AtkinsRéalis

Environmental Impact Assessment Report – Volume 2

WuXi Biologics Limited Ireland

April 2024

100085897DG001

EFFLUENT BALANCING AND RESOURCE RECOVERY SYSTEM

AtkinsRéalis - Baseline / Référence

Notice

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Client signoff

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Project	EFFLUENT BALANCING AND RESOURCE RECOVERY SYSTEM
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INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared by AtkinsRéalis on behalf of WuXi Biologics Ireland Limited (hereafter referred to as 'WuXi Biologics') to accompany the application for a proposed development of the Effluent Balancing and Resource Recovery System at the Dundalk Science and Technology Park in Haynestown, Dundalk in County Louth.

1. Introduction and Methodology

This Environmental Impact Assessment Report (EIAR) has been prepared by AtkinsRéalis on behalf of WuXi Biologics Ireland Limited (hereafter referred to as 'WuXi Biologics'). This report will accompany the planning application for the development of the Effluent Balancing and Resource Recovery System and associated works (the 'Proposed Development') at the Dundalk Science and Technology Park in Haynestown, Dundalk, County Louth ('the Site'). The location of the Site is shown in Figure 11.

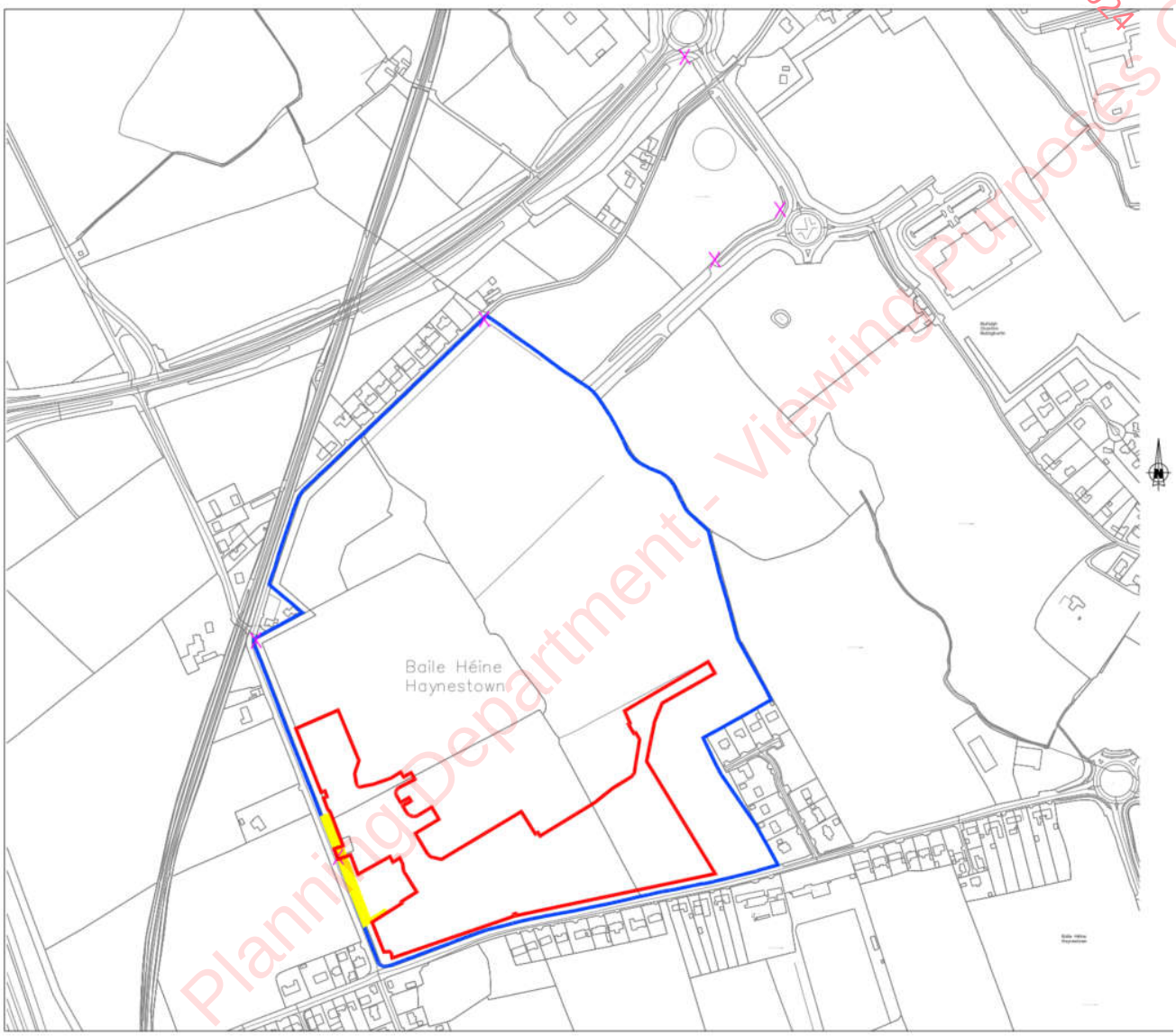


Figure 1.1 - Site Location

1.1 Introduction

The site is located within Louth County Council (LCC) on land owned by WuXi Biologics. The proposed site is located within a greenfield site adjacent to the existing WuXi Biologics Facility. This company is licenced by the Environmental Protection Agency (IE Licence Ref. No. P1122-01). The Proposed Development will tie into the existing WuXi Biologics Facility to pre-treat the increased effluent loading resulting from increased production

at the Plant. Refer to Figure 1.2 for the site location of the Proposed Development. The site is bounded to the north and east by the existing WuXi Biologics Facility (P1122-01), to the west by Mullagharlin road, residential dwellings and agricultural land and to the south by Marlbog Road, residential dwellings and agricultural land. The site lies ca. 480m east of the M1 and the land in the vicinity of the site is for residential, commercial and agricultural purposes.

A review of the Louth County Development Plan 2021-2027 shows that the proposed development and much of the land surrounding the Proposed Development is land-use zoned as '*Business and Technology*'. The land to the south of the Proposed Development is zoned as '*Existing Residential*', '*Open Space*', *'Agriculture'* and *'Strategic Reserve'* while the area north of the proposed development is zoned as *'Existing Residential'*.

