composite barrier, comprising a HDPE membrane and a 1.0 m clay basal layer with a permeability of 1 x 10-9 m/s, which is the same specification as the landfill cell clay barrier. The constructed wetlands (north and south) comprises a shallow clay-lined pond both naturally colonised and planted with appropriate species.

As per the IE Licence (W0146-04), currently there is continuous monitoring equipment on each pond inlet and on the discharge point of the northern surface water management infrastructure which monitors parameters on a continuous frequency as required by Schedule C.2.2 Monitoring of Emissions to Water, of the IE Licence.

Composite samplers have been installed at emission points SW09 and SW10 prior to discharge occurring to the Knockharley Stream. These are continuously monitored to ensure receiving water quality is maintained.

14.3.5 Foul Drainage Infrastructure

All foul effluent generated from the existing welfare facilities on site is collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

14.3.6 Potable Water Supply

A source of potable water for use in the canteen, welfare facilities and for general site cleaning is sourced from the mains supply. This water source also provides water to a fire hydrant onsite.

14.3.7 Natural Gas

The Proposed Development site has no connection to the existing Bord Gáis gas pipeline, which runs west to east through the southern part of the site, just south of the existing landfill footprint and north of the existing surface water attenuation pond.

The existing gas and power lines are shown in WSP Drawing ref: IE0037029.9627 004.

14.3.8 Waste

In terms of waste management, the receiving environment is largely defined by Meath County Council as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the NWMPCE 2024 – 2030 and the WAPCE.

The waste management plans set out the following targets for waste management in the region:

- Achieve a recycling rate of 55% of managed municipal waste by 2025; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and Indigenous recovery practices.

The Regional Waste Management Planning Offices have issued a National Waste Management Plan for a Circular Economy 2024 - 2030 (NWMPCE) in March 2024, which supersedes the Eastern Midlands Regional (EMR) waste management plan and the two other regional waste management plans. The NWMPCE does not however dissolve the three regional waste areas. The NWCPCE sets the ambition of the plan to have a 0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector.

The Meath County Development Plan 2021 – 2027 sets out the objectives for the MCC area which reflect those set out in the regional waste management plan and can be found in Appendix 14.1.

The existing Knockharley Landfill which operates privately is a key piece of physical waste infrastructure in the region and is currently licenced to accepted up to 435,00 tonnes of non-hazardous waste and 5,000 tonnes of stable, non-reactive hazardous waste.

MCC no longer directly operates any municipal waste landfills. As well as the Knockharley Landfill, there are a number of waste permitted and licensed facilities located in the EMR Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, municipal waste landfills, material recovery facilities and waste transfer stations.

However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which will be more beneficial from an environmental perspective.

The ultimate selection of waste contractors and waste facilities will be subject to appropriate selection criteria proximity, competency, capacity and serviceability.

14.4 Characteristics Of the Proposed Development

This section describes the built services and infrastructure, and waste management for the Proposed Development during both construction and operational phases.

Chapter 2 (Description of the Proposed Development) provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant documents to define the Proposed Development.

14.4.1 Demolition Phase

There is no demolition associated with the proposed development and as such there is to be no demolition waste generated.

14.4.2 Construction Phase

14.4.2.1 Land Use, Property, and Access

The site is located approximately 800 metres from the N2 National Primary Road and has its own private entrance directly off the N2. This existing entrance will be used during the construction phase of the Proposed Development to accommodate the movement of both staff and construction vehicles.

A wheel wash system already in place at the site will continue to be used during construction to prevent dirt and debris from being tracked onto the public road. A road sweeper will also be employed as required to maintain cleanliness on the surrounding public roads.

There is existing on-site car parking which will continue to be provided for construction personnel. Staff will be encouraged to walk, cycle, or use public transport where feasible, and information on local transport options will be displayed on site.

All construction materials will be delivered to the site by road using clean vehicles. Lorries and trucks transporting friable materials or spoil will be properly enclosed or covered to prevent material escaping onto public roads.

Traffic management and road signage, if required, will comply with the Department of Transport's Traffic Signs Manual – Chapter 8: Temporary Traffic Measures and Signs for Road Works and will be agreed upon with Meath County Council (MCC). Additional construction traffic management and mitigation measures, including provisions for minimising impacts during peak periods, are detailed in Chapter 13 – Traffic and Transportation of this EIAR.

The design of the proposed landfill extension will be fully integrated with the existing landfill layout and will maintain the same engineering standards, environmental protections, and operational protocols currently in place.

14.4.2.2 Power and Electrical Supply and Telecommunications

There is an established electrical connection to the national grid which will be used to power electrical equipment and plant necessary to complete the construction of the Proposed Development.

Construction plant shall be powered by mains electricity wherever possible, rather than by generators.

14.4.2.3 Telecommunications

There is an established telecommunications connection on site which will continue to be used during the construction phase of the Proposed Development.

14.4.2.4 Surface Water Infrastructure

WSP have developed a detailed Outline Construction Environmental Management Plan (CEMP). Prior to construction works relation to the Proposed Development taking place on site, the CEMP will be updated to incorporate mitigation measures outlined in this EIAR.

Measures will be employed to protect surface water features, particularly the Knockharley Stream, in the receiving environment during construction, and to prevent its contamination by direct run-off or by infiltration from the development site. An Emergency Response Plan will be prepared. Measures have been included in the Outline Construction Environmental Management Plan prepared by WSP (2025) to address the following:

- Overground oil/diesel storage
- Refuelling
- Concrete washout
- Oil spills
- Road sweepers/cleaning
- Protection of surface water features

During construction run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions.

14.4.2.5 Foul Drainage Infrastructure

There are existing welfare facilities on site which will be utilised during the construction phase of the Proposed Development.

Foul water will continue to be collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

14.4.2.6 Potable Water Supply

There is an existing potable water connection on site which will continue to be utilised for the duration of the construction phase.
Water will be required for welfare facilities, dust suppression and general construction activities.

14.4.2.7 Natural Gas

No natural gas mains connection will be established as a part of the Proposed Development.

14.4.2.8 Waste

During the construction phase, the primary waste stream will consist of excavated material, including soil, clay, and stone. It is estimated that a total of 1,807,499 m³ will need excavated to facilitate the proposed extension of the existing landfill footprint and all ancillary works. Of this, 1,440,434 m³ of material will be retained on site for the construction of embankments, berms, capping and use as clay liner.

Approximately 367,065 m³ of material will require removal from the site. It is currently anticipated that Regulation 27 (commonly referred to as "Article 27") of the European Communities (Waste Directive) Regulations 2011 as amended will be utilised to manage all excavated material which requires removal from the Proposed Development site.

This material will be taken to authorised recovery/backfilling sites, such as Tara Mines (Boliden) or other similar facilities. The Applicant has engaged with Tara Mines (Boliden) and there is currently capacity at this site for the volume of soil to be removed, however soil removal is subject to the approval of a Regulation 27 By-Product Notification, which has not been register with the EPA at the time of writing (December 2025) and also subject to capacity at the time.

If the material is deemed unsuitable for reuse and requires removal from site it is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the 'Waste Management Act 1996' (as amended), the 'Waste Management (Collection Permit) Regulations 2007' as amended, and the 'Waste Management (Facility Permit & Registration) Regulations 2007' as amended. The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or license is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011), as amended'.

To establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication 'Waste Classification – List of Waste and Determining If Waste is Hazardous or Non-Hazardous'. Environmental soil analysis will be conducted prior to removal of the material on a number of the soil samples in accordance with the requirements for the acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability.

Secondary waste streams are anticipated to be very minimal and will consist mainly of surplus construction materials such as broken or off-cuts of timber, concrete, bricks, and packaging waste (cardboard, plastic, timber). The appointed contractor will be required to ensure that oversupply of materials is minimised and opportunities for reuse of suitable materials are maximised.

Waste will also be generated from construction phase workers e.g. organic / food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins, Tetra Pak cartons) and mixed non-recyclables from temporary welfare facilities provided on-site during the construction phases. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further details on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP.

14.4.3 Operational Phase

14.4.3.1 Land Use, Property, and Access

The Proposed Development primarily comprises an extension to the existing Knockharley Landfill, enabling the continued operation of landfill activities at the site. The extension will increase the landfill area by approximately 17.68 hectares, providing an additional 4.12 million cubic metres of void space for landfilling.

There will be no change to the volume of waste accepted or the types of waste streams managed at the site during the operational phase of the Proposed Development. Accordingly, operational traffic volumes are expected to remain consistent with the current baseline, which reflects traffic levels associated with the existing Knockharley Landfill facility.

The site is located within the administrative area of Meath County Council and is subject to the provisions of the Meath County Development Plan 2021–2027. According to the Plan, the Proposed Development site is zoned RA – Rural Area. The stated zoning objective is:

"To protect and promote in a balanced way, the development of agriculture, forestry and rural-related enterprise, biodiversity, the rural landscape, and the built and cultural heritage."

The continued use of the site for waste management activities, including the proposed extension, is considered to be compatible with the RA zoning objective, particularly as it supports rural-related enterprise and makes use of an existing, long-established waste facility.

14.4.3.2 Power and Electrical Supply

As part of the Proposed Development, an existing 220 kV overhead ESB powerline that currently crosses the western boundary of the landfill must be relocated to avoid conflict with the proposed landfill cell extension.

The powerline will be realigned within the wider site boundary, involving the decommissioning and removal of three existing 220 kV transmission towers. In their place, seven new towers will be installed along a revised alignment that maintains appropriate clearances from landfill infrastructure and complies with ESB Networks' statutory requirements.

The new towers will range in height from approximately 20.06 m to 26.175 m (see ESB drawing refs: PG567-D004-708-001-000 and PG567-D004-711-001-000, and WSP drawing ref: 297705 Con-ESB-Sec, submitted with the planning application). Final tower heights will be determined by ESB Networks based on detailed design and site-specific constraints.

All relocation works will be undertaken in coordination with ESB Networks and in compliance with health and safety legislation, electrical infrastructure standards, and environmental best practice. Appropriate environmental management measures will be implemented to avoid or minimise impacts on sensitive receptors, habitats, and existing utilities.

With respect to the power and electricity supply to the site, no alterations to the existing connection are proposed.

14.4.3.3 Telecommunications

The telecommunications services currently available on site will remain unchanged.

14.4.3.4 Surface Water Infrastructure

The proposed surface water management infrastructure will connect to the existing system on site and continue to operate in its current manner. The existing surface water system at the landfill is divided into two catchments: the northern catchment, which incorporates a holding pond and the northern attenuation pond, and the southern catchment, which incorporates the southern attenuation pond. The Proposed Development will continue to discharge surface water to both of these catchments.

Grassed swales are proposed to provide treatment and conveyance of surface water from the landfill to the attenuation ponds. A continuous swale will be constructed around the perimeter of the newly proposed landfill cell, with sections of the swale directing flows to the northern attenuation pond and others directing flows to the southern attenuation pond. A more detailed description of the proposed surface water management system is provided in Chapter 2 (Description of Proposed Development) of this EIAR. Reference should also be made to WSP drawing ref. IE0037029.9627 017A submitted with the planning application.

14.4.3.5 Foul Drainage Infrastructure

All foul effluent generated by the existing welfare facilities is collected onsite and treated through a Bio-Cycle unit. Effluent from this unit is discharged to the waste leachate lagoon and tankered offsite for

further treatment. There is no changes to the on site foul drainage network associated with the Proposed Development.

Please refer to Foul Water Network WSP drawing ref. IE0037029.9627 017 for details of the Foul Water Network.

14.4.3.6 Potable Water Supply

Potable water for the canteen, welfare facilities, and general site cleaning is supplied from the mains. This source also feeds the on-site fire hydrant and will remain unchanged during the operational phase of the Proposed Development.

14.4.3.7 Natural Gas

No natural gas mains connection will be established as a part of the Proposed Development.

14.4.3.8 Waste

The proposed development extension will give rise to similar operational waste streams to those currently generated at the facility.

Within site offices, welfare facilities, and workshops, general municipal-type waste (will be generated). Other waste streams which may be generated at an irregular basis may be silt sludge and sediment arising from settlement tanks, leachate treatment plants, drainage ditches, or road sweeping and electrical equipment.

Waste streams generated by the landfill itself will include leachate and landfill gas. Leachate and landfill gas will be managed in line with the current IED Licence (W0146-04) for the existing facility.

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site. All wastes generated by the servicing and maintenance of plant is immediately removed from site by the service contractor. Sludges from the on-site interceptor is removed on a regular basis (at least annually) by a suitably licensed operator.

14.4.4 Decommissioning

Decommissioning and remediation of the site will be carried out in accordance with the existing IED Licence (W0146-04), the CRAMP for the facility and the planning applications permitted by the planning authority, including planning conditions.

14.5 Potential Impacts of The Proposed Development

14.5.1 Do Nothing Scenario

If the Proposed Development does not proceed, the existing landfill would continue to operate until its permitted capacity is reached. Waste currently managed at this facility would then to be sent to alternative licensed facilities, potentially requiring longer transport distances and associated environmental impacts. The lands identified for expansion would remain in their current use and condition.

14.5.2 Construction Phase

14.5.2.1 Land Use, Property, And Access

To minimise nuisance to neighbouring properties, the outline CEMP prepared by WSP will be updated prior to the construction phase of the Proposed Development. The CEMP will be implemented and adhered to

by the contractor and will be overseen and updated where necessary by the Project Manager, Environmental Manager, Resource Manager, and Ecological Clerk of Works, as appropriate.

All mitigation measures outlined in this EIAR and the CEMP will be implemented during the construction phase. The contractor will also update the CEMP to incorporate any additional mitigation measures required to ensure compliance with subsequent planning conditions associated with the Proposed Development.

The potential impact associated with land use, property, and access during the construction phase is predicted to be ***negative, not significant,*** and ***long- term.***

14.5.2.2 Power Supply and Electrical Supply

Any excavations within the vicinity of existing electrical services will be conducted in consultation with ESB Networks to ensure there is no impact on existing users. The electrical connection should have no disruptions to the national grid during connection works.

All utilities work shall be carried out in accordance with the relevant requirements of the respective service providers. These works will be conducted in a manner that is safe, and which minimises interruptions of service which might affect residents and businesses, and adjacent developments.