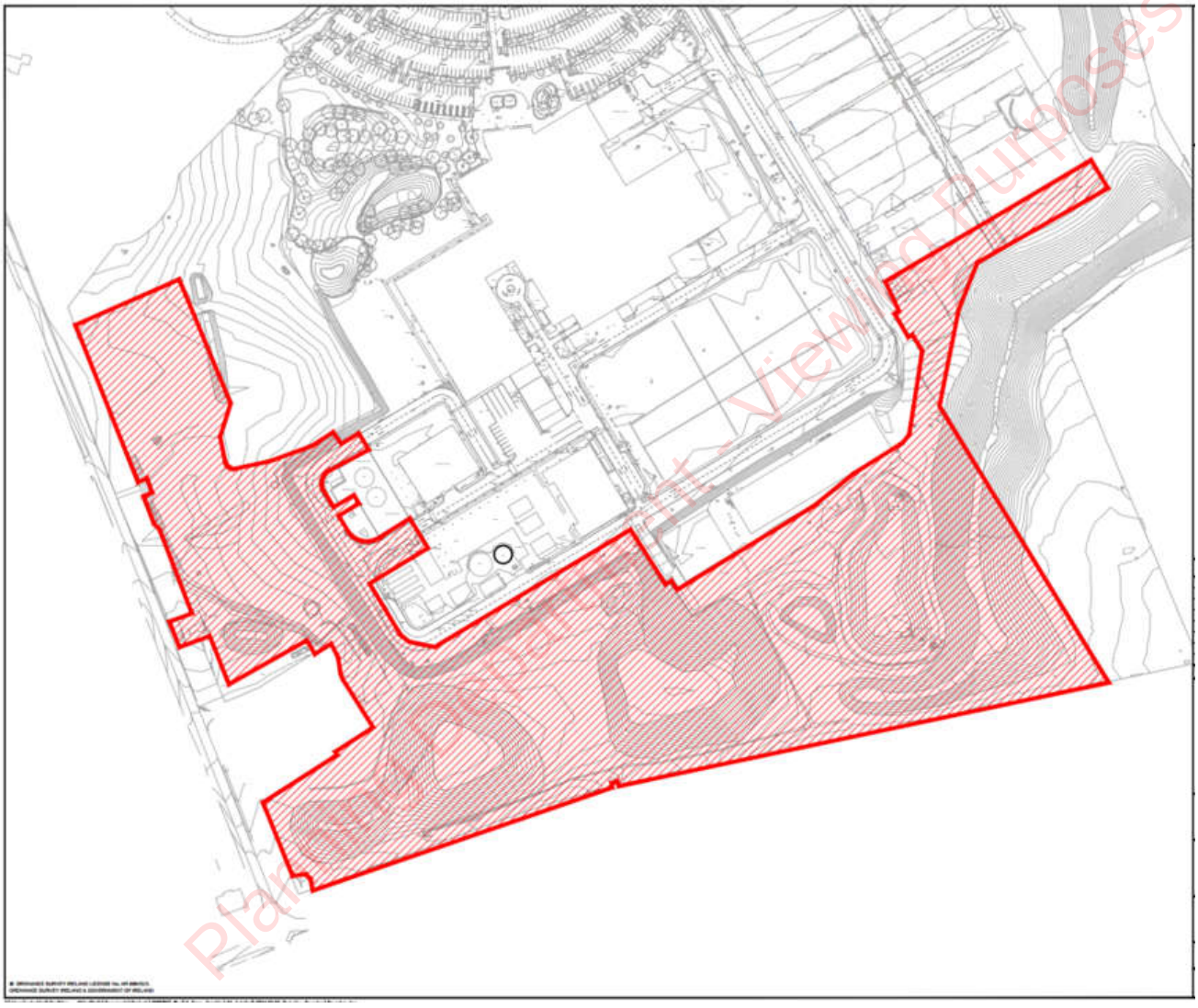


Figure 1.2 - Proposed Development Site

1.2 Background

WuXi Biologics is a global Contract Research, Development and Manufacturing Organization (CRDMO). Currently, WuXi Biologics are in the process of increasing production and expanding its workforce to meet an increase in activity following its successful transition from construction project to operational facility. WuXi

Biologics is subject to an Environmental Protection Agency (EPA) Industrial Emissions (IE) Licence (Ref. No. P1122-01[1]). This licence is for the operation of a multiproduct biopharmaceutical, contract manufacturing facility. The WuXi Biologics facility imports mammal cells which are multiplied and then biopharmaceutical intermediates (proteins / enzymes) are extracted. The intermediates are shipped to another facility for formulation into administrable drugs. This activity falls under the following category of Annex I of the Industrial Emissions Directive:

4.5: Production of pharmaceutical products including intermediates.

The Licence requires that WuXi Biologics concludes an end user agreement with Uisce Éireann (UÉ). During the development of the end user agreement with UE, it became apparent that the effluent emission limits proposed by UÉ would be more onerous than those initially provided in the IED Licence - refer to Table 1-1. Furthermore, UÉ indicated that it did not have sufficient headroom in the Dundalk Wastewater Treatment Plant (WwTP) (in accordance with the wastewater discharge licence D0053-01 for the WwTP) to treat the expected loads arising from the facility due to both capacity issues and an inability to accommodate fluctuations in loading. In order to maintain production capacity at the WuXi plant, the current pre-treatment capacity will need to be increased, and effluent balancing/storage capacity increased to ensure that the site maintains compliance with proposed end user agreement effluent limits. The Proposed Development will, therefore, provide pre-treatment to manage the biologics waste stream from the site prior to discharging to the Dundalk WwTP. This will improve overall wastewater handling capacity at the site while providing a better-quality wastewater discharge. As the production activity in the site has increased, the water usage has also increased and to mitigate any adverse effects caused by this increase on the Dundalk WwTP, an upgrade to the on-site treatment system is necessary. In order to achieve this, a planning application for the construction of an effluent balancing and water recovery system is being prepared. The system is designed to balance the flow of effluent from the site and to recover water for reuse within the site. The Effluent Balancing and Resource Recovery System Project is the subject of this Environmental Impact Assessment Report (EIAR) application to Louth County Council (LCC) and is hereafter also referred to as the 'Proposed Development'.

Table 1-1 - Effluent limits proposed by UÉ for WuXi (P1122-01)

Parameters	Concentration (24hour composite sample)	Load Max (kg/d)
Biochemical Oxygen Demand mg/L (BOD)	840	295
Chemical Oxygen Demand (COD) mg/L	2,640	392
Total Suspended Solids (TSS) mg/L	500	175
Total Nitrogen mg/L (As N)	130	30
Total Phosphorus mg/L (as P)	50	17
Chloride mg/L	2,000	1,500

[1] https://epawebapp.epa.ie/terminalfour/ippc/ippc-view.jsp?regno=P1122-01

Parameters	Concentration (24hour composite sample)	Load Max (kg/d)
Sulphate mg/L	1,000	1,500
Fats, Oils and Grease mg/L	100	150
Anionic Surfactants / Detergents mg/L	100	150

The existing WuXi Biologics Facility is subject to a Greenhouse Gas (GHG) Emission permit (Permit number: IE-GHG199-10526-1) in accordance with the European Communities (Greenhouse Gas Emission Trading) Regulations 2004, (S.I No. 437 of 2004 and amendments). The GHG permit is for the Annex 1 activity - Combustion of fuels in installations with a total rated thermal input exceeding 20 MW (except in installations for the incineration of hazardous or municipal waste). The GHG permit states that carbon dioxide from Schedule 1 activities shall be emitted to atmosphere only from the following emission sources:

- S1 – Boiler 1 (Capacity 7.5MW);
- S2 – Boiler 2 (Capacity 7.5MW);
- S3 – Boiler 3 (Capacity 7.5MW);
- S4 – Backup Generator 1 (Capacity 5.08 MW);
- S5 – Backup Generator 2 (Capacity 5.08 MW);
- S6 – Backup Generator 3 (Capacity 5.08 MW);
- S7 – Fire Pump 1 (Capacity 0.4 MW);
- S8 – Fire Pump 2 (Capacity 0.4 MW); and,
- S9 – Kitchen Equipment (Gas Cooker) (Capacity 0.05 MW).

The facility is subject to a Genetically Modified Organism (GMO) (Genetically modified microorganisms (GMM) Class 1 Permit (Permit number: G0731-01) in accordance with GMO (contained use) Regulation 2001 (S.I. No. 73 of 2001), as amended. The permit is for the first time use of a premises for the contained use of Class 1 GMMs in accordance with Part II of the Regulations.

1.3 EIAR Contribution

This EIAR has been prepared by competent experts. The following table clearly sets out a list of the experts who have contributed to this EIAR, showing which parts of the EIAR they have worked on, their qualifications, experience and any other relevant credentials.

Name	Company	Area of Expertise	Relevant Chapter / Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
Julie Larkin	AtkinsRéalis	Environmental Assessment, Project Management, Resource and Waste Management Plans, Contaminated Land Assessments, Environmental Human Health Assessments	EIAR co-ordinator Chapter 1 – Introduction Chapter 2 - Project Description Chapter 3 – Consideration of Reasonable Alternatives Chapter 13 - Material Assets	M.Sc. of Environmental Protection and Management (Hons), 2014 B.Sc. Environmental Science (Hons), 2013 Chartered Member of Institute of Water and Environmental Management (C.WEM)	10 years
Avril McCollom	AtkinsRéalis	Environmental Human Health Assessments	Chapter 4 – Population and Human Health	BSc. (Hons.) in Freshwater and Marine Biology, 2017	7 years
Deirdre Larkin	AtkinsRéalis	Geology, Hydrogeology, Hydrology, Human Health, Risk Assessment	Chapter 10 – Land, Soils and Geology Chapter 11 – Water	BSc. (Hons) Geology (2003) UCC MSc Applied Hydrogeology (2012) University of Newcastle. IGI PGeo No. 223 EurGeol No. 1064	20 years
Daniel Blake	AtkinsRéalis	Biodiversity / Ecology	Chapter 5 – Biodiversity	BSc Hons Wildlife Biology	6 years
Colin Wilson	AtkinsRéalis	Biodiversity / Ecology	Chapter 5 – Biodiversity Appendix 5.1 AA Screening Report	B.Sc. (Hons) Environmental Science (Middlesex University 1992 Full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM)	16 years
Owen O'Keefe	AtkinsRéalis	Biodiversity / Ecology	Chapter 5 – Biodiversity Appendix 5.1 AA Screening Report	Ecology from University College Cork (2015) Full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM).	8 years
Ronan Finnegan	Cunnane Stratton Reynolds Land Planning & Design	Landscape and Visual Specialist	Chapter 6 – Landscape and Visual	Chartered Landscape Architect (Landscape Institute UK) PG Dip Landscape Architecture BSc Hons Geography & Geology	13 years

Name	Company	Area of Expertise	Relevant Chapter / Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
Evelyn Sikora	Cunnane Stratton Reynolds Land Planning & Design	Landscape and Visual Specialist	Chapter 6 – Landscape and Visual	MILI Senior Landscape Planner of Cunnane Stratton Reynolds.	Over 10 years
Barry Murphy	Model Works	Photomontage	Appendix 6.1 - Photomontages	B. Eng. MIEI	20 Years
Imelda Shanahan	TMS Environment Ltd	Air Quality, Odour and Climate	Chapter 7 - Air Quality, Odour and Climate Appendix 7.1 – Dispersion Model Input Data and Predictions	BSc (Hons) in Chemistry from University College Dublin PhD in Physical Chemistry, Imelda is a Chartered Chemist and a Fellow of the Institute of Chemistry of Ireland and a Fellow of the Royal Society of Chemistry.	32 years'
Nathaniel Blue	TMS Environment Ltd	Air Quality, Odour and Climate	Chapter 7 - Air Quality, Odour and Climate Appendix 7.1 - Dispersion Model Input Data and Predictions	BSc in Environmental Science from Seattle University (2020) Master's in environmental sciences from Trinity College Dublin (2021)	5 years'
James Mangan	RSK	Noise	Chapter 8 – Noise and Vibration	Diploma in Acoustics and Noise Control, University of the West of England (PgDip) from University of the West of England, Institute of Acoustics Modern Apprenticeship (Advanced) Engineering from Bridgwater College Member of Institute of Acoustics (MIOA) at Institute of Acoustics	23 years'
Kerith McClung	RSK	Noise	Chapter 8 – Noise and Vibration	BSc (Honours) Environmental Science (Ulster University) Diploma in Acoustics & Noise Control (IoA) Certificate in Environmental Noise Measurements (IoA)	2 years
Nicholas van den Berg	AtkinsRéalis	Traffic and Transportation	Chapter 9 – Traffic	Chartered Engineer with the Institution of Engineers Ireland,	10 years

Name	Company	Area of Expertise	Relevant Chapter / Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
				BSc (Eng) from the University of Kwazulu-Natal (2013)	
Dr Enda O'Flaherty	Rubicon Heritage Services Ltd	Archaeology and Cultural Heritage	Chapter 13 - Cultural Heritage Appendix 8.1 to 8.4	BA, H-Dip, PhD	6 Years

1.4 EIAR Screening

By reference to Section 3 of the Planning and Development Act, 2000, as amended, the Proposed Development constitutes development having regard to Section 32 of the Planning and Development Act, 2000, as amended. There is a general requirement to obtain planning permission in respect of any development on land, not being exempted development. There are no exemptions available for the nature and extent of the Proposed Development, therefore, planning permission will be required.