The potential impact associated with power and electrical supply for the construction phase in the absence of mitigation measures will be a ***neutral***, ***imperceptible,*** and ***long- term.***

14.5.2.3 Telecommunications

The potential impact on telecommunications infrastructure during the construction phase in the absence of mitigation measures is ***neutral, imperceptible,*** and ***long- term.***

14.5.2.4 Surface Water Infrastructure

During the construction phase, there is potential for rainfall run-off and dewatering water during the construction phase may contain increased silt levels or otherwise become polluted from construction activities. Suspended solids in runoff water may result in an increase in suspended sediment load, resulting in increased turbidity, which may in turn impact on local infiltration capacity, or downstream watercourses.

The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially overwhelm the existing on site drainage systems, leading to localized flooding. Run-off containing substantial amounts of silt can cause damage to on site surface water networks.

As there is no connection to the public surface water network there is no potential for impact on the public surface water network.

14.5.2.5 Foul Drainage Infrastructure

As there is no connection to the public foul water network there is no potential for impact on the public foul water network.

14.5.2.6 Potable Water Supply

The water demand during the construction phase will not be significant enough to affect existing pressures. The potential impact on potable water supplies and infrastructure during the construction phase is ***negative, imperceptible,*** and ***long- term.***

14.5.2.7 Natural Gas

There is no requirement for natural gas connection, therefore during the construction phase there is no potential impact.

14.5.2.8 Waste

If waste materials are not managed and stored correctly, it is likely to lead to litter or pollution issues at the Proposed Development site and in adjacent areas. The indirect effect of litter issues is the presence of vermin/flies in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long- term, not significant*** and ***negative***.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, not significant*** and ***negative***.

C&D wastes arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the EMR and across the island of Ireland which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the Proposed Development site would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. Many construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***long- term, significant*** and ***negative.***

There is a quantity of material that will need to be excavated to facilitate the Proposed Development. A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 5 (Land, Soils & Geology). Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and managed in a way that will not impact negatively on workers, or on the water and soil environments, both on and off-site. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***long- term, significant*** and ***negative***.

14.5.3 Operational Phase

14.5.3.1 Land Use, Property and Access

During the operational phase the Proposed Development is not anticipated to generate significant air (including odour), noise, water emissions or traffic impacts during normal operating conditions; these have been discussed further in the respective EIAR chapters, Chapter 6 (Hydrology and Hydrogeology), Chapter 8 (Air Quality), Chapter 9 (Climate), Chapter 10 (Noise and Vibration), and Chapter 13 (Traffic and Transportation).

The Proposed Development is consistent with the zoning of these lands.

The overall potential impact associated with land use, property, and access during the operational phase will be localised ***neutral, not significant***, and ***long term***.

14.5.3.2 Power Supply and Electrical Supply

The Proposed Development will continue to be served by the existing electricity connection to the site. As no significant additional electrical demand is anticipated beyond current operational requirements for

administration and site facilities, the Proposed Development will not result in any notable increase in demand on the national grid.

Maintenance of the existing electrical infrastructure will be undertaken in accordance with the relevant requirements of the utility supplier.

There will be a ***neutral, imperceptible,*** and ***long-term*** effect on electrical supply during the operational phase of the Proposed Development.

14.5.3.3 Telecommunications

There will be no significant increase in demand on the local telecommunications network during the operational phase of the Proposed Development. No additional capacity will be required from the wider telecommunications network.

The connection to the external telecommunications network will be completed by a statutory telecommunications operator. The potential impact on telecommunications infrastructure during the operational phase is considered to be ***neutral, imperceptible,*** and ***long term***.

14.5.3.4 Surface Water Infrastructure

During operation, a primary risk to surface water quality arises from contaminated runoff, where rainwater comes into contact with waste materials, leachate, or other pollutants on site.

As there is no connection to public surface water infrastructure there is no potential risk of impact.

14.5.3.5 Foul Drainage Infrastructure

There is no foul sewer service in the area. All foul effluent generated from administration welfare facilities is collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

As there is no connection to public foul water infrastructure there is no potential risk of impact.

14.5.3.6 Potable Water Supply

The Proposed Development will continue to use the existing mains connection for potable water, with no increase in operational demand. Consequently, the potential impact on potable water infrastructure is considered ***neutral, imperceptible,*** and ***long term.***

14.5.3.7 Natural Gas

There is no requirement for natural gas connection, therefore during the operational phase there is no potential impact.

14.5.3.8 Waste

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy, which would lead to small volumes of waste being sent unnecessarily to landfill and diverted from reuse or recycling. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative***.

The nature of the Proposed Development means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste effectively from this type of development. Waste unsuitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of

municipal recyclables, which is typically exported as a raw material to produce recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas. The knock-on effect of litter issues is the presence of vermin in affected areas. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term***, ***significant*** and ***negative***.

Waste contractors will be required to service the Proposed Development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***indirect, long-term***, ***significant*** and ***negative***.

14.6 Mitigation Measures

14.6.1 Construction Phase

14.6.1.1 Utilities

Consultation with Meath County Council, EirGrid, ESB Networks and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth construction schedule without disruption to local and business community. The works contractor will be obliged to put best practice measures in place to ensure, any planned interruptions are agreed in advance with the utilities suppliers.

The construction contractor will employ strict quality control measures will be undertaken while laying pipes and utilities to minimise or eradicate infiltration and ex-filtration.

Prior to commencing any construction activities, the contractor shall conduct a comprehensive utility locating survey using advanced technologies such as ground-penetrating radar (GPR) and electromagnetic induction methods. This survey will accurately identify the location and depth of all existing underground services, including high voltage (HV) cables, water and gas pipelines, and telecommunication lines. Based on the results of the utility locating survey, exclusion zones will be demarcated around identified utilities. These zones will indicate areas where construction activities are restricted or subject to specific safety protocols.

The detailed CEMP will be prepared by the main contractor prior to the start of construction. This outlines the construction techniques and methodologies which will be implemented during construction of the Proposed Development. The mitigation measures set out in this EIAR and the CEMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager, Resource Manager and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures. The detailed CEMP will include any subsequent planning conditions relevant to the Proposed Development and set out further detail of the overarching vision of how the construction contractor of the Proposed Development manage the site in a safe and organised manner.

14.6.1.2 Waste

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and manage the waste in such a manner as to minimise the effects on the environment.

The concept of the 'circular economy'(CE) and 'waste hierarchy' are employed when considering all mitigation measures.

While the waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal.

The following mitigation measures will be implemented during the construction phase of the Proposed Development:

As previously stated, a project-specific RWMP has been prepared in line with the requirements of the EPA '*Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects'* (2021) and is included as Appendix 14.1 to this chapter. The mitigation measures outlined in the RWMP will be implemented in full and form part of the mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the Proposed Development.

- Prior to commencement, the appointed contractor(s) will be required to refine / update the RWMP (Appendix 14.1) in agreement with MCC and in compliance with any planning conditions, or submit an addendum to the RWMP to MCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases.

A quantity of topsoil and subsoil will need to be excavated to facilitate the Proposed Development. The quantity surveyors have estimated that the bulk of this material will be reused on site, with approximately 401,217 m³ estimated for removal off site. Any excavated materials requiring removal off site will be subject to appropriate classification and segregation to ensure that potentially contaminated materials are identified and managed in a manner that will not negatively impact workers and the surrounding soil and water environments, both on and off site.

In addition, the following mitigation measures will be implemented:

Building materials will be chosen to 'design out waste'.

On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:

- Clean Soil
- Contaminated soil (if located onsite)
- Concrete rubble (including ceramics, tiles and bricks);
- Plasterboard;
- Metals;
- Glass; and
- Timber.

Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal).

All waste materials will be stored in skips or other suitable receptacles in designated areas of the site.

Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required).

A Resource Manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works.

All construction staff will be provided with training regarding the waste management procedures.

All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal.

All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities.

All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Regulation 27 (By-products), as amended, European Union (Waste Directive) Regulations as amended. EPA approval will be obtained prior to moving material as a by-product.

These mitigation measures will ensure that the waste arising from the construction phase of the Proposed Development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, as amended and the NWMPCE. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

14.6.2 Operational Phase

14.6.2.1 Utilities

The Proposed Development stormwater drainage network design includes sustainable drainage systems (SuDS), i.e. surface water swales, wetlands and attenuation ponds, these measures by design ensure the stormwater leaving the site is of a suitable quality.

Any necessary maintenance or upgrades of on-site utilities infrastructure during the operational phase of the Proposed Development will be carried out in accordance with the specifications of the relevant service providers and facilitated by facilities management.

14.6.2.2 Waste

During the facilities operations, waste materials will be segregated on-site, where possible, into at least the following non-hazardous waste types:

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials.

All wastes generated by the servicing and maintenance of plant is immediately removed from site by the service contractor.

Sludges from the on-site interceptor is removed on a regular basis (at least annually) by a suitably licensed operator.

The operator and staff will ensure that all waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted, or licensed facilities.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Acts 1996 - 2011* and associated Regulations, the *Litter Pollution Act of 1997* as amended and the *NWMPCE*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

14.7 Monitoring Or Reinstatement Measures

The management of waste during the construction phase will be monitored by the contactor's appointed Resource Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.

The management of waste during the operational phase will be monitored by the operator / personnel to ensure effective implementation of the operational mitigation by the nominated waste contractor(s).

Table 14.1 Monitoring Proposals

Likely Significant Effect	Monitoring Proposals
Litter Pollution	The Contractor will review and maintain waste records and site audits
Unlicensed Waste Collection (Illegal Dumping)	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Insufficient Waste Facilities	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Lack of Waste Classification	An appointed Resource Manager will monitor all on-site waste segregation and classification
Unlicensed Waste Collection (Illegal Dumping)	The operator/ facilities management company will maintain waste receipts on-site for a period of 7 years and make available to MCC as requested.
Poor Waste Segregation	Waste generation volumes and cross contamination will be monitored by the operator / facilities management company
Litter Pollution	Waste storage areas will be monitored by the operator / facilities management company

14.7.1 Construction Phase

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets.

The management of waste during the construction phase shall be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the RWMP, including maintenance of waste documentation.

The mitigation measures in the RWMP specify the need for a Resource Manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the Resource Manager shall identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the construction phase will enable better management of waste contractor requirements and identify trends. The data will be maintained to advise on future projects.

14.7.2 Operational Phase

The management of waste during the operational phase shall be monitored to ensure effective implementation of mitigation measures by facilities management and the nominated waste contractor(s). Waste generation volumes shall be monitored as there may be opportunities to reduce the number of bins and equipment required in the Waste Storage Area where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contactor costs.

14.8 Residual Effects of The Proposed Development

14.8.1 Construction Phase

14.8.1.1 Utilities

The works contractor will be obliged to put best practice measures in place and work in accordance with the CEMP. The implementation of mitigation measures within each chapter of this EIAR and measures detailed in Section 14.6.1 of this chapter will ensure that the residual impacts on the material assets considered in this chapter during the construction phase will be ***neutral, not significant,*** and ***long-term***.

14.8.1.2 Waste

A carefully planned approach to waste management as set out in Section 14.6.1 and adherence to the RWMP (which includes mitigation) (Appendix 14.1) during the construction phase will promote resource efficiency and waste minimisation. When the mitigation measures are implemented and a high rate of prevention reuse, recycling and recovery is achieved, the predicted impact of the construction phase on the environment will be ***long-term, imperceptible*** *and* ***neutral.***

14.8.2 Operational Phase

14.8.2.1 Utilities

The Proposed Development does not require any additional connections to utilities, as these have already been provided at the existing Knockharley Landfill facility.

The implementation of mitigation measures within each chapter of this EIAR and detailed in Section 14.6 of this chapter will ensure that the residual impacts on the material assets considered in this chapter during the operational phase will be ***neutral, imperceptible,*** and ***long-term***.

14.8.2.2 Waste

During the operational phase, a structured approach to waste management as set out in Section 14.6.2 and will promote resource efficiency and waste minimisation. When the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be ***long-term, imperceptible*** *and* ***neutral.***

14.9 Cumulative Impacts of The Proposed Development

The cumulative impact of the Proposed Development with any relevant other planned or permitted developments are discussed below. For details on the developments considered for cumulative impacts refer to Chapter 2 and Appendix 2.1 of this EIAR.

14.9.1 Construction Phase

14.9.1.1 Utilities

The Proposed Development entails minimal use of public material assets (utilities) during construction therefore there is limited opportunity for the causation of cumulative impacts during the construction phase of the Proposed Development in combination with other planned or permitted developments.

The developments listed in Chapter 2, Appendix 2.1 of this EIAR have been reviewed, and all are capable of combining with the Proposed Development to result in cumulative effects on material assets. Coordination and consultation will be had between the construction contractor and relevant service providers within the locality to facilitate the Proposed Development. The Proposed Development will be in accordance with the requirements of statutory providers for electrical infrastructure and water infrastructure.

The implementation of mitigation measures during construction works as well as the compliance of adjacent development with their respective agreement with network providers (ESB and Telecoms) means that the Proposed Development in combination with other exiting and permitted development is not likely to result in prolonged utility disruption; notable extra demand on a utility; or medium-term disruption to a significant piece of infrastructure. It is unlikely that there will be significant cumulative effects with other planned or permitted developments (as described in Chapter 2).

The residual cumulative effects on the material assets during the construction phase for the Proposed Development will be ***negative, not significant,*** and ***short-term***.

14.9.1.2 Waste

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise / mitigate any potential cumulative impacts associated with waste generation and waste management. As such, the cumulative effect in terms of waste will be ***short-term***, ***imperceptible*** *and* ***neutral***.

14.9.2 Operational Phase

14.9.2.1 Utilities

The Proposed Development and all permitted developments considered are required to engage with MCC, Uisce Éireann and ESB to ensure that there is sufficient capacity to cater for the increase in water and electricity requirements.

The developments listed in Chapter 2, Appendix 2.1 of this EIAR have been reviewed, and all are capable of combining with the Proposed Development to result in cumulative effects on material assets.

The Proposed Development will not necessitate any additional connections to utilities, as these have already been provided at the existing Knockharley Landfill facility, therefore there is no potential for cumulative impact during the operational phase.

14.9.2.2 Waste

There are existing residential and commercial developments close by. All the current and potential developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables.