The planning route for the Proposed Development is an application to Louth County Council under Section 34 of the Planning and Development Act, 2000, as amended.

The Proposed Development is a new Effluent Balancing and Resource Recovery Plant (EBRRP) at the existing WuXi Biologics facility (P1122-01) in Dundalk. As per the Planning and Development Regulations, 2001, as amended, the project type could be considered to be applicable in class 11(c) of Part 2 of Schedule 2 of the Planning and Development Regulations, 2001, as amended, which requires a mandatory Environmental Impact Assessment (EIA). An Environmental Impact Assessment Report (EIAR) and a Stage 1 Appropriate Assessment will be completed for the proposed Effluent Balancing and Resource Recovery System.

The Proposed Development will also consist of a variation to a previously permitted development for an activity for which a licence under Part IV of the Environmental Protection Agency Act, 1992 (as amended by the Protection of the Environment Act, 2003) is required.

1.5 EIAR Scoping

As part of the assessment process, an environmental scoping exercise was carried out. The purpose of the exercise was to define the scope of the EIAR. The environmental factors assessed within this EIAR are detailed in Chapter 4 to Chapter 14. The EIAR scoping report is presented in Appendix 1. As part of the EIAR assessment process, consultation was undertaken with statutory organisations at various stages of the pre-planning process for the current application. Environmental consultees were issued a scoping report via. email in December 2023 (during the Environmental Scoping phase of EIAR) regarding any environmental or planning interests that they may have in relation to the development.

A summary of the relevant feedback in relation to the proposed development is presented in Section 2.5 of the EIAR. A copy of the pre-application consultation correspondence received from statutory organisations as part of the EIAR process is presented in Appendix 2.

All relevant comments from the various consultees have been fully addressed as required within this EIAR and the accompanying AA Screening Report.

It was concluded that the construction and operational phases of the Proposed Development do not pose a risk with regard to potential radiation impacts. While on a regional scale the EPA (2023) predicts that *'About 1 in 10 homes in this area is likely to have high radon levels'* any risk is considered to be minor and will be addressed via the installation of a radon barrier as per standard building regulation requirements. Potential radiation impacts are not considered further within this EIAR. Refer to Chapter 10 – Soils, Geology and Land.

Consultation was undertaken with relevant statutory organisations as part of the assessment process, as detailed further in Chapter 2.

1.6 Appropriate Assessment

Natura 2000 Sites, which comprise Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), are a network of Sites designated across Europe in order to protect biodiversity within the EU. SACs are designated under the EU Habitats Directive (92/43/EEC), as transcribed into Irish law by the European Communities (Birds & Natural Habitats) Regulations, 2011 [S.I. 477 of 2011], while SPAs are designated under the EU Birds Directive (79/4089/EEC and amendments as consolidated in 2009/147/EC).

Article 6(3) of the EU Habitats Directive states that: '*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] Site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the Site in view of the Site's conservation objectives*.' Such an assessment is known as an Appropriate Assessment or a Habitats Directive Assessment. Further guidance on this process is provided by the European Commission (2000) and DEHLG (2009[2]).

An Appropriate Assessment Screening was undertaken by AtkinsRéalis on behalf of WuXi Biologics to consider in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on European sites.

The Stage 1 AA Screening confirmed that an appropriate assessment is not required as it can be excluded, on the basis of objective information (and without the application of mitigation measures), that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

These findings are discussed in greater detail in the AA Screening Report (AtkinsRéalis, 2024) that accompanies this application.

1.7 Methodology and Structure of this Report

This EIAR has been prepared in accordance with Planning and Development Regulations as amended 2001-2023, and with due regard to the following EIAR guidance;

[2] Note: DEHLG (2009) guidance was updated in 2010, by replacing the term "Statement for Appropriate Assessment" with "Natura Impact Statement" or "NIS.

- *'Guidelines on the information to be contained in Environmental Impact Assessment Reports' published in 2022 (EPA, 2022);*
- *Environmental Impact Assessment of Projects Guidance on Scoping* (Directive 2011/92/EU as amended by 2014/52/EU);
- *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU),* published by the European Commission.';
- *Department of Housing, Planning and Local Government 'Guidelines for Planning Authorities and An Bord Pleanala on Carrying out Environmental Impact Assessment', 2018; and,*
- *European Commission, 'Guidelines for the Assessment of Indirect and Cumulative Imoacts as well as Impact Interactions', 1999.*

Additionally, discipline specific best practice guidance has been consulted by each specialist for each of the relevant topics (Population & Human Health; Biodiversity; Landscape and Visual; Air Quality; Noise & Vibration; Traffic; Land, Soils & Geology; Water; Cultural Heritage; and, Material Assets) during the preparation of the EIAR.

This EIAR includes all necessary technical studies to address the likely environmental effects of the construction, demolition and operation of the Proposed Development. The disciplines identified for inclusion in this EIAR, along with the technical content, were determined based on a site walkover survey, completion of an environmental scoping exercise (to inform the content and extent of matters covered in the environmental information) and consultation with statutory bodies.

The EIAR is presented in three volumes as follows;

- Volume 1 - Non-Technical Summary;
- Volume 2 - EIAR; and,
- Volume 3 - EIAR Appendices.

Within the main body of the EIAR (Volume 2), Chapter 1 sets out the introduction and methodology, Chapter 2 describes the project and identifies the information required in an EIAR, and Chapter 3 identifies the alternatives considered.

The environmental topics where there is potential for significant effects to arise are addressed in Chapters 4 to 14 as follows;

- Chapter 4: Population and Human Health;
- Chapter 5: Biodiversity;
- Chapter 6: Landscape & Visual;
- Chapter 7: Air Quality, Odour and Climate;
- Chapter 8: Noise & Vibration;
- Chapter 9: Traffic;
- Chapter 10: Land, Soils & Geology;

- Chapter 11: Water;
- Chapter 12: Cultural Heritage;
- Chapter 13: Material Assets; and,
- Chapter 14: Cumulative Effects.