The Proposed Development may also generate streams which are not generated by typical residential or commercial development, such as leachate and sludges.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the effect will be a ***long-term, imperceptible and neutral.***

14.10 References

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- Litter Pollution Act 1997 as amended.
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- European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC).
- Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC).
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- Environmental Protection Agency (EPA), National Waste Database Reports 1998 – 2020 and the Circular Economy and National Waste Database Report 2021 -.
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- Department of Transport, Tourism and Sport and Department of Housing, Planning and Local Government, Design Manual for Urban Roads and Streets (2019)

Chapter 14 – Material Assets – Utilities & Waste

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14. MATERIAL ASSETS – UTILITIES AND WASTE

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) evaluates the potential impacts that the Proposed Development may have on a range of Material Assets (built services / utilities and waste), as defined in the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU) and EPA Guidelines 'Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

The EPA Guidelines (EPA, 2022) specifically lists and provides sample headings and topics for material assets that include: Roads and Traffic, (Construction Phase, Operational Phase, Unplanned Events [i.e. Accidents]), Built Services (Electricity, Telecommunications, Gas, Water Supply Infrastructure, and Sewerage), Waste Management (Construction Waste, and Operational Waste).

The impact assessment presented in this chapter aims to identify potential impacts specifically related to built services / utilities and waste management. Traffic and Transportation (Chapter 13), and Architectural and Archaeological Heritage (Chapter 12) are assessed elsewhere in this EIAR.

WSP Ireland Consulting Ltd (WSP) has prepared a site-specific Resource & Waste Management Plan (RWMP) to deal with resource use and waste generation during the excavation and construction phases of the proposed development and is included as Appendix 14.1 to this chapter. The RWMP was prepared in accordance with the Environmental Protection Agency's (EPA) document 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021).

The purpose of this chapter is to identify and evaluate any potential significant impacts that the Proposed Development may have on these material assets, such as damage to infrastructure or disruptions to essential services, and to ensure the sustainable management of wastes arising at the development site in accordance with the legislative requirements and best practice standards. By conducting this assessment, appropriate mitigation measures can be developed and implemented to minimise any negative impacts and ensure that the development project is conducted in an environmentally responsible manner.

It should be noted that waste management is assessed with respect to the outgoing waste and resources during the construction and operational phases from the Proposed Development and does not consider incoming waste as part of general landfill operations.

14.1.1 Waste Legislation and Guidance

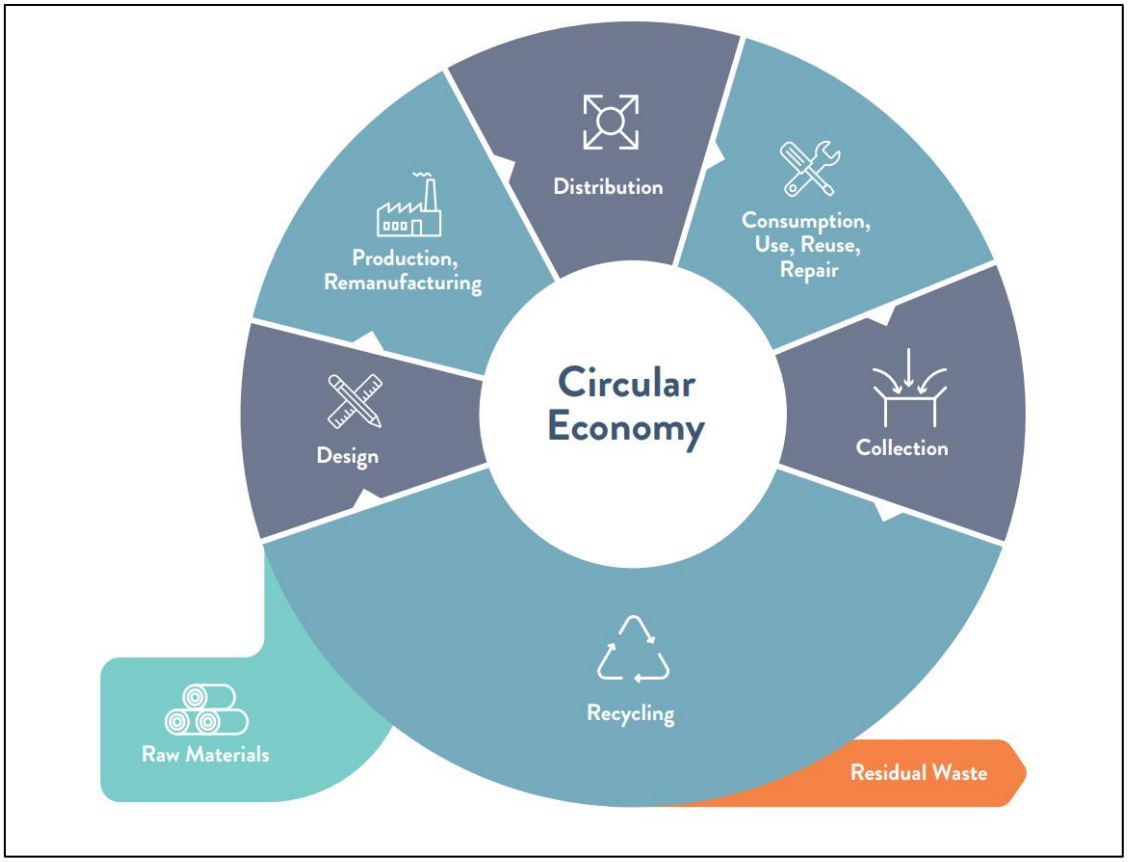
Waste management in Ireland is subject to EU, national and regional waste legislation, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the 'Waste Framework Directive (2008/98/EC)' as amended, which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the 'Waste Management Act 1996 (as amended)'. European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for re-use > recycling > recovery > disposal) (Figure 14-1).

Figure 14-1 Waste Hierarchy (Source: European Commission)



EU and Irish national waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (CE) is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products ().

Figure 14-2 Circular Economy (Source: EPA)



The Irish Government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of

waste. The policy document, 'Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland' (WAPCE), was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national targets is due to Irish and international waste context changing in the years since the launch of the previous waste management plan, 'A Resource Opportunity', in 2012.

One of the first actions to be taken from the WAPCE was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021.

The Circular Economy and Miscellaneous Provisions Act 2022 (as amended) was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, which retains the value of resources in our economy for as long as possible and that will significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste and streamlines the national processes for End-of-Waste and By-Products decisions.

The National Waste Management Plan for a Circular Economy 2024-2030 (2023) has been published and replaces the Regional Waste Management Plans. The Plan sets out a framework for the prevention and management of waste in Ireland for the period 2024 to 2030.

This Plan recognises Climate Change as a key driver for both behavioural change and improved waste management practices. The ambition of this Plan is 0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector. This ambition is underpinned with a comprehensive series of targets, policies, actions and a suite of key deliverables.

National End-of-Waste Decision EoW-N001/2023 establishes criteria determining when recycled aggregate resulting from a recovery operation ceases to be waste.

The strategy for the management of waste from the construction phase is in line with the requirements of the 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction and Demolition Projects' document, produced by the EPA in November 2021. The guidance document 'Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers' (FÁS & Construction Industry Federation 2002) was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including:

- The National Waste Management Plan for a Circular Economy 2024 – 2030 (NWMPCE) (2024),
- BS 5906:2005 Waste Management in Buildings – Code of Practice,
- Meath County Council (MCC) Waste Management (Segregation, Storage & Presentation of Household and Commercial Waste) Bye-Laws (2018),
- EPA National Waste Database Reports 1998 – 2020,
- The Circular Economy and National Waste Database Report 2021-2022 (2024) and
- The EPA National Waste Statistics Web Resource.

14.1.2 Waste Terminology

Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

- **Waste:** Any substance or object which the holder discards or intends or is required to discard.
- **Prevention:** Measures taken before a substance, material or product has become waste, which reduce:
  a. the quantity of waste, including through the re-use of products or the extension of the life span of products;
  b. the adverse impacts of the generated waste on the environment and human health; or
  c. the content of harmful substances in materials and products.

- **Reuse:** Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
- **Preparing for Reuse:** Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.
- **Treatment:** Recovery or disposal operations, including preparation prior to recovery or disposal.
- **Recovery:** Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.
- **Recycling:** Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.
- **Disposal:** Any operation which is not recovery even where the operation has, as a secondary consequence, the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations.
- **Circular Economy:** A model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible.

14.2 Methodology

14.2.1 Utilities

In this EIAR, the impacts on the utilities described in the above guidance have already been considered in the following chapters and therefore these aspects will not be addressed in specific detail within this chapter.

- Chapter 4 – Human Health and Populations;
- Chapter 5 – Land, Soils and Geology;
- Chapter 6 – Hydrology and Hydrogeology;
- Chapter 8 – Air Quality and Odour;
- Chapter 9 – Climate;
- Chapter 10 – Noise and Vibration;
- Chapter 11 – Archaeological, Architectural and Cultural Heritage;
- Chapter 12 – Landscape and Visual Impact; and
- Chapter 13 – Material Assets - Traffic and Transportation

This chapter assesses material assets major infrastructure and utilities which have not already been addressed elsewhere in this EIAR. The potential impacts, if any, are assessed in terms of the following:

- Land Use, Property, and Access.
- Power and Electrical Supply.
- Telecommunications.
- Surface water infrastructure.

- Foul drainage infrastructure.
- Potable Water infrastructure, and
- Natural Gas infrastructure

Detailed drainage design information is provided in the Site Drainage and SUDS Technical Memorandum and drawings prepared by WSP.

14.2.2 Waste Management

The assessment of the impacts of the Proposed Development, arising from the consumption of resources and the generation of waste materials, was carried out, taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management; including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports.

This chapter is based on the Proposed Development, as described in Chapter 2 (Description of Proposed Development) and considers the following aspects:

- Legislative context;
- Construction phase (including demolition, excavation and site preparation);and
- Operational phase.

A desktop study was carried out, which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction and operational phases of the Proposed Development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the Proposed Development on the environment during the construction and operational phases, to promote efficient waste segregation, and to reduce the quantity of waste requiring disposal. This information is presented in Section 14.6.

A detailed review of the existing ground conditions on a regional, local and site-specific scale is presented in Chapter 5 (Land, Soils and Geology). Chapter 5 also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the Proposed Development.

14.2.3 Difficulties Encountered

Until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

While it is possible to initially select a licensed waste facility for soil disposal, there is potential to encounter contaminated material or material with naturally occurring variations in minerals and chemicals that necessitates sending it to a different suitably licensed facility. The sampling and testing carried out in the

Site Investigation (SI) process provides spot samples, and further testing may be required during the excavation process, as the true condition of all excavated materials cannot be ascertained with certainty until this is undertaken.

There is a number of licensed, permitted and registered waste facilities in the Meath County region, in the surrounding counties, the eastern midlands waste region and in Ireland and Northern Ireland. However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which will be more beneficial from an environmental perspective.

Licensed waste facilities have annual limitations on material that they can import as part of their license agreements. Because of this it would not make it possible to commit to a singular specific receiving facility as it is not available throughout the excavation phase. It would not be viable to cease a development and wait until a receiving facilities annual receiving quotas are reset. In a normal development waste facilities would switch between facilities with available capacity.

The ultimate selection of waste contractors and waste facilities would be subject to appropriate selection criteria proximity, competency, capacity, serviceability, and cost.

In relation the utilities, there were no significant difficulties encountered in compiling the specified information for this EIAR chapter.

14.3 Receiving Environment

14.3.1 Land Use, Property, and Access

The existing Knockharley Landfill facility is located on a site of approximately 135.2 hectares and operates under an EPA-issued Industrial Emissions Licence (IEL), Licence Number W0146-04. The current ongoing development is being carried out under An Coimisiún Pleanála (ACP) permission Reg. Ref. 303211, which allows for an expanded landfill with a capacity of approximately 440,000 tonnes per year. Chapter 2 provides a detailed breakdown of the waste streams currently accepted at the site, as well as a description of all existing on-site infrastructure.

The Proposed Development site is located within the townlands of Knockharley, Flemingstown, and Tuitrath, Navan, Co. Meath, and is currently in use primarily as an active landfill. The site lies approximately 800 metres from the N2 National Primary Road and is accessed via a private entrance directly off the N2.

The site is surrounded on all sides by agricultural land, which is the predominant land use in the wider area. There are scattered residential properties in the vicinity, with the closest houses located along Knockharley Road, immediately north of the site, and along the Rathdrinagh/Flemingstown Road (L5056) to the east.

The Knockharley Stream (EPA Name: Flemingstown 08, EPA Code: 08F05) flows west to east through the northern portion of the site, continues along the eastern boundary, and then travels south/southeast where it joins the Nanny River (EPA Name: Nanny (Meath), EPA Code: 08_757) approximately 3 km downstream. The Knockharley Stream traverses or runs adjacent to the site's boundary for approximately 3 km. A portion of this stream to the north of the landfill was diverted as part of the permitted ABP-303211-18 development.

The Kentstown Stream (EPA Name: Kentstown 08, EPA Code: 08K18) flows along the southern boundary of the site for approximately 90 metres before turning south and joining the Knockharley Stream approximately 550 metres downstream.

14.3.2 Power and Electrical Supply

Existing overhead power lines are present at the following locations:

- 220 kVA running north south and adjacent to the western boundary of the existing landfill footprint.
- 20 kVA running north south on the eastern boundary parallel to the existing local road with spurs to:
  - An ESB substation exporting power from the landfill gas compound to a 20kVA line.
  - An ESB substation importing power to the administration building.

The 20 kV line provides electricity to the existing landfill site.

14.3.3 Telecommunications

The existing Knockharley Landfill facility is serviced by telecommunications infrastructure.

14.3.4 Surface Water Infrastructure

Surface water on the site is managed via an existing surface water pipeline network, swales and surface water attenuation ponds and wetlands.

Swales are vegetated channels over which flows are conveyed at low non-erosive velocities to store and convey run-off and remove any collected pollutants. The existing swales drain collected rainwater run-off from capped areas of the landfill and the perimeter of the landfill footprint, IBA cell footprint and embankments surrounding the cells. These swales are of approximate depth 600 mm with a bottom width of 1000 mm and side slopes of 1 in 3. The swales were constructed in accordance with CIRIA C698, Site Handbook for the Construction of SUDS. As the landfill cells develop further, the surface water swales will continue to be constructed around the landfill footprint and embankments.

Surface water from the landfill footprint is drained via the main landfill perimeter swale to a purpose-built storm water attenuation pond and constructed wetland to the south of the site – known as the southern attenuation pond and wetlands. Surface water runoff from roads and hard standing areas discharge to a surface water trunk main collection pipe. This surface water trunk is located on the eastern side of the perimeter access road and runs between the administration building to the southern surface water attenuation pond. This below ground pipe main varies from 225 mm diameter up to 750 mm diameter. There is also a 450 mm diameter spur from this pipe main to the north of the permitted C&D Fines Treatment Facility building which runs from east to west and turns north to receive runoff from the main site access road. The pipe discharges to an existing attenuation pond and wetland at the south of the site, via a Class 1 bypass proprietary oil/water separator. This petrol interceptor treats any accidental discharge of hydrocarbons within stormwater run-off prior to stormwater run-off discharging to the attenuation pond and further treatment provided by a wetland.

Surface water from the IBA cells and adjacent screening berm to the east is drained via the perimeter swales adjacent to these features to a purpose built attenuation pond, holding pond and wetlands to north of the IBA cells and to the northeast of the existing landfill footprint – known as the northern attenuation pond, holding pond and wetlands.

The attenuation ponds and wetlands were designed to manage the runoff from the development for up to a 1 in 100-year design return period storm event. The outflow from the southern attenuation pond and wetlands discharges into the local drainage network at the south-eastern corner of the site, while the outflow from the northern attenuation pond, holding pond and wetlands is to the local water course/drainage network at the north-eastern corner of the site.

The southern attenuation pond has a total storage volume of 20,369 m^3 - total dead storage volume of 13,481 m^3 and a total live storage volume of 6,888 m^3.

An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

The northern attenuation pond and holding pond have a total storage volume of 16,953 m^3 – total dead storage volume of 9,032 m^3 (7,047 m^3 and 1,985 m^3, respectively), and a live storage volume of 7,921 m^3 (6,317 m^3 and 1,604 m^3 respectively). The two ponds are hydraulicly connected, with a large diameter pipe, and function as a single attenuation system.

The outflow from the northern attenuation pond discharges at a maximum rate of 69 l/s and 109 l/s during a 1:1 and 1:100 AEP event, respectively.

An emergency spillway has been provided above the 1:100 AEP level to safely pass any exceedance flows.

The storm water attenuation ponds (north and south) are lined with a composite barrier, comprising a HDPE membrane and a 1.0 m clay basal layer with a permeability of 1 x 10-9 m/s, which is the same specification as the landfill cell clay barrier. The constructed wetlands (north and south) comprises a shallow clay-lined pond both naturally colonised and planted with appropriate species.

As per the IE Licence (W0146-04), currently there is continuous monitoring equipment on each pond inlet and on the discharge point of the northern surface water management infrastructure which monitors parameters on a continuous frequency as required by Schedule C.2.2 Monitoring of Emissions to Water, of the IE Licence.

Composite samplers have been installed at emission points SW09 and SW10 prior to discharge occurring to the Knockharley Stream. These are continuously monitored to ensure receiving water quality is maintained.

14.3.5 Foul Drainage Infrastructure

All foul effluent generated from the existing welfare facilities on site is collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

14.3.6 Potable Water Supply

A source of potable water for use in the canteen, welfare facilities and for general site cleaning is sourced from the mains supply. This water source also provides water to a fire hydrant onsite.

14.3.7 Natural Gas

The Proposed Development site has no connection to the existing Bord Gáis gas pipeline, which runs west to east through the southern part of the site, just south of the existing landfill footprint and north of the existing surface water attenuation pond.

The existing gas and power lines are shown in WSP Drawing ref: IE0037029.9627 004.

14.3.8 Waste

In terms of waste management, the receiving environment is largely defined by Meath County Council as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the NWMPCE 2024 – 2030 and the WAPCE.

The waste management plans set out the following targets for waste management in the region:

- Achieve a recycling rate of 55% of managed municipal waste by 2025; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and Indigenous recovery practices.

The Regional Waste Management Planning Offices have issued a National Waste Management Plan for a Circular Economy 2024 - 2030 (NWMPCE) in March 2024, which supersedes the Eastern Midlands Regional (EMR) waste management plan and the two other regional waste management plans. The NWMPCE does not however dissolve the three regional waste areas. The NWCPCE sets the ambition of the plan to have a 0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector.

The Meath County Development Plan 2021 – 2027 sets out the objectives for the MCC area which reflect those set out in the regional waste management plan and can be found in Appendix 14.1.

The existing Knockharley Landfill which operates privately is a key piece of physical waste infrastructure in the region and is currently licenced to accepted up to 435,00 tonnes of non-hazardous waste and 5,000 tonnes of stable, non-reactive hazardous waste.

MCC no longer directly operates any municipal waste landfills. As well as the Knockharley Landfill, there are a number of waste permitted and licensed facilities located in the EMR Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, municipal waste landfills, material recovery facilities and waste transfer stations.

However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which will be more beneficial from an environmental perspective.

The ultimate selection of waste contractors and waste facilities will be subject to appropriate selection criteria proximity, competency, capacity and serviceability.

14.4 Characteristics Of the Proposed Development

This section describes the built services and infrastructure, and waste management for the Proposed Development during both construction and operational phases.

Chapter 2 (Description of the Proposed Development) provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant documents to define the Proposed Development.

14.4.1 Demolition Phase

There is no demolition associated with the proposed development and as such there is to be no demolition waste generated.

14.4.2 Construction Phase

14.4.2.1 Land Use, Property, and Access

The site is located approximately 800 metres from the N2 National Primary Road and has its own private entrance directly off the N2. This existing entrance will be used during the construction phase of the Proposed Development to accommodate the movement of both staff and construction vehicles.

A wheel wash system already in place at the site will continue to be used during construction to prevent dirt and debris from being tracked onto the public road. A road sweeper will also be employed as required to maintain cleanliness on the surrounding public roads.

There is existing on-site car parking which will continue to be provided for construction personnel. Staff will be encouraged to walk, cycle, or use public transport where feasible, and information on local transport options will be displayed on site.

All construction materials will be delivered to the site by road using clean vehicles. Lorries and trucks transporting friable materials or spoil will be properly enclosed or covered to prevent material escaping onto public roads.

Traffic management and road signage, if required, will comply with the Department of Transport's Traffic Signs Manual – Chapter 8: Temporary Traffic Measures and Signs for Road Works and will be agreed upon with Meath County Council (MCC). Additional construction traffic management and mitigation measures, including provisions for minimising impacts during peak periods, are detailed in Chapter 13 – Traffic and Transportation of this EIAR.

The design of the proposed landfill extension will be fully integrated with the existing landfill layout and will maintain the same engineering standards, environmental protections, and operational protocols currently in place.

14.4.2.2 Power and Electrical Supply and Telecommunications

There is an established electrical connection to the national grid which will be used to power electrical equipment and plant necessary to complete the construction of the Proposed Development.

Construction plant shall be powered by mains electricity wherever possible, rather than by generators.

14.4.2.3 Telecommunications

There is an established telecommunications connection on site which will continue to be used during the construction phase of the Proposed Development.

14.4.2.4 Surface Water Infrastructure

WSP have developed a detailed Outline Construction Environmental Management Plan (CEMP). Prior to construction works relation to the Proposed Development taking place on site, the CEMP will be updated to incorporate mitigation measures outlined in this EIAR.

Measures will be employed to protect surface water features, particularly the Knockharley Stream, in the receiving environment during construction, and to prevent its contamination by direct run-off or by infiltration from the development site. An Emergency Response Plan will be prepared. Measures have been included in the Outline Construction Environmental Management Plan prepared by WSP (2025) to address the following:

- Overground oil/diesel storage
- Refuelling
- Concrete washout
- Oil spills
- Road sweepers/cleaning
- Protection of surface water features

During construction run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions.

14.4.2.5 Foul Drainage Infrastructure

There are existing welfare facilities on site which will be utilised during the construction phase of the Proposed Development.

Foul water will continue to be collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

14.4.2.6 Potable Water Supply

There is an existing potable water connection on site which will continue to be utilised for the duration of the construction phase.
Water will be required for welfare facilities, dust suppression and general construction activities.

14.4.2.7 Natural Gas

No natural gas mains connection will be established as a part of the Proposed Development.

14.4.2.8 Waste

During the construction phase, the primary waste stream will consist of excavated material, including soil, clay, and stone. It is estimated that a total of 1,807,499 m³ will need excavated to facilitate the proposed extension of the existing landfill footprint and all ancillary works. Of this, 1,440,434 m³ of material will be retained on site for the construction of embankments, berms, capping and use as clay liner.

Approximately 367,065 m³ of material will require removal from the site. It is currently anticipated that Regulation 27 (commonly referred to as "Article 27") of the European Communities (Waste Directive) Regulations 2011 as amended will be utilised to manage all excavated material which requires removal from the Proposed Development site.

If the material is deemed unsuitable for reuse and requires removal from site it is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the 'Waste Management Act 1996' (as amended), the 'Waste Management (Collection Permit) Regulations 2007' as amended, and the 'Waste Management (Facility Permit & Registration) Regulations 2007' as amended. The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or license is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011), as amended'.

To establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication 'Waste Classification – List of Waste and Determining If Waste is Hazardous or Non-Hazardous'. Environmental soil analysis will be conducted prior to removal of the material on a number of the soil samples in accordance with the requirements for the acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability.

Secondary waste streams are anticipated to be very minimal and will consist mainly of surplus construction materials such as broken or off-cuts of timber, concrete, bricks, and packaging waste (cardboard, plastic, timber). The appointed contractor will be required to ensure that oversupply of materials is minimised and opportunities for reuse of suitable materials are maximised.

Waste will also be generated from construction phase workers e.g. organic / food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins, Tetra Pak cartons) and mixed non-recyclables from temporary welfare facilities provided on-site during the construction phases. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further details on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP.

14.4.3 Operational Phase

14.4.3.1 Land Use, Property, and Access

The Proposed Development primarily comprises an extension to the existing Knockharley Landfill, enabling the continued operation of landfill activities at the site. The extension will increase the landfill area by approximately 17.68 hectares, providing an additional 4.12 million cubic metres of void space for landfilling.

There will be no change to the volume of waste accepted or the types of waste streams managed at the site during the operational phase of the Proposed Development. Accordingly, operational traffic volumes are expected to remain consistent with the current baseline, which reflects traffic levels associated with the existing Knockharley Landfill facility.

The site is located within the administrative area of Meath County Council and is subject to the provisions of the Meath County Development Plan 2021–2027. According to the Plan, the Proposed Development site is zoned RA – Rural Area. The stated zoning objective is:

> *"To protect and promote in a balanced way, the development of agriculture, forestry and rural-related enterprise, biodiversity, the rural landscape, and the built and cultural heritage."*

The continued use of the site for waste management activities, including the proposed extension, is considered to be compatible with the RA zoning objective, particularly as it supports rural-related enterprise and makes use of an existing, long-established waste facility.

14.4.3.2 Power and Electrical Supply

As part of the Proposed Development, an existing 220 kV overhead ESB powerline that currently crosses the western boundary of the landfill must be relocated to avoid conflict with the proposed landfill cell extension.

The powerline will be realigned within the wider site boundary, involving the decommissioning and removal of three existing 220 kV transmission towers. In their place, seven new towers will be installed along a revised alignment that maintains appropriate clearances from landfill infrastructure and complies with ESB Networks' statutory requirements.

The new towers will range in height from approximately 20.06 m to 26.175 m (see ESB drawing refs: PG567-D004-708-001-000 and PG567-D004-711-001-000, and WSP drawing ref: 297705 Con-ESB-Sec, submitted with the planning application). Final tower heights will be determined by ESB Networks based on detailed design and site-specific constraints.

All relocation works will be undertaken in coordination with ESB Networks and in compliance with health and safety legislation, electrical infrastructure standards, and environmental best practice. Appropriate environmental management measures will be implemented to avoid or minimise impacts on sensitive receptors, habitats, and existing utilities.

With respect to the power and electricity supply to the site, no alterations to the existing connection are proposed.

14.4.3.3 Telecommunications

The telecommunications services currently available on site will remain unchanged.

14.4.3.4 Surface Water Infrastructure

The proposed surface water management infrastructure will connect to the existing system on site and continue to operate in its current manner. The existing surface water system at the landfill is divided into two catchments: the northern catchment, which incorporates a holding pond and the northern attenuation pond, and the southern catchment, which incorporates the southern attenuation pond. The Proposed Development will continue to discharge surface water to both of these catchments.

Grassed swales are proposed to provide treatment and conveyance of surface water from the landfill to the attenuation ponds. A continuous swale will be constructed around the perimeter of the newly proposed landfill cell, with sections of the swale directing flows to the northern attenuation pond and others directing flows to the southern attenuation pond. A more detailed description of the proposed surface water management system is provided in Chapter 2 (Description of Proposed Development) of this EIAR. Reference should also be made to WSP drawing ref. IE0037029.9627 017A submitted with the planning application.

14.4.3.5 Foul Drainage Infrastructure

All foul effluent generated by the existing welfare facilities is collected onsite and treated through a Bio-Cycle unit. Effluent from this unit is discharged to the waste leachate lagoon and tankered offsite for further treatment. There is no changes to the on site foul drainage network associated with the Proposed Development.

Please refer to Foul Water Network WSP drawing ref. IE0037029.9627 017 for details of the Foul Water Network.

14.4.3.6 Potable Water Supply

Potable water for the canteen, welfare facilities, and general site cleaning is supplied from the mains. This source also feeds the on-site fire hydrant and will remain unchanged during the operational phase of the Proposed Development.

14.4.3.7 Natural Gas

No natural gas mains connection will be established as a part of the Proposed Development.

14.4.3.8 Waste

The proposed development extension will give rise to similar operational waste streams to those currently generated at the facility.

Within site offices, welfare facilities, and workshops, general municipal-type waste (will be generated). Other waste streams which may be generated at an irregular basis may be silt sludge and sediment arising from settlement tanks, leachate treatment plants, drainage ditches, or road sweeping and electrical equipment.

Waste streams generated by the landfill itself will include leachate and landfill gas. Leachate and landfill gas will be managed in line with the current IED Licence (W0146-04) for the existing facility.