Interactions between disciplines are addressed in Chapter 15 and the Schedule of Environmental Commitments are presented in Chapter 16.

Where appropriate, each of the main sections of this report are structured in the same general format, as follows:

- An introduction describing the purpose of the section;
- A description of the methodology used in the section;
- A description of the aspects of the existing environment (and where relevant future receiving environment) relevant to the environmental topic under consideration;
- A description of the future receiving environment relevant to the location of the proposed development;
- Characteristics of the Proposed Development under consideration;
- An assessment of the likely significant effects of the impacts of the Proposed Development on the environmental topic;
- Recommendations for mitigation measures to reduce or eliminate any impacts which may have potential to result in significant adverse effects identified; and,
- An assessment of the residual effects that will remain, assuming that recommended mitigation measures are fully and successfully implemented.

Further details of the methodology and discipline specific best practice and guidance are presented in the relevant Chapters included within this report. All required planning drawings are submitted as part of this planning application and have not been duplicated within the EIAR appendices.

Sources of information mentioned in the text are either i) listed in full in the bibliography (Chapter 17 – References) or ii) are referenced in full in the text.

The full planning application pack, including this EIAR will be available for public viewing at the Louth County Council Office.

AtkinsRéalis has undertaken the assessment of effects in accordance with best practice, current legislation and various guidance notes. We have used the EPA Guidance on the Information to be Contained in an EIAR (2022), to determine the significance and effects of impacts.

1.8 Need for the Proposed Development

WuXi Biologics Facility (P1122-01) currently discharges effluent to the public sewer system through an existing balance system and pH correction system. However, the flow of and concentration of the waters arising from the production processes on the site is variable and could possibly limit the potential treatment capacity of the sewer system due to this variability. Reserving the potential capacity of the treatment (via. neutralisation) system and reducing water demand for use by others, will ensure continued growth of Dundalk and meeting the commitments of the Irish government Housing for all Plan.

The effluent balancing system will help to address this problem by storing effluent during periods of high flow and concentration and releasing it to the sewer system during periods of low flow and concentrations. This will help to ensure that the capacity of the sewer system is not overloaded, and that the environment is protected.

The system will also recover water and potentially nutrients from the effluent for reuse. This will help to reduce the site's reliance on public water supplies and reduce pressure on the public water system. The facility is intended to a be a New Milestone in WuXi Biologics Net-Zero Journey.

2. Project Description

This Chapter of the EIAR describes the Proposed Development, including design, size and other relevant features of the proposed project, the physical characteristics, proposed use of materials. The chapter also sets out the likely construction programme, phasing, and activities.

The proposed Effluent Balancing and Resource Recovery System is located at the Dundalk Science and Technology Park in Haynestown, Dundalk in County Louth and is hereafter referred to as 'the proposed development' or 'the site'.

Of note, alternatives considered and the preferred outcome and design for the proposed development is discussed further in Chapter 3 – Alternatives.

2.1 Nature and Extent of the Proposed Development

The Proposed Development will consist of the following:

The construction and operation of a new Effluent Balancing and Resource Recovery Plant (EBRRP) on a site of 7.888hectares, which will consist of:

(1) Excavation of the site to facilitate the Proposed Development, and reuse of excavated material as a landscaped spoil heap within the site.

(2) Construction of 3no. covered structures containing 12no. process tanks, located within concrete bunds with metal stairwells and platforms for access, and connected to an odour treatment facility.

(3) Installation of 5no. covered storage tanks located within concrete bunds with metal stairwells and platforms for access.

(4) Installation of a sludge dewatering facility.

(5) Construction of a single-storey administration and process building with roof-mounted solar panels and rainwater harvesting tank.

(6) Widening of an existing access on the Mullagharlin Road, and associated setback of the existing hedgerow, to facilitate a temporary construction access and a permanent operational access for small vehicles.

(7) Construction of a fabricated metal access bridge and pipe and cable support structures to link the Proposed Development with the existing biopharmaceuticals plant.

(8) A temporary construction compound, to include double-stacked metal containers/cabins with access stairs, laydown areas, and 50no. parking spaces; temporary internal road; and temporary internal construction haul road (including footpath).

(9) All site development works, drainage, ancillary equipment, lighting, retaining walls, fencing, and landscaping works.

The application relates to a development which comprises of an activity which holds an Industrial Emissions Discharge (IED) Licence (Licence No. P1122-01).

Refer to Figure 2.1 to Figure 2.6 for the layout for the Proposed Development.

Surface Water Drainage

The proposed design includes a separate stormwater network which will discharge to the existing WuXi stormwater network which includes silt traps, interceptors and attenuation to green field rates. The flows from the Proposed Development will be attenuated to the calculated QBar value. Outfall, from the Wuxi Biologics facility drainage network, is via SW-1 which connects to a local sewer and then Dundalk WwTP. No surface water is discharged to a watercourse, it is all contained within the existing drainage system. The proposed design includes a rainwater harvesting system which will feed the proposed WC's as well as washdown facilities for use of cleaning down the tanks etc.

The existing attenuation pond capacity is 2,403m3. The attenuation pond has existing hydrocarbon interceptors, flow control and emergency storage for the existing site infrastructure surface water run-off. The existing attenuation pond serves the entire campus for the purpose of SuDS. It captures the existing stormwater runoff from the site and stores it. The stored water is then slowly released back to the external environment at the calculated greenfield runoff rate i.e. the rate of discharge if there was no development there. There is currently no treatment to the captured water prior to release.

The storm water pump system being installed in the existing attenuation pond is intended to be used to direct waters from the attenuation pond back to the treatment plant. It is not intended that the system will be used other than in emergencies or to supplement water reuse system within the site as required. This water will enter the start of the treatment process and will be treated the same as effluent from the manufacturing process.

Foul Drainage

The proposed design includes a dedicated foul sewer which will discharge to the existing WuXi foul sewer network. The system has been designed as a gravity system. The discharge point will be located downstream of the outfall of the existing treatment plant onsite and will not discharge any effluent (manufacturing process) to the existing WWTP for treatment. All washdown facilities on the proposed project will discharge to the proposed foul sewer. All foul drainage related works will be carried out in consultation with Uisce Éireann and in accordance with all relevant Uisce Éireann guidelines and any Site-specific additional requirements.