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site. All wastes generated by the servicing and maintenance of plant is immediately removed from site by the service contractor. Sludges from the on-site interceptor is removed on a regular basis (at least annually) by a suitably licensed operator.

14.4.4 Decommissioning

Decommissioning and remediation of the site will be carried out in accordance with the existing IED Licence (W0146-04), the CRAMP for the facility and the planning applications permitted by the planning authority, including planning conditions.

14.5 Potential Impacts of The Proposed Development

14.5.1 Do Nothing Scenario

If the Proposed Development does not proceed, the existing landfill would continue to operate until its permitted capacity is reached. Waste currently managed at this facility would then to be sent to alternative licensed facilities, potentially requiring longer transport distances and associated environmental impacts. The lands identified for expansion would remain in their current use and condition.

14.5.2 Construction Phase

14.5.2.1 Land Use, Property, And Access

To minimise nuisance to neighbouring properties, the outline CEMP prepared by WSP will be updated prior to the construction phase of the Proposed Development. The CEMP will be implemented and adhered to by the contractor and will be overseen and updated where necessary by the Project Manager, Environmental Manager, Resource Manager, and Ecological Clerk of Works, as appropriate.

All mitigation measures outlined in this EIAR and the CEMP will be implemented during the construction phase. The contractor will also update the CEMP to incorporate any additional mitigation measures required to ensure compliance with subsequent planning conditions associated with the Proposed Development.

The potential impact associated with land use, property, and access during the construction phase is predicted to be ***negative, not significant,*** and ***long- term.***

14.5.2.2 Power Supply and Electrical Supply

Any excavations within the vicinity of existing electrical services will be conducted in consultation with ESB Networks to ensure there is no impact on existing users. The electrical connection should have no disruptions to the national grid during connection works.

All utilities work shall be carried out in accordance with the relevant requirements of the respective service providers. These works will be conducted in a manner that is safe, and which minimises interruptions of service which might affect residents and businesses, and adjacent developments.

The potential impact associated with power and electrical supply for the construction phase in the absence of mitigation measures will be a ***neutral***, ***imperceptible,*** and ***long- term.***

14.5.2.3 Telecommunications

The potential impact on telecommunications infrastructure during the construction phase in the absence of mitigation measures is ***neutral, imperceptible,*** and ***long- term.***

14.5.2.4 Surface Water Infrastructure

During the construction phase, there is potential for rainfall run-off and dewatering water during the construction phase may contain increased silt levels or otherwise become polluted from construction activities. Suspended solids in runoff water may result in an increase in suspended sediment load, resulting in increased turbidity, which may in turn impact on local infiltration capacity, or downstream watercourses.

The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially overwhelm the existing on site drainage systems, leading to localized flooding. Run-off containing substantial amounts of silt can cause damage to on site surface water networks.

As there is no connection to the public surface water network there is no potential for impact on the public surface water network.

14.5.2.5 Foul Drainage Infrastructure

As there is no connection to the public foul water network there is no potential for impact on the public foul water network.

14.5.2.6 Potable Water Supply

The water demand during the construction phase will not be significant enough to affect existing pressures. The potential impact on potable water supplies and infrastructure during the construction phase is ***negative, imperceptible,*** and ***long- term.***

14.5.2.7 Natural Gas

There is no requirement for natural gas connection, therefore during the construction phase there is no potential impact.

14.5.2.8 Waste

If waste materials are not managed and stored correctly, it is likely to lead to litter or pollution issues at the Proposed Development site and in adjacent areas. The indirect effect of litter issues is the presence of vermin/flies in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long- term, not significant*** and ***negative***.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, not significant*** and ***negative***.

C&D wastes arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the EMR and across the island of Ireland which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the Proposed Development site would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. Many construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***long- term, significant*** and ***negative.***

There is a quantity of material that will need to be excavated to facilitate the Proposed Development. A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 5 (Land, Soils & Geology). Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and managed in a way that will not impact negatively on workers, or on the water and soil environments, both on and off-site. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***long- term, significant*** and ***negative***.

14.5.3 Operational Phase

14.5.3.1 Land Use, Property and Access

During the operational phase the Proposed Development is not anticipated to generate significant air (including odour), noise, water emissions or traffic impacts during normal operating conditions; these have been discussed further in the respective EIAR chapters, Chapter 6 (Hydrology and Hydrogeology), Chapter 8 (Air Quality), Chapter 9 (Climate), Chapter 10 (Noise and Vibration), and Chapter 13 (Traffic and Transportation).

The Proposed Development is consistent with the zoning of these lands.

The overall potential impact associated with land use, property, and access during the operational phase will be localised ***neutral, not significant***, and ***long term***.

14.5.3.2 Power Supply and Electrical Supply

The Proposed Development will continue to be served by the existing electricity connection to the site. As no significant additional electrical demand is anticipated beyond current operational requirements for administration and site facilities, the Proposed Development will not result in any notable increase in demand on the national grid.

Maintenance of the existing electrical infrastructure will be undertaken in accordance with the relevant requirements of the utility supplier.

There will be a ***neutral, imperceptible,*** and ***long-term*** effect on electrical supply during the operational phase of the Proposed Development.

14.5.3.3 Telecommunications

There will be no significant increase in demand on the local telecommunications network during the operational phase of the Proposed Development. No additional capacity will be required from the wider telecommunications network.

The connection to the external telecommunications network will be completed by a statutory telecommunications operator. The potential impact on telecommunications infrastructure during the operational phase is considered to be ***neutral, imperceptible,*** and ***long term***.

14.5.3.4 Surface Water Infrastructure

During operation, a primary risk to surface water quality arises from contaminated runoff, where rainwater comes into contact with waste materials, leachate, or other pollutants on site.

As there is no connection to public surface water infrastructure there is no potential risk of impact.

14.5.3.5 Foul Drainage Infrastructure

There is no foul sewer service in the area. All foul effluent generated from administration welfare facilities is collected onsite and passed through a Bio-Cycle treatment unit. Any effluent from this unit is discharged to the waste leachate lagoon and is tankered offsite for further treatment.

As there is no connection to public foul water infrastructure there is no potential risk of impact.

14.5.3.6 Potable Water Supply

The Proposed Development will continue to use the existing mains connection for potable water, with no increase in operational demand. Consequently, the potential impact on potable water infrastructure is considered ***neutral, imperceptible,*** and ***long term.***

14.5.3.7 Natural Gas

There is no requirement for natural gas connection, therefore during the operational phase there is no potential impact.

14.5.3.8 Waste

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy, which would lead to small volumes of waste being sent unnecessarily to landfill and diverted from reuse or recycling. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative***.

The nature of the Proposed Development means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste effectively from this type of development. Waste unsuitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables, which is typically exported as a raw material to produce recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas. The knock-on effect of litter issues is the presence of vermin in

affected areas. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative***.

Waste contractors will be required to service the Proposed Development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***indirect, long-term, significant*** and ***negative***.

14.6 Mitigation Measures

14.6.1 Construction Phase

14.6.1.1 Utilities

Consultation with Meath County Council, EirGrid, ESB Networks and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth construction schedule without disruption to local and business community. The works contractor will be obliged to put best practice measures in place to ensure, any planned interruptions are agreed in advance with the utilities suppliers.

The construction contractor will employ strict quality control measures will be undertaken while laying pipes and utilities to minimise or eradicate infiltration and ex-filtration.

Prior to commencing any construction activities, the contractor shall conduct a comprehensive utility locating survey using advanced technologies such as ground-penetrating radar (GPR) and electromagnetic induction methods. This survey will accurately identify the location and depth of all existing underground services, including high voltage (HV) cables, water and gas pipelines, and telecommunication lines. Based on the results of the utility locating survey, exclusion zones will be demarcated around identified utilities. These zones will indicate areas where construction activities are restricted or subject to specific safety protocols.

The detailed CEMP will be prepared by the main contractor prior to the start of construction. This outlines the construction techniques and methodologies which will be implemented during construction of the Proposed Development. The mitigation measures set out in this EIAR and the CEMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager, Resource Manager and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures. The detailed CEMP will include any subsequent planning conditions relevant to the Proposed Development and set out further detail of the overarching vision of how the construction contractor of the Proposed Development manage the site in a safe and organised manner.

14.6.1.2 Waste

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and manage the waste in such a manner as to minimise the effects on the environment.

The concept of the 'circular economy'(CE) and 'waste hierarchy' are employed when considering all mitigation measures.

While the waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal.

The following mitigation measures will be implemented during the construction phase of the Proposed Development:

As previously stated, a project-specific RWMP has been prepared in line with the requirements of the EPA '*Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects'* (2021) and is included as Appendix 14.1 to this chapter. The mitigation measures outlined in the RWMP will be implemented in full and form part of the mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the Proposed Development.

- Prior to commencement, the appointed contractor(s) will be required to refine / update the RWMP (Appendix 14.1) in agreement with MCC and in compliance with any planning conditions, or submit an addendum to the RWMP to MCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases.

A quantity of topsoil and subsoil will need to be excavated to facilitate the Proposed Development. The quantity surveyors have estimated that the bulk of this material will be reused on site, with approximately 401,217 m³ estimated for removal off site. Any excavated materials requiring removal off site will be subject to appropriate classification and segregation to ensure that potentially contaminated materials are identified and managed in a manner that will not negatively impact workers and the surrounding soil and water environments, both on and off site.

In addition, the following mitigation measures will be implemented:

Building materials will be chosen to 'design out waste'.

On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:

- Clean Soil
- Contaminated soil (if located onsite)
- Concrete rubble (including ceramics, tiles and bricks);
- Plasterboard;
- Metals;
- Glass; and
- Timber.

Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal).

All waste materials will be stored in skips or other suitable receptacles in designated areas of the site.

Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required).

A Resource Manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works.

All construction staff will be provided with training regarding the waste management procedures.

All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal.

All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities.

All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Regulation 27 (By-products), as amended, European Union (Waste Directive) Regulations as amended. EPA approval will be obtained prior to moving material as a by-product.

These mitigation measures will ensure that the waste arising from the construction phase of the Proposed Development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, as amended and the NWMPCE. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

14.6.2 Operational Phase

14.6.2.1 Utilities

The Proposed Development stormwater drainage network design includes sustainable drainage systems (SuDS), i.e. surface water swales, wetlands and attenuation ponds, these measures by design ensure the stormwater leaving the site is of a suitable quality.

Any necessary maintenance or upgrades of on-site utilities infrastructure during the operational phase of the Proposed Development will be carried out in accordance with the specifications of the relevant service providers and facilitated by facilities management.

14.6.2.2 Waste

During the facilities operations, waste materials will be segregated on-site, where possible, into at least the following non-hazardous waste types:

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials.

All wastes generated by the servicing and maintenance of plant is immediately removed from site by the service contractor.

Sludges from the on-site interceptor is removed on a regular basis (at least annually) by a suitably licensed operator.

The operator and staff will ensure that all waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted, or licensed facilities.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Acts 1996 - 2011* and associated Regulations, the *Litter Pollution Act of 1997* as amended and the *NWMPCE*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

14.7 Monitoring Or Reinstatement Measures

The management of waste during the construction phase will be monitored by the contactor's appointed Resource Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.

The management of waste during the operational phase will be monitored by the operator / personnel to ensure effective implementation of the operational mitigation by the nominated waste contractor(s).

Table 14.1 Monitoring Proposals

Likely Significant Effect	Monitoring Proposals
Litter Pollution	The Contractor will review and maintain waste records and site audits
Unlicensed Waste Collection (Illegal Dumping)	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Insufficient Waste Facilities	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Lack of Waste Classification	An appointed Resource Manager will monitor all on-site waste segregation and classification
Unlicensed Waste Collection (Illegal Dumping)	The operator/ facilities management company will maintain waste receipts on-site for a period of 7 years and make available to MCC as requested.
Poor Waste Segregation	Waste generation volumes and cross contamination will be monitored by the operator / facilities management company
Litter Pollution	Waste storage areas will be monitored by the operator / facilities management company

14.7.1 Construction Phase

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets.

The management of waste during the construction phase shall be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the RWMP, including maintenance of waste documentation.

The mitigation measures in the RWMP specify the need for a Resource Manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the Resource Manager shall identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the construction phase will enable better management of waste contractor requirements and identify trends. The data will be maintained to advise on future projects.

14.7.2 Operational Phase

The management of waste during the operational phase shall be monitored to ensure effective implementation of mitigation measures by facilities management and the nominated waste contractor(s).

Waste generation volumes shall be monitored as there may be opportunities to reduce the number of bins and equipment required in the Waste Storage Area where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contactor costs.

14.8 Residual Effects of The Proposed Development

14.8.1 Construction Phase

14.8.1.1 Utilities

The works contractor will be obliged to put best practice measures in place and work in accordance with the CEMP. The implementation of mitigation measures within each chapter of this EIAR and measures detailed in Section 14.6.1 of this chapter will ensure that the residual impacts on the material assets considered in this chapter during the construction phase will be ***neutral, not significant,*** and ***long-term***.

14.8.1.2 Waste

A carefully planned approach to waste management as set out in Section 14.6.1 and adherence to the RWMP (which includes mitigation) (Appendix 14.1) during the construction phase will promote resource efficiency and waste minimisation. When the mitigation measures are implemented and a high rate of prevention reuse, recycling and recovery is achieved, the predicted impact of the construction phase on the environment will be ***long-term, imperceptible*** *and* ***neutral***.

14.8.2 Operational Phase

14.8.2.1 Utilities

The Proposed Development does not require any additional connections to utilities, as these have already been provided at the existing Knockharley Landfill facility.

The implementation of mitigation measures within each chapter of this EIAR and detailed in Section 14.6 of this chapter will ensure that the residual impacts on the material assets considered in this chapter during the operational phase will be ***neutral, imperceptible,*** and ***long-term***.

14.8.2.2 Waste

During the operational phase, a structured approach to waste management as set out in Section 14.6.2 and will promote resource efficiency and waste minimisation. When the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be ***long-term, imperceptible*** *and* ***neutral***.

14.9 Cumulative Impacts of The Proposed Development

The cumulative impact of the Proposed Development with any relevant other planned or permitted developments are discussed below. For details on the developments considered for cumulative impacts refer to Chapter 2 and Appendix 2.1 of this EIAR.

14.9.1 Construction Phase

14.9.1.1 Utilities

The Proposed Development entails minimal use of public material assets (utilities) during construction therefore there is limited opportunity for the causation of cumulative impacts during the construction phase of the Proposed Development in combination with other planned or permitted developments.

The developments listed in Chapter 2, Appendix 2.1 of this EIAR have been reviewed, and all are capable of combining with the Proposed Development to result in cumulative effects on material assets. Coordination and consultation will be had between the construction contractor and relevant service providers within the locality to facilitate the Proposed Development. The Proposed Development will be in accordance with the requirements of statutory providers for electrical infrastructure and water infrastructure.

The implementation of mitigation measures during construction works as well as the compliance of adjacent development with their respective agreement with network providers (ESB and Telecoms) means that the Proposed Development in combination with other exiting and permitted development is not likely to result in prolonged utility disruption; notable extra demand on a utility; or medium-term disruption to a significant piece of infrastructure. It is unlikely that there will be significant cumulative effects with other planned or permitted developments (as described in Chapter 2).

The residual cumulative effects on the material assets during the construction phase for the Proposed Development will be ***negative, not significant,*** and ***short-term***.

14.9.1.2 Waste

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise / mitigate any potential cumulative impacts associated with waste generation and waste management. As such, the cumulative effect in terms of waste will be ***short-term***, ***imperceptible*** *and* ***neutral***.

14.9.2 Operational Phase

14.9.2.1 Utilities

The Proposed Development and all permitted developments considered are required to engage with MCC, Uisce Éireann and ESB to ensure that there is sufficient capacity to cater for the increase in water and electricity requirements.

The developments listed in Chapter 2, Appendix 2.1 of this EIAR have been reviewed, and all are capable of combining with the Proposed Development to result in cumulative effects on material assets.

The Proposed Development will not necessitate any additional connections to utilities, as these have already been provided at the existing Knockharley Landfill facility, therefore there is no potential for cumulative impact during the operational phase.

14.9.2.2 Waste

There are existing residential and commercial developments close by. All the current and potential developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables.

The Proposed Development may also generate streams which are not generated by typical residential or commercial development, such as leachate and sludges.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the effect will be a ***long-term, imperceptible and neutral.***

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Chapter 16 – Interactions

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15. INTERACTIONS

15.1 Introduction

This chapter of the EIA Report in accordance with the guidance, assesses the potential interactions and inter-relationships between the environmental factors discussed in the preceding chapters. This covers both the construction/demolition and operational phase of the proposed development.

Directive 2011/92/EU, as amended by Directive 2014/52/EU, and section 171A of the Planning and Development Act 2000, as amended, both provide that EIA shall identify, describe and assess in an appropriate manner, in the light of each individual case, the interaction between the following factors:

- human beings, fauna and flora population and human health;
- biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
- land, soil, water, air and climate and landscape;
- material assets, cultural heritage and the landscape.

This chapter has been produced following the requirements of the EIA Directive and Planning and Development Act 2000, as amended. The contents of the chapter have been prepared following European Commission 'Guidance on Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (2017) and the 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2022).

The quality, magnitude and duration of potential impacts are defined in accordance with the criteria provided in the EPA 2022 Guidance as outlined in Chapter 1 (Introduction). This section of the assessment presents a summary and assessment of the identified interactions.

15.2 Population and Human Health and its Interaction with:

15.2.1 Biodiversity

Construction Phase

Construction sites can give rise to opportunities for birds and vermin to accumulate as they scavenge for food and water. The CEMP and the RWMP outline standard measures designed to mitigate the potential for nuisance impacts to human population arising from uncontrolled fauna and avi-fauna scavenging within the subject site.

There are no potentially significant interactions identified between Population and Human Health, and Biodiversity during the construction phase. The interaction is considered to be ***negative***, ***imperceptible*** and ***long term***.

Operational Phase

There are no potential interactions between Population and Human Health, and Biodiversity during the operational phase.

15.2.2 Land, Soils, and Geology

Construction Phase

During construction of the landfill, there is potential for generation of dust during the excavation works.

There is medium risk of dust-related human health impacts associated with the proposed works. As a result, standard practice dust mitigation measures associated with high risk works will be implemented to ensure there are no significant impacts at nearby sensitive receptors. Provided the dust minimisation measures are adhered to (see Section 8.10.1 of Chapter 8), the predicted interaction is considered to be ***long-term, negative*** and ***not significant***.

Operational Phase

There is no source pathway linkage with respect to an interaction impact between land, soils and geology, and population and human health, therefore no mitigation is required. The predicted interaction is considered to be ***neutral, imperceptible*** and ***long-term.***

15.2.3 Hydrology and Hydrogeology

Construction Phase

The construction phase of the proposed development has the potential (without mitigation) to impact on the water quality via unmitigated pollutants entering the Knockharley Stream. It is proposed to realign the Knockharley Stream as part of the Proposed Development works.

Potential pollutants include increased suspended solids, excavations / top and sub soil stripping, concrete washout, hydrocarbons and other ecotoxic chemicals through accidental spillage and wastewater through accidental discharge. These have the potential to interact negatively on human health, if water is used for water supply or recreational use which it is not in this case.

Taking into account the design and standard mitigation measures set out in the CEMP and Chapter 6 of this EIAR, there is no potential for negative interaction between Human Health and Populations, and Hydrology and Hydrogeology during the construction phase. The interaction is considered to be ***neutral, imperceptible*** and ***long term***.

Operational Phase

The proposed development will not impact on any domestic wells or any groundwater protection areas. As a result of the landfill extension, the proposed development has the potential to impact on human health, populations, located downstream of the site, if runoff water is not adequately attenuated on site.

Taking into account the design for on site attenuation and SuDS measures set out in Chapter 2 of this EIAR, there is no potential for negative interaction between Human Health and Populations, and Hydrology during the operational phase. The interaction is considered to be ***neutral, imperceptible*** and ***long term***.

15.2.4 Air Quality

Construction Phase

Air quality does not have a significant number of interactions with other topics. The most significant interactions are between population and human health and air quality. An adverse impact due to air quality in the construction phase has the potential to cause health and dust nuisance issues.

There is a medium risk of dust-related human health impacts during the construction phase of the Proposed Development. As a result, standard practice dust mitigation measures associated with high risk works will be implemented to ensure there are no significant impacts at nearby sensitive receptors. The predicted impact is ***long-term, negative*** and ***not significant*** with respect to population and human health during the construction phase.

Operational Phase

There is potential for odour impact during the operational phase given the nature of the Proposed Development.

The odour modelling results with the Proposed Development in place are detailed in Table 8-12 of Chapter 8. The results indicate that the predicted ground level concentrations are below the relevant odour guideline value of 1.5 OU_E/m^3. Under worst-case operation of the Proposed Development (as described in Section 8.5.2.2.4 of Chapter 8), the 98th%ile of mean hourly odour concentrations ranges from 0.03 – 3.58 OU_E/m^3 at the modelled sensitive receptors. For the worst-case year and at the most impacted receptor, emissions from the site lead to predicted ambient hourly mean (measured as a 98th percentile) odour concentrations which are at most 238% of the of the odour guideline value at the worst-case receptor (location shown in Figure 8-4 of Chapter 8).

The geographical variations in ground level odour predicted environmental concentrations (PEC) beyond the Proposed Development boundary for the worst-case year modelled are illustrated as concentration contours in Figure 8-4 of Chapter 8, to demonstrate the direction and extent of the emission plume.

Of the modelled receptors, odour concentrations are predicted to be below the odour guideline value at 63 no., while 46 no. are predicted to experience odour concentrations above the odour guideline value. The exposure of sensitive receptors to odour nuisance is dependent on meteorological conditions such as wind speed and wind direction. These conditions vary frequently, on an hourly basis or less. Exposure to any odour nuisance is therefore expected to be occasional and brief over the operational lifespan of the Proposed Development, according to the EPA guidelines which defines this as "*effects lasting less than a day*".

Receptors where modelled odour concentrations are predicted to be above the odour guideline value of 1.5 OU_E/m^3 may experience direct, negative, brief and significant effects due to odour nuisance.

Taking the likely brief duration and infrequent nature of any potential odour nuisance into account, the overall impact of the Proposed Development in terms of odour can be considered ***direct***, ***negative, long-term*** and ***slight***, which is overall ***not significant*** in EIA terms.

15.2.5 Climate

Construction Phase

There are no potentially significant interactions identified between climate, and human health during the construction phase.

Operational Phase

The emissions to air detailed in Chapter 8 Air Quality do not, on their own or in combination together, constitute greenhouse gases (GHGs), nor contribute to GHG emissions, nor have a warming effect that is of relevance to climate. There are no potentially significant interactions identified between climate, and human health during the operational phase.

15.2.6 Noise and Vibration

Construction Phase

During the construction phase of the Proposed Development there may be some slight impacts on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impacts are kept to a minimum.

Taking into account the design and standard mitigation measures set out in the CEMP and Chapter 10 (Noise and Vibration) of this EIA Report, there is potential for negative interaction between Population and Human Health, and Noise and Vibration during the construction phase. The interaction is considered to be ***negative, not significant - moderate,*** and ***long term***.

Operational Phase

During the operational phase associated with normal day to day operations, noise levels and the noise character in the area associated with the proposed development will remain largely unchanged compared to the existing operational phase of facility due to the same items of external mobile plant being utilised as part of the proposed development across the site.

The key potential noise sources associated with the Proposed Development will comprise the following which will operate over the existing permitted hours of operation:

- Tree felling and berm construction;
- Construction, filling and capping of proposed landfill cells 31 to 39, and;
- Operation of proposed gas booster pump.

Across the majority of all NSLs modelled surrounding the facility, operational noise levels associated with Phase 1 are comfortably below the daytime Emission Limit Values of 55 dB $L_{Aeq,T}$. There are 9 noise sensitive locations along the north of the site along Knockharley Road where noise levels are calculated between 56 and 60 dB $L_{Aeq,T}$ when tree felling and berm construction are occurring along the immediate boundaries with these NSLs.

The calculated noise levels at these 9 noise sensitive locations are dominated by tree felling activities and to a lower extent from berm construction activities. In reality, tree felling activities will occur prior to berm construction in any one area and will be completed within the earlier phase of the Proposed Development. Felling will occur on a phased basis and the maximum noise levels predicted will be for a short duration (typically less than 1 week). The screening berm construction will be undertaken to provide further noise screening to noise sensitive locations in the longer term scenario.

Once the tree felling activities are located in excess of approximately 200m from a noise sensitive location, the operational cumulative noise levels are below the operational daytime Emission Limit Values. The calculated noise levels associated with the temporary tree felling / berm construction are all below the construction noise threshold of 65 dB $L_{Aeq,T}$.

At all other locations, the calculated cumulative future operational noise levels are below the daytime Emission Limit Values of 55 dB $L_{Aeq,T}$.

At all locations from Phase 2 onwards, the calculated cumulative future operational noise levels are below the daytime, evening-time and night time Emission Limit Values.

Taking into account the design and standard mitigation measures set out in Chapter 10 (Noise and Vibration) of this EIA Report, there is potential for negative interaction between Population and Human Health, and Noise and Vibration during the operational phase. The interaction is considered to be ***negative, moderate - slight,*** and ***long term***.

15.2.7 Material Assets, including Waste, Utilities and Transport

Construction Phase

Construction phase impacts to human health as a result of waste are primarily associated with the indirect effect of litter issues resulting in increase in vermin. Mismanagement of soil material can potentially lead to air / dust impacts. There are all also potential risks to human health associated with accidents when handling and transporting earthworks and wastes.

Taking into account the design and standard mitigation measures set out in Chapters 13 and 14 (Traffic and Transportation, and Utilities and Waste) of this EIAR and the project specific Resource Waste Management Plan (RWMP) (Appendix 14.1) and Traffic Management Plan, there is, as described above, slight potential for negative interaction between Population and Human Health, and Material Assets during the construction phase. The interaction is considered to be ***negative***, ***not significant*** and ***long-term***.

Operational Phase

Similar risks to those described above for the construction phase associated with improper waste management during the operational phase could lead to litter and associated vermin. There is the slight potential for risks when untrained staff and waste contractors use waste equipment or move waste receptacles improperly.

Traffic activity has an indirect relationship with population and human health, primarily through potential impacts such as noise, air emissions, and road safety. However, the traffic generated by the development is modest with an average of 73 no. HGV trips per day and limited staff vehicle movements. Given the site location and the established landfill use and given that there is no new traffic, no perceptible impact on human health, amenity, or safety is anticipated.

A carefully planned approach to waste management will ensure appropriate management of waste and avoid any negative impacts on the local population. The effects should be ***long-term, imperceptible*** and ***neutral***.

15.2.8 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Population and Human Health, and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Population and Human Health, and Archaeological and Cultural Heritage during the operational phase.

15.2.9 Landscape and Visual Impact

Construction Phase

The principal construction stage landscape and visual impacts are associated with the movement of heavy earth-moving machinery and the erection of tower cranes on-site. In addition, the temporary storage of excavated materials on-site and the gradual emergence of the proposed development will also generate landscape and visual impacts. Construction of the landfill extension is expected to take place over 17 years, therefore construction stage visual effects are long term.

Taking into account the design and standard mitigation measures set out in Chapter 11 (Landscape and Visual) of this EIA Report, and the low landscape sensitivity designation of the site lands, there is a low potential for negative interaction between Population and Human Health, and Landscape and Visual Impact during the construction phase. The interaction is considered to be ***negative, moderate – slight*** and ***long term***.

Operational Phase

In terms of landscape impacts, the proposed development is of notable scale and extent, albeit contained within an existing, established landfill facility and well enclosed by surrounding perimeter vegetation. This

vegetation will be enhanced as part of the proposed mitigation measures through the introduction of surrounding earthen screening berms and additional native woodland planting.

Overall, the proposed development does not conflict with the current landscape and visual policies and objectives within the current county development plan and represents the continuation and intensification of a well-established land uses. As a result, the significance of operational phase landscape effect is deemed ***moderate***, is of a ***negative-neutral*** quality and is ***permanent*** in terms of duration.

The residual visual effects of the proposed development are in the lower order of magnitude as the development tends to be well screened and where visible, will not present in a highly prominent manner, nor will it detract notably from the prevailing robust rural character of the surrounding landscape.