In addition, in order to control the discharge of potentially contaminated runoff in the case of a fire, it is proposed to put a pump station in the existing attenuation pond. In the event of a fire, contaminated water will be detected by sensors shutting closed the penstock valve at the outfall of the existing attenuation pond. The contaminated water will be stored in the pond and then pumped to the proposed treatment facility to be treated before final discharge to the foul sewer. A sensor will be placed on the rising main from the pump station to the proposed WWTP to detect the water quality. Once the water has reached suitable quality levels the penstock will be reopened on the attenuation pond and normal operations will resume.

Processed Wastewater Detail

The proposed project involves the balancing and treatment of effluent from the WuXi Biologics facility (P1122-01). During the operational phase of the Proposed Development (following the proposed treatment) treated waters will be discharged to the local IDA pumping station, via SE-1 (as per the EPA Licence) which connects to Dundalk Wastewater Treatment Plant (WwTP) (Licence No: D0053-01). Any surface water from the bunded treatment plant process area is captured and re-circulated into the treatment process with eventual discharge (after treatment) to the local foul sewer which connects to Dundalk WwTP.

Sludge

Sludge will be produced at a rate of ca. 5 tonnes per day. Sludge will be removed in sealed tankers by licenced hauliers and will be treated at a licenced waste facility. The sealed tankers will prevent release of odour emissions at any significant rate. The operation and disposal of the sludge will be in accordance with Urban Wastewater Treatment Directive 91/271/EEC and Waste Management Act 1996 as amended. The sludge cake will meet the Class A Bio Solids standards.

Nutrients

As part of the Proposed Development recovery of nutrients from the proposed development will occur during the operational phase. These recovered nutrients will most likely be phosphates and nitrogen and will potentially be utilised for non-food crops such as bio-fuel feed stock. Further assessment of the recovery of nutrients is required. Any nutrient applications will not be entered into the food chain.

Lighting

The lighting design for the Proposed Development has been developed with cognisance of the neighbouring properties. The lighting scheme for the Proposed Development site has been developed with the following principals to the fore; only illuminating what needs to be illuminated (e.g. light directed to the plant, walkways & access roads only), reducing night time light levels where possible (also being cognisant of H&S requirement for any operations during the night), reducing the height of the luminaires, shielding of luminaires and correct choice of light (e.g. in line with the current light levels on the existing site).

Project specific lighting designs include for:

- LED luminaires shall be used due to the fact that they are highly directional, have lower intensity, have good colour rendition and dimming capability;
- The proposed development site column heights shall be carefully considered to minimise light spill;
- All luminaires shall lack UV/IR elements to reduce impact;
- Only illuminating what needs to be illuminated (e.g. light directed to the plant, walkways & access roads only); and,
- Reducing night time light levels.

The lighting factors considered which will minimise the effect on neighbouring properties are as follows:

- Lighting schemes have been designed with luminaires that provide no uplight, or have narrow downward beams of light, and will have optics or shields that prevent back spill etc;
- Reflectance's downward lighting can be reflected from bright surfaces, so use of Black Tarmac is proposed for all road surfaces in line with the existing service roads. The same applies to other materials such as the colour finish on the lights, poles, walls, street furniture etc;
- Type of Light Proposed – principally LED lighting which has no UV with exact cut-off optics will be used; and,
- Lighting Controls – Lighting controls have also to be taken into consideration to reduce light and/or switch off luminaires.

Landscape

The resulting excavated spoil will be retained on site and used to create new berms which will be located alongside existing berms found near the southern boundary. These earthworks will be sown with a mix of grasses along with some wildflower meadow areas with additional biodiversity benefits.