With regard to the reinstatement phase of the development, effects are generally considered to be positive in quality, as they represent the transition from a highly industrial land use to one that exhibits more typical rural characteristics. The landscape planting measures established and matured during the operational phase will be maintained and managed accordingly, while the final capping of the landfill will be developed as a native grassland meadow.

The residual visual effects associated with the reinstatement phase are assessed as ranging between ***slight*** and ***imperceptible***. The quality of both the landscape and visual effects during the reinstatement phase is deemed ***positive***.

15.3 Biodiversity and its Interaction With:

15.3.1 Land, Soils, and Geology

Construction Phase

The construction phase of the proposed development has the potential for contaminated run-off from accidental leakages to contaminate soil and groundwater, and enter the Knockharley Stream and impact on local biodiversity downstream. Furthermore, dust emissions from exposed earthworks has the potential to settle on plants causing impacts to local ecology. In addition to this construction works will result in the direct loss of habitat for a roosting bat.

Taking into account the design and standard mitigation measures set out in Chapter 5, 6 and 7 of this EIAR, and the specific mitigation measures stated in the NIS, along with the existence of alternative habitat for species in the immediate surrounds, there remains a residual negative interaction between Land, Soil, and Geology and Biodiversity during the construction phase. The interaction is considered to be ***negative, imperceptible*** and ***long term***.

Operational Phase

There are no potentially significant interactions identified between Land, Soils and Geology, and Biodiversity during the operational phase.

15.3.2 Hydrology and Hydrogeology

Construction Phase

There is potential for impacts to biodiversity associated with accidental leaks discharging without mitigation to the Knockharley Stream.

Taking into account the design and standard mitigation measures set out in Chapters 5 6, and 7 of this EIA Report, there remains a residual negative interaction between Hydrology and Hydrogeology and Biodiversity during the construction phase. The interaction is considered to be ***negative, imperceptible,*** and ***short term***.

The specific mitigation measures outlined in the NIS will ensure that there is no significant impact upon Natura 2000 sites.

Operational Phase

There is a hydrological pathway to the The River Nanny Estuary and Shore SPA and North-west Irish Sea SPA lie approximately 22km and 27.8km downstream from the Proposed Development, respectively. However, the connection is a long hydrological pathway allowing significant time for settlement and dilution and as such there is no potential for change in water quality of this receiving habitat.

The NIS prepared by Scott Cawley (2025) has concluded that the Proposed Development does not pose a risk of adversely affecting (either directly or indirectly) the integrity of River Nanny Estuary and Shore SPA or the North-west Irish Sea SPA.

Taking into account the design and standard mitigation measures set out in Chapters 6 and 7 of this EIA Report, the interaction between Hydrology and Hydrogeology and Biodiversity during the operational phase is considered to result in a ***neutral, not significant*** and ***long-term*** impact.

15.3.3 Air Quality

Construction Phase

Dust generation can occur during extended dry weather periods as a result of construction traffic along haul routes and from construction activities such as excavations and soil movements. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant as well as other effects. Any ecology of regional, national, or international importance is beyond the distance for potential dust impacts and therefore, no significant impacts are predicted. Standard dust mitigation measures will be implemented on site as set out in Chapter 8 of the EIAR. With the implementation of these standard mitigation measures dust emissions will be minimised and impacts will be ***long-term, negative*** and ***imperceptible*** with respect to biodiversity.

Operational Phase

There are no potentially significant interactions identified between air quality, and biodiversity during the operational phase.

15.3.4 Climate

Construction Phase

There are no potentially significant interactions identified between climate, and biodiversity during the construction phase.

Operational Phase

There are no potentially significant interactions identified between climate, and biodiversity during the operational phase.

15.3.5 Noise and Vibration

Construction Phase

There is potential for construction noise to impact on local fauna during construction. With standard mitigation measures as set out in Chapter 10 of the EIAR, noise will be minimised and impacts will be ***long-term, negative*** and ***not-significant*** with respect to biodiversity.

Operational Phase

The development will not result in a change in noise levels from the existing Knockharley Landfill facility site. The interaction is considered to be ***negative, not significant***, and ***long-term***.

15.3.6 Material Assets, including Waste, Utilities and Transport

Construction Phase

There are no potentially significant interactions identified between Biodiversity, and Material Assets during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Biodiversity, and Material Assets during the operational phase.

15.3.7 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Biodiversity, and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Biodiversity, and Archaeological and Cultural Heritage during the operational phase.

15.3.8 Landscape and Visual Impact

Construction Phase

The construction phase will result in the loss of 15.2 ha of existing woodland. However, it is planned for 16.6 ha of woodland to be planted on the berms and in other locations on site to compensate for this loss, and to enhance the existing woodland areas.

Site clearance works will result in permanent changes to the landscape, and removal of existing vegetation. There will be negative effects on some of the planted forestry due to the construction works of this development.

Taking into account the landscape design measures set out in Chapter 12 of this EIAR, there remains a residual negative interaction between Biodiversity, and Landscape and Visual Impact during the construction phase. The interaction is considered to be ***negative, moderate - slight*** and ***long-term***.

Operational Phase

During the operational phase, it is proposed to bolster existing perimeter hedgerows 'where necessary' with under-planting and inter-planting of whip transplants in order to ensure dense and consistent screening of the site in perpetuity.

To compensate for the loss in woodland during the construction phase, a landscape plan is proposed within the Biodiversity Management Plan which will result in a net gain in biodiversity over the existing baseline. The biodiversity enhancement measures will to be implemented during the Operation Phase will involve planting 19.8ha of native woodland.

The creation of this woodland will work as both a screening tool with respect to visual impact and simultaneously create a positive impact on biodiversity.

Taking into account the landscape design set out in Chapter 11 of this EIAR, there remains a residual positive interaction between Biodiversity, and Landscape and Visual Impact during the operational phase. The interaction is considered to be ***positive, slight*** and ***long-term***.

15.4 Land, Soil and Geology and its Interaction With:

15.4.1 Hydrology and Hydrogeology

Construction Phase

The construction phase of the proposed development has the potential for contaminated run-off from accidental leakages to discharges to ground potential resulting in a local impact on soil and water quality which could impact the Knockharley Stream.

Taking into account the standard design and mitigation measures set out in Chapters 5 and 6 of this EIA Report, along with the CEMP and the specific mitigation measures stated in the NIS, there is a residual neutral interaction between Land, Soil, and Hydrology during the construction phase. The interaction is considered to be ***neutral, imperceptible*** and ***short term***.

Operational Phase

There is a low potential for contaminated soil or groundwater to impact on local hydrology. The site will be served by the on-site surface water network consisting swales, attenuation ponds and wetland. These features have been adequately designed to manage the surface water generated by the Proposed Development

Taking into account the design and standard mitigation measures, and the implementation of comprehensive emergency response procedures which are outlined in the site's EPA licence (W0146-04), there is a residual neutral interaction between Land, Soil, Geology and Hydrogeology and Hydrology during the operational phase. The interaction is considered to be ***neutral, imperceptible*** and ***long term***.

15.4.2 Air Quality

Construction Phase

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land, soils and geology in the form of dust emissions. With the appropriate standard mitigation measures to prevent fugitive dust emissions stated in Chapter 8, it is predicted that there will be no significant interactions between air quality and land and soils during the construction phase. The interaction is considered to be ***neutral, imperceptible*** and ***short term***.

Operational Phase

There are no potentially significant interactions identified between Land, Soils and Geology, and Air Quality during the operational phase.

15.4.3 Climate

Construction Phase

There are no potentially significant interactions identified between climate, and land, soils and geology during the construction phase.

Operational Phase

There are no potentially significant interactions identified between climate, and land, soils and geology during the operational phase.

15.4.4 Noise and Vibration

Construction Phase

There are no potentially significant interactions identified between Land, Soils and Geology, and Noise and Vibration during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Land, Soils and Geology, and Noise and Vibration during the operational phase.

15.4.5 Material Assets, including Utilities, Waste, and Transport

Construction Phase

During the construction phase, excavated soil and stone (c. 1.77 million m^3) will be generated from the excavations required to construct the landfill void space. It is estimated that 401,217 m^3 of the excavated material will need to be removed off-site with the remaining balance being reused on site. Where material cannot be reused onsite it will be taken off-site, it will be taken for reuse or recovery, where practical, with disposal as a last resort. Adherence to the mitigation measures in Chapter 14 and the requirements of the RWMP (Appendix 14.1), will ensure the effect is ***long-term, imperceptible*** and ***neutral.***

Operational Phase

There are no potentially significant interactions identified between Land, Soils and Geology, and Material Assets during the operational phase.

15.4.6 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Land, Soils and Geology, and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Land, Soils and Geology, and Archaeological and Cultural Heritage during the operational phase.

15.4.7 Landscape and Visual Impact

Construction Phase

Much of the soil to be retained on site will be used in the creation of berms around the site. The purpose of these berms are to create a visual blockade to the landfill to avoid any negative visual impacts. This also allows for the effective management of a large proportion of the soil generated as part of the construction works. The interaction is considered to be ***neutral, imperceptible*** and ***permanent***.

Operational Phase

The area surrounding the berms and the berms them selves will be planted as per the landscape plan outlined by Macroworks during the construction stage and will mature during the operational and decommissioning phase of the Proposed Development. The interaction is considered to be ***positive, not-significant*** and ***permanent***.

15.5 Hydrology and Hydrogeology and its Interaction With:

15.5.1 Air Quality

Construction Phase

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and hydrology in the form of dust emissions that may deposit in surface waters.

Standard mitigation measures implemented during the construction phase will ensure that the deposition of dust is minimised. With the appropriate standard mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and hydrology and hydrogeology. The interaction is considered to be ***neutral, imperceptible*** and ***short term***.

Operational Phase

There are no potentially significant interactions identified between air quality, and hydrology and hydrogeology during the operational phase.

15.5.2 Climate

Construction Phase

There are no potentially significant interactions identified between climate, and hydrology and hydrogeology during the construction phase.

Operational Phase

Climate change has the potential to increase the risk of flooding in future years due to increased rainfall.

A Flood Risk Assessment has been undertaken for the proposed extension of the Knockharley Landfill facility. The assessment has identified that the proposed layout is located primarily in Flood Zone C. However, Flood Zones A and B extents are present within the site, associated with the existing northern settlement pond and southern wetland, respectively. The proposed development has been assessed as having a high vulnerability to climate change related flooding. Following the required Justification Test as required under DECLG/OPW Guidelines, it is concluded that no residual risk is foreseen as the proposed development will not affect the existing hydrological, morphological and hydraulic conditions that define the aforementioned Flood Zones.

The proposed drainage system has been designed to accommodate the 1% AEP plus climate change allowance. The proposed layout will also have capacity to control and attenuate the 0.1% AEP event without additional flooding risk.

The risk from pluvial, coastal and groundwater sources is considered low.

The impact will be ***neutral, not significant*** and ***long term.***

15.5.3 Noise and Vibration

Construction Phase

There are no potentially significant interactions identified between Hydrology and Hydrogeology and Noise and Vibration during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Hydrology and Hydrogeology and Noise and Vibration during the operational phase.

15.5.4 Material Assets, including Utilities, Waste, and Transport

Construction Phase

There are no potentially significant interactions identified between Hydrology and Hydrogeology and Material Assets during the construction phase of the proposed development.

Operational Phase

The use of SuDS during operations will mean that the development will result in neutral stormwater impacts in the operational phase with regard to runoff rates and flooding risk. As a part of the SuDS features, it is anticipated that small amounts of hydrocarbon sludge waste and debris may be generated in the hydrocarbon interceptors which will treat the surface water run-off. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 14. The interaction is considered to be ***neutral, imperceptible,*** and ***long-term.***

15.5.5 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Hydrology and Hydrogeology and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Hydrology and Hydrogeology and Archaeological and Cultural Heritage during the operational phase.

15.5.6 Landscape and Visual Impact

Construction Phase

There are no potentially significant interactions identified between Hydrology and Hydrogeology and Landscape and Visual Impact during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Hydrology and Hydrogeology and Landscape and Visual Impact during the operational phase.

15.6 Air Quality and its Interaction With:

15.6.1 Climate

Construction Phase

Air quality and climate have interactions due to the emissions from the burning of fossil fuels associated with vehicles and machinery during the construction phase generating both air quality and climate impacts. There is no impact on climate due to air quality; however, the sources of impacts on air quality and climate are strongly linked.

Operational Phase

Air quality and climate have interactions due to the emissions from the burning of fossil fuels associated with vehicles and machinery and also the flaring of landfill gas as part of the operation of the landfill. Flaring of landfill gas is regulated by the current IED licence (W0146-04) on site.

Once the mitigation measures outlined in Section **Error! Reference source not found.** of Chapter 9 are i mplemented, the residual impacts on climate from the operational phase will be ***indirect, long-term, negative*** and ***minor adverse.*** Thus, in terms of climate operational phase of the Proposed Development will be ***not significant***.

15.6.2 Noise and Vibration

Construction Phase

There are no potentially significant interactions identified between Air Quality and Climate and Noise and Vibration during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Air Quality and Climate and Noise and Vibration during the operational phase.

15.6.3 Material Assets, including Utilities Waste, and Transport

Construction Phase

As per Chapter 13 - Material Assets - Traffic and Transportation of this EIAR, it has been determined by the traffic consultant that the construction stage traffic will not increase by 1,000 AADT, or 200 HDV AADT. The construction stage traffic has been reviewed, and it has been determined that the construction stage traffic will not increase by 1,000 AADT, or 200 HDV AADT; additionally, the development will not result in speed changes or changes in road alignment. Therefore, the traffic does not meet the above scoping criteria. A detailed air quality assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to local air quality with respect with human or ecological receptors.

Operational Phase

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Proposed Development. The TII Guidance scoping criteria detailed in Section 8.5.1.2 of Chapter 8 were used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air dispersion modelling assessment. The Proposed Development will not result in the operational phase traffic increasing by more than 1,000 AADT or 200 HDV AADT. In addition, there are no proposed changes to the traffic speeds or road alignment. Therefore, no road links impacted by the Proposed Development satisfy the screening criteria (Section **Error! R eference source not found.**). A quantitative assessment of the impact of traffic emissions on ambient air quality is not necessary as there is no potential for significant impacts to local air quality with respect with human or ecological receptors.

15.6.4 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Air Quality and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Air Quality and Archaeological and Cultural Heritage during the operational phase.

15.6.5 Landscape and Visual Impacts

Construction Phase

There are no potentially significant interactions identified between Air Quality and Landscape and Visual Impact during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Air Quality and Landscape and Visual Impact during the operational phase.

15.7 Climate and its Interaction With:

15.7.1 Noise and Vibration

Construction Phase

There are no potentially significant interactions identified between climate, and noise and vibration during the construction phase.

Operational Phase

There are no potentially significant interactions identified between climate, and noise and vibration during the operational phase.

15.7.2 Material Assets, including Utilities, Waste, and Transport

Construction Phase

During the construction phase, there is the potential for interactions between Climate and Traffic as vehicles accessing the site will result in emissions of CO_2, a greenhouse gas. However, the change in traffic is not predicted to be significant. There are no potentially significant interactions identified between Climate and Traffic.

Waste management measures as set out in Chapter 14 and the RWMP (Appendix 13.1) will be put in place during the construction phase to minimise the amount of waste entering landfill, which has higher associated embodied carbon emissions than other waste management such as recycling. The impact to climate as a result of embodied carbon in waste materials is not considered significant.

The impact of the interactions between climate and material assets are considered to be ***long-term, imperceptible*** and ***negative*** during the construction phase.

Operational Phase

During operation traffic emissions have the potential to emit GHGs, such as CO_2, which impact climate. However, the change in traffic as a result of the proposed development will not result in a significant increase in emissions. There are no potentially significant interactions identified between Climate and Traffic.

The impact of the interactions between climate and material assets are considered to be ***long-term, imperceptible*** and ***negative*** during the operational phase.

15.7.3 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between climate, and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between climate, and Archaeological and Cultural Heritage during the operational phase.

15.7.4 Landscape and Visual Impact

Construction Phase

There are no potentially significant interactions identified between climate, and landscape and visual impact during the construction phase.

Operational Phase

There are no potentially significant interactions identified between climate, and landscape and visual impact during the operational phase.

15.8 Noise and Vibration and its Interaction With

15.8.1 Material Assets, including Utilities, Waste, and Transport

Construction Phase

Taking into account the design and standard mitigation measures set out in Chapter 13 and Chapter 14 of this EIAR, there remains a residual neutral interaction between Noise and Vibration, and Material Assets during the construction phase. The interaction is considered to be ***neutral, not significant*** and ***short term***.

Operational Phase

HGV traffic can be a source of intermittent noise, particularly during acceleration, braking, or turning manoeuvres. However, traffic is expected to be spread throughout the day, with no significant clustering or peak-hour intensity. Noise emissions from traffic have been assessed in the Noise and Vibration Chapter and are not predicted to exceed relevant thresholds or result in significant environmental effects.

As there will be no change in the quantity of waste material or inclusion of additional waste streams at the site as part of the operational phase of the Proposed Development, the operational traffic will remain consistent with the current traffic which takes into account traffic for the existing Knockharley Landfill facility. There is no change to traffic noise impacts along the existing access road or along roads outside of the site.

Taking into account the design and standard mitigation measures set out in Chapter 10 of this EIAR, there remains a residual negative interaction between Noise and Vibration, and Material Assets during the construction phase. The interaction is considered to be ***negative, not significant*** and ***long term***.

15.8.2 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Noise and Vibration, and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Noise and Vibration, and Archaeological and Cultural Heritage during the operational phase.

15.8.3 Landscape and Visual Impact

Construction Phase

There are no potentially significant interactions identified between Noise and Vibration, and Landscape and Visual Impact during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Noise and Vibration, and Landscape and Visual Impact during the operational phase.

15.9 Material Assets, including Utilities, Waste and Transport and its Interaction With:

15.9.1 Archaeological and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Material Assets, and Archaeological and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Material Assets, and Archaeological and Cultural Heritage during the operational phase.

15.9.2 Landscape and Visual Impact

Construction Phase

There are no potentially significant interactions identified between Landscape and Visual Impact, and Material Assets during the construction phase.

Operational Phase

Although HGVs are mobile sources, their contribution to visual impact is minimal in the context of the existing landfill setting. There is no expectation of adverse landscape or visual impact resulting from traffic movements associated with the development.

In conclusion, the traffic associated with the proposed development has been assessed in the context of interactions with other environmental topics. No significant cumulative or cross-topic effects are anticipated. All relevant impacts are minor and appropriately addressed through standard design and operational measures.

15.10 Archaeological and Cultural Heritage and its Interaction With:

15.10.1 Landscape and Visual Impact

Construction Phase

There are no potentially significant interactions identified between Landscape and Visual Impact, and Archaeological, and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions between Landscape and Visual Impact, and Archaeological, and Cultural Heritage during the operational phase.

Table 15-1 Summary of Interactions Between the Environmental Factors

	Population & Human Health		Biodiversity		Land, Soils, Geology		Hydrology Hydrogeology		Air Quality		Climate		Noise & Vibration		Material Assets		Archaeological & Cultural Heritage		Landscape & Visual Impact	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
Population & Human Health			–	o	-	o	o	o	–	-			–	–	–	o			–	+/-
Biodiversity					–		–	o	-				–	–					–	+
Land, Soils, Geology							o	o	o						o				o	+
Hydrogeology, Hydrology									o			o				o				
Air Quality															o	o				
Climate															-	-				
Noise & Vibration															–	–				
Material Assets																				
Archaeological & Cultural Heritage																				
Landscape & Visual Impact																				

Con.	Construction Phase
Op.	Operational Phase
	No Interaction

+	Positive Interaction
o	Neutral Interaction
–	Negative Interaction

Chapter 16 – Summary of Residual Effects

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16. SUMMARY OF RESIDUAL EFFECTS

16.1 Introduction

This Chapter provides a summary of the residual effects associated with the construction and operational phases of the Proposed Development, as described through this EIAR. Detailed impact assessments are presented in Chapters 4 to 14 of this EIAR.

Residual impacts are defined as the final or remaining impacts that may occur once the proposed mitigation measures have been implemented. They reflect the degree of change that persists following mitigation.

Table 16.1 summarises the residual impacts and details their quality (e.g. positive, negative), significance (e.g. imperceptible, not significant, significant) and duration (e.g. short-term, long-term).

The terminology used to describe residual impact significance in this Chapter is consistent with that applied throughout the EIAR. In line with best practice, the Environmental Protection Agency's (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) form the primary reference, supplemented where appropriate by discipline-specific guidance.

Full details of all residual impacts can be found within the EIAR Chapters.

Table 16.1 Summary of Residual Effects

EIAR Chapter	Residual Effect Description	Potential Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
Chapter 4 Human Health and Population	**Construction Phase**		
	Socioeconomic Impact on Businesses and Residences: job creation	Slight, long-term and positive impact	Positive, local to regional, imperceptible, long-term
	Some negative landscape and visual effects are anticipated due to woodland removal, landfill construction, and the realignment of overhead cable corridors.	Negative, moderate-slight, and long-term (landscape effects). Negative, moderate and long-term (visual effects).	Moderate-Slight and Negative (landscape effects) Moderate and Negative (visual effects)
	There is a risk of accidental pollution to surface and groundwater from sources such as suspended solids from excavation, cement or concrete washout, hydrocarbon spillages from machinery, and wastewater discharges from site facilities.	Negative, slight and long-term	Neutral, imperceptible, and long-term
	The potential for nuisance dust to affect residential properties within 20 m of the site boundary.	Direct, long-term, negative and slight impacts	Long-term, direct, negative, localised and not significant.
	Noise impact during construction.	Negative, not significant to moderate and temporary to long-term.	Negative, not significant to moderate and temporary to long-term.
	Additional traffic movements associated with the proposed development	Negative, not significant and long-term	Negative, not significant and long-term
	Operational Phase		
	Business: The proposed development will not create employment opportunities.	Imperceptible, long-term	Imperceptible, long-term
	The local landscape	Moderate, negative-neutral and permanent (local landscape)	Not significant.

EIAR Chapter	Residual Effect Description	Potential Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
	Visual impact	Vary from imperceptible (viewpoint from Newgrange Passage Tomb) to moderate slight (local road at Knockharley) (visual impact).	
	No recreational waters, bathing waterbodies, downgradient surface water abstraction points, or designated source protection areas in the vicinity, and no potential for off-site flooding,	Neutral, imperceptible, and long-term.	Neutral, imperceptible, and long-term
	Odour effect	Direct, negative, long-term, and slight, not significant.	Direct, negative, long-term, and slight, not significant.
	Additional traffic movements associated with the proposed development	Negative, not significant and long-term	Negative, not significant and long-term
	Noise impact to residential properties within 20 m of the site boundary. No vibration impacts are anticipated.	Negative, slight to moderate and long-term.	Negative, not significant to moderate and temporary to long-term
Chapter 5 Land, Soils and Geology	**Construction Phase**		
	Local removal of soil cover, increasing aquifer vulnerability	Negative, Slight and short-term	Neutral, Slight and short-term
	Operational Phase		
	No residual effects predicted as a result of the operational phase of the Proposed Development		
Chapter 6 Hydrology and Hydrogeology	**Construction Phase**		
	Temporary slight impact on Knockharley stream due to construction activities	Negative, slight, and long-term.	Neutral, imperceptible and long-term.
	An ongoing change in the groundwater flow direction within the site area but no overall change in the groundwater flow and regime off site within the aquifer and the underlying Realtage GWB.	No impacts	Neutral, imperceptible and long-term
	Diversion of the Knockharley Stream and the establishment of a new culvert along this diversion	Negative, slight and short-term.	Neutral, imperceptible and long-term.
	No potential impacts on Water Framework Directive status of any waterbody or habitat	No impacts	Neutral, imperceptible and long-term

EIAR Chapter	Residual Effect Description	Potential Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
	Operational Phase		
	Surface Water and Groundwater Quality	Neutral, not significant and long term.	Neutral, imperceptible and long-term.
	A potential for a slight change in groundwater flow paths locally. However, there will be no impact or change in the overall regime of groundwater flows within the aquifer and the underlying Realtage GWB considering the proportion of the site area in relation to the total aquifer area.	Neutral, not significant and long term.	Neutral, imperceptible and long-term.
	No effects on Water Framework Directive status of any receiving waterbody or habitat	Neutral, imperceptible and long-term.	Neutral, imperceptible and long-term.
Chapter 7 Biodiversity	**Construction Phase**		
	No residual effects during the construction phase		
	Operational Phase		
	No residual effects during the operational phase		
Chapter 8 Air Quality	**Construction Phase**		
	Impact of construction dust from construction and trackout in terms of dust soiling, and human health	Negative, Slight, Long-Term	Negative, Not Significant, Long-Term
	Operational Phase		
	Impact of operational phase odour emissions from Proposed Development on sensitive receptors	Negative, Slight, Long-Term	Negative, Slight, Long-Term
Chapter 9 Climate	**Construction Phase**		
	Construction Traffic	Negative, Imperceptible, Medium-Term	Negative, Imperceptible, Medium-Term
	Embodied Carbon - Construction Material	Negative, Imperceptible, Medium-Term	Negative, Imperceptible, Medium-Term
	Operational Phase		
	Operational Traffic	Negative, Not Significant, Long-Term	Negative, Not Significant, Long-Term
	Landfill Emissions	Negative, Not Significant, Long-Term	Negative, Not Significant, Long-Term
	Construction Phase		

EIAR Chapter	Residual Effect Description	Potential Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
Chapter 10 Noise and Vibration	Constructions activities	Not significant to slight to moderate	Negative, not significant to moderate and temporary to short term
	Operational Phase		
	Tree felling and berm construction along the north of the site		Negative, slight to moderate and long-term
Chapter 11 Archaeology, Architectural and Cultural Heritage	**Construction Phase**		
	Unearthing of archaeological features	Negative, Not Significant, Permanent	Positive, Significant, Permanent
	Operational Phase		
	No residual effects during the operational phase		
Chapter 12 Landscape and Visual	**Construction Phase**		
	Movements of heavy earth moving machinery and erection of tower cranes	Negative, Slight-Moderate, Medium-Term	Negative, Slight-Moderate, Medium-Term
	Temporary storage of excavated materials on-site	Negative, Slight-Moderate, Medium-Term	Negative, Slight-Moderate, Medium-Term
	Emergence of the Proposed Development (Berms and Landfill Side Slopes)	Negative, Moderate, Medium-Term	Negative, Moderate, Medium-Term
	Operational Phase		
	Emergence of the Proposed Development (Landfill)	Negative-Neutral, Moderate, Long-Term	Negative-Neutral, Moderate, Long-Term
	Realignment of Existing Overhead Cables	Negative, Slight-Imperceptible, Long-Term	Negative, Slight-Imperceptible, Long-Term
	Decommissioning of Landfill and final Landscaping (Landscape)	Positive, Not Significant, Long-Term	Positive, Not Significant, Long-Term
	Decommissioning of Landfill and final Landscaping (Visual)	Positive, Not Significant, Long-Term	Positive, Not Significant, Long-Term
Chapter 13 Material Assets – Traffic and Transportation	**Construction Phase**		
	General Construction Traffic	Negative, Direct, Not significant, Long-Term	Negative, Direct, Not significant, Long-Term
	Operational Phase		

EIAR Chapter	Residual Effect Description	Potential Significance (Pre-Mitigation)	Residual Significance (Post-Mitigation)
	Operational Traffic	Negative, Direct, Not significant, Long-Term	Negative, Direct, Not significant, Long-Term
Chapter 14 Material Assets – Utilities and Waste	**Construction Phase**		
	Land Use	Negative, Not Significant, Long-Term	Negative, Imperceptible, Long-Term
	Utilities (Power Supply, Telecommunications, Potable Water)	Neutral-Negative, Imperceptible, Long-Term	Neutral, Imperceptible, Long-Term
	Construction Waste Management	Negative, Not-Significant – Significant, Long-Term	Neutral, Imperceptible, Long-Term
	Operational Phase		
	Land Use	Neutral, Not Significant, Long-Term	Neutral, Not Significant, Long-Term
	Utilities (Power Supply, Telecommunications, Potable Water)	Neutral, Imperceptible, Long-Term	Neutral, Imperceptible, Long-Term
	Operational Waste Management	Negative, Significant, Long-Term	Neutral, Imperceptible, Long-Term