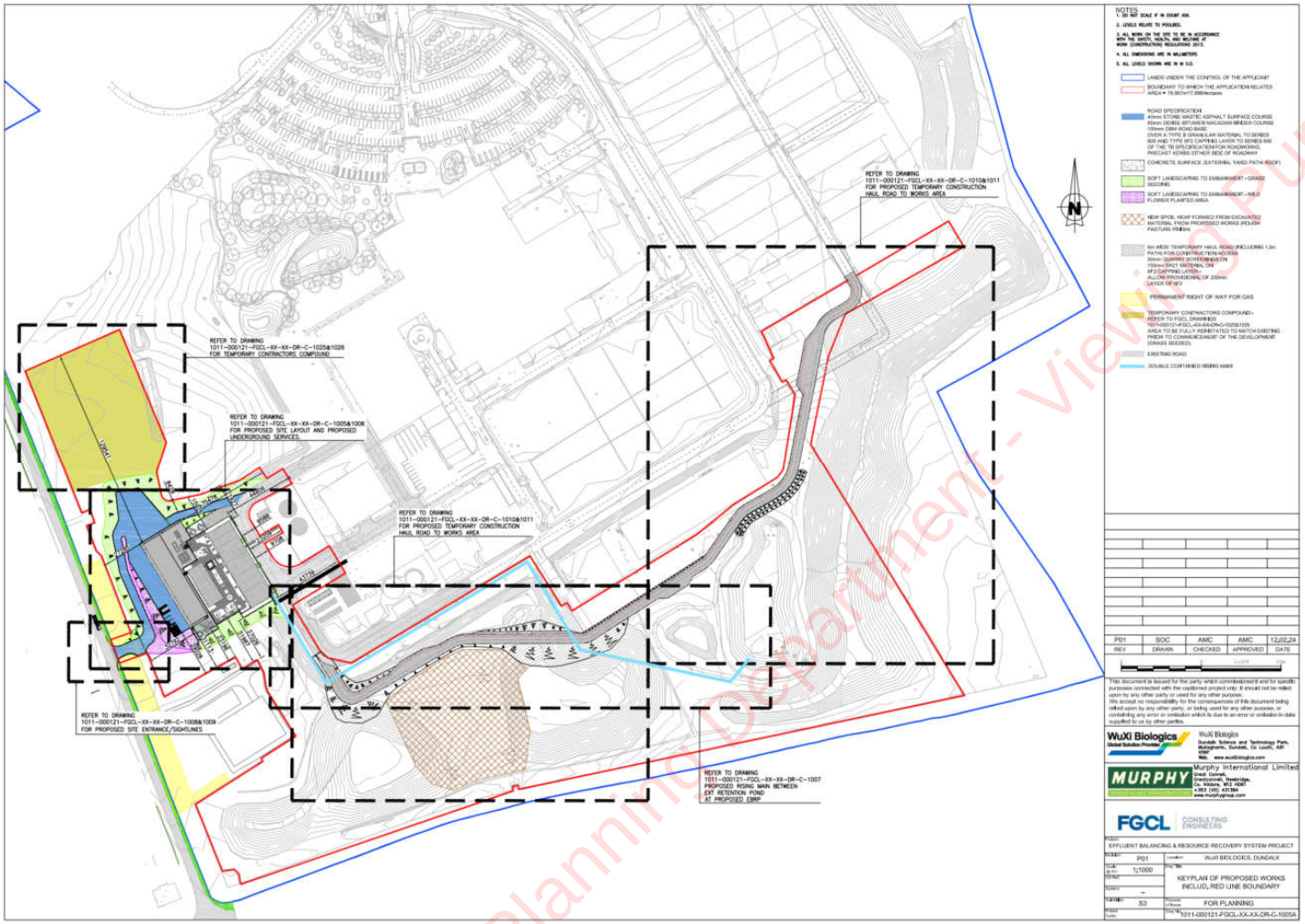


Figure 2.1 - Layout of the proposed development (1 of 6)

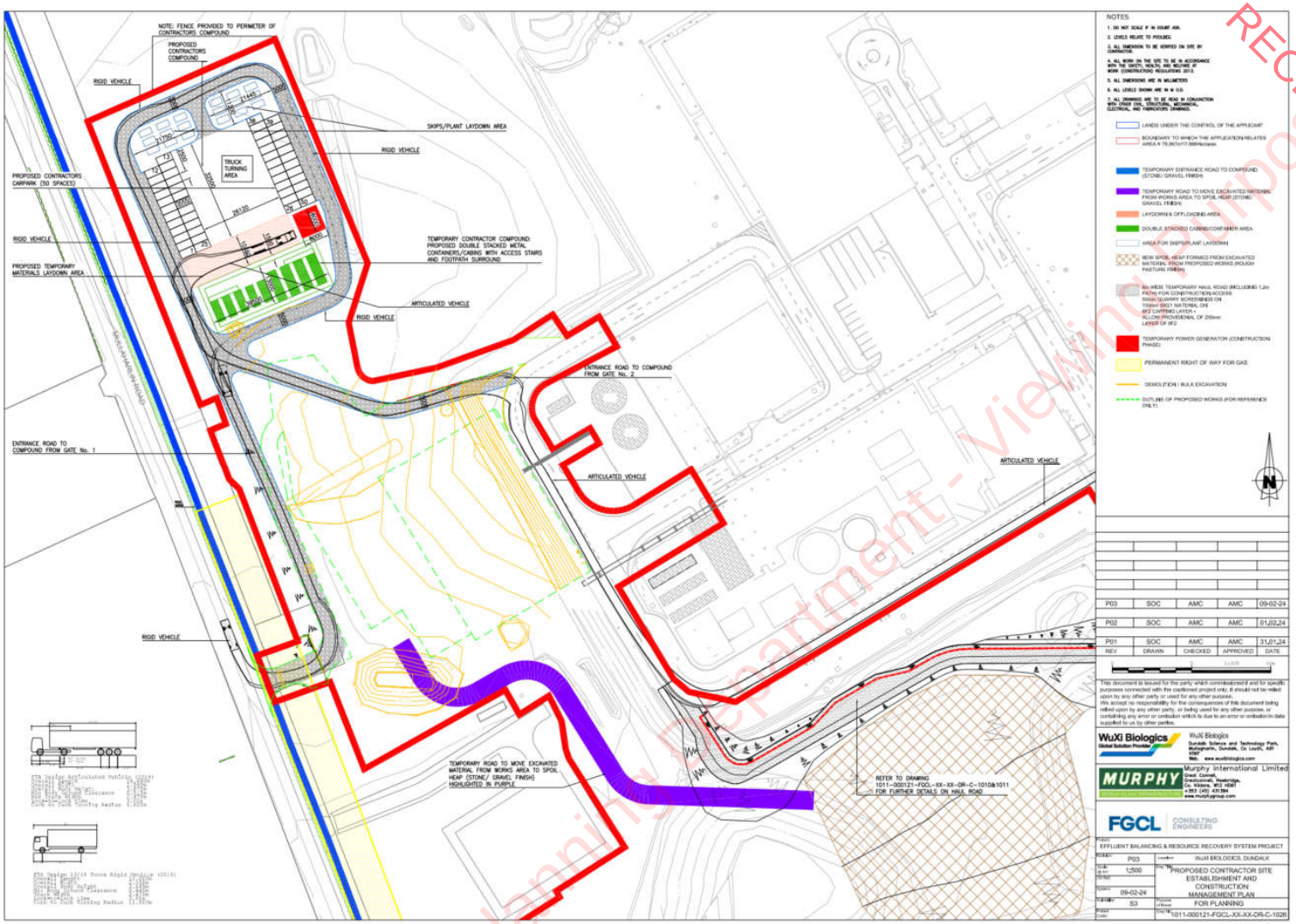


Figure 2.2 - Layout of the proposed development (2 of 6)

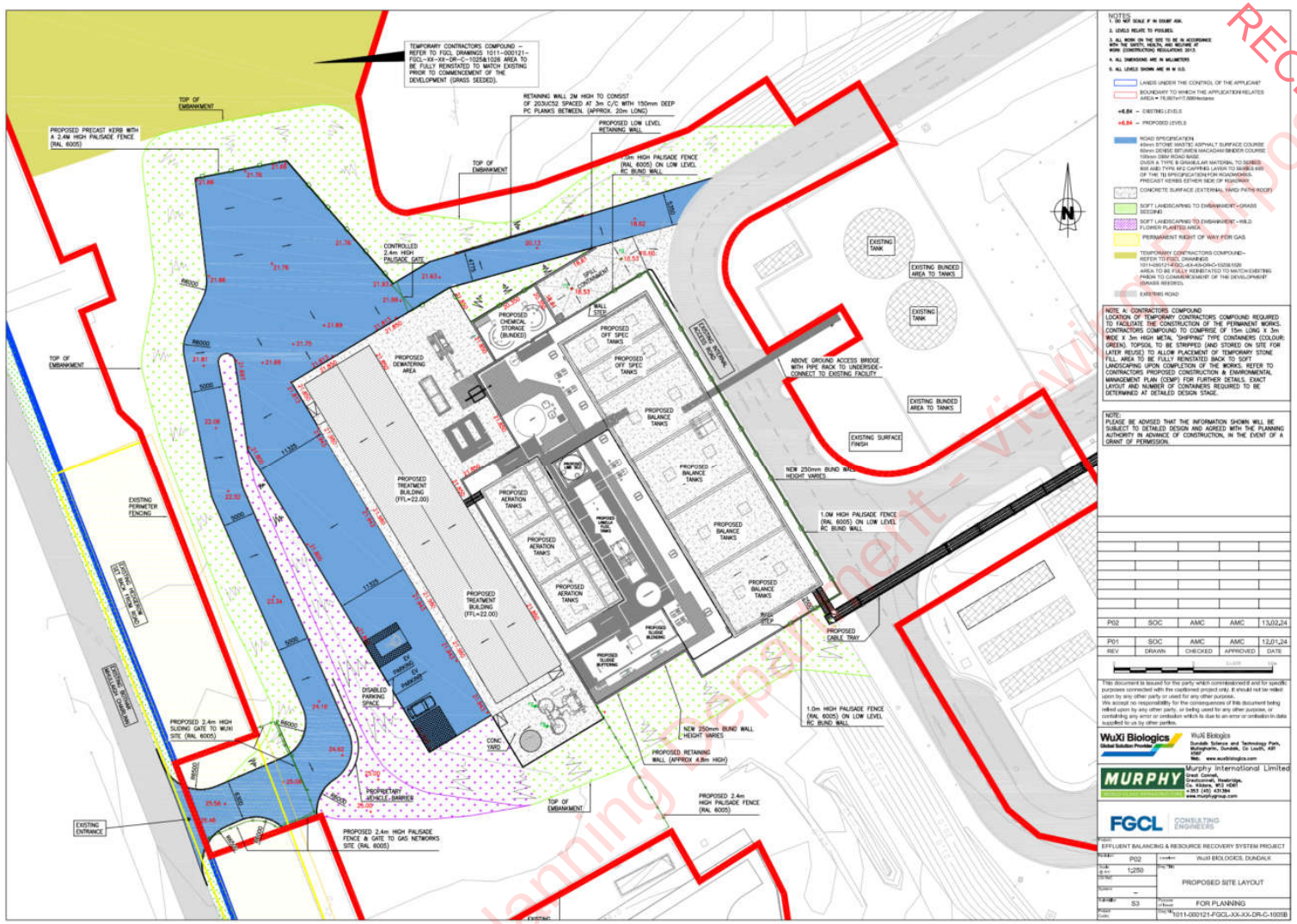


Figure 2.3 - Layout of the proposed development (3 of 6)

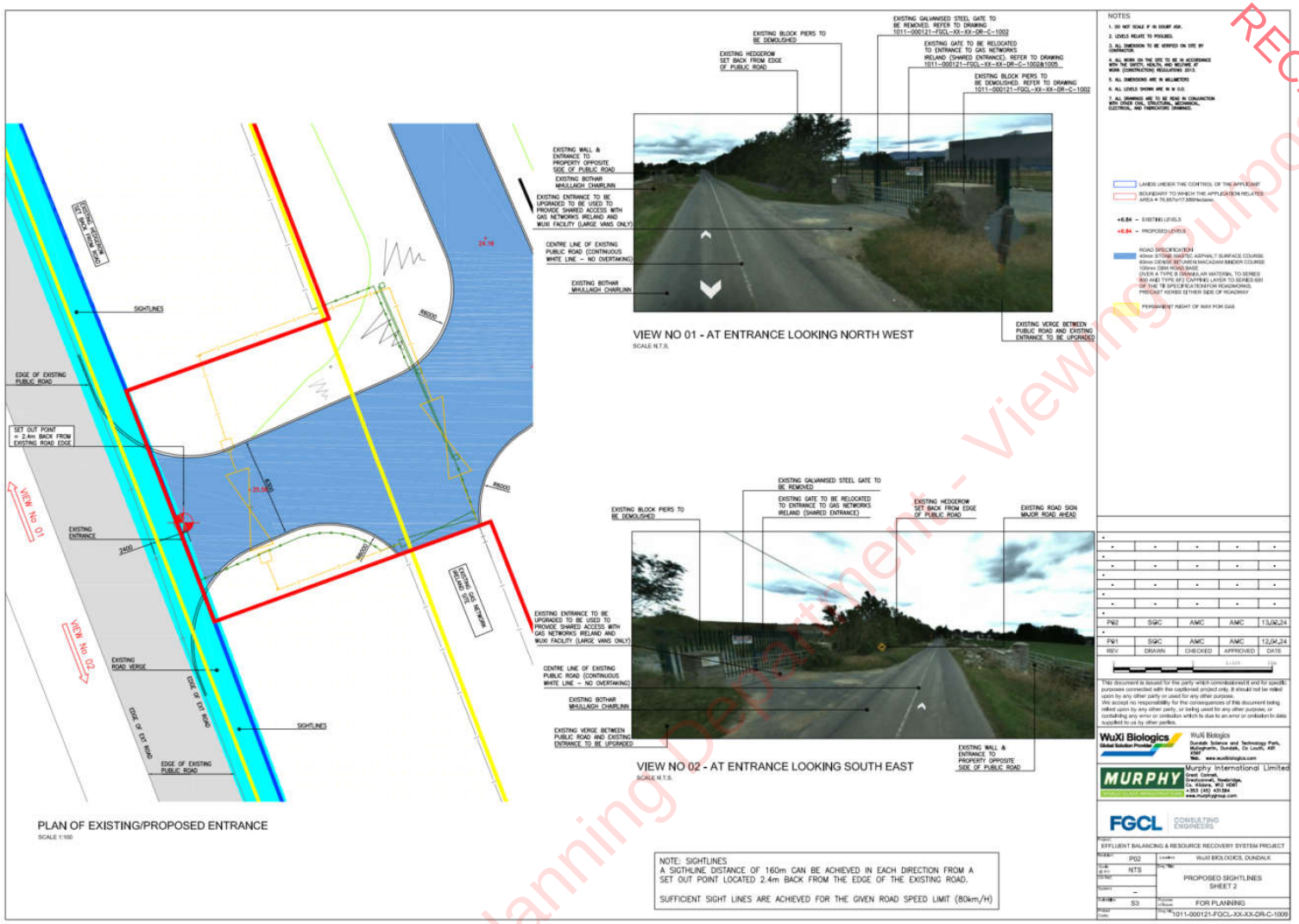


Figure 2.4 - Layout of the proposed development (4 of 6)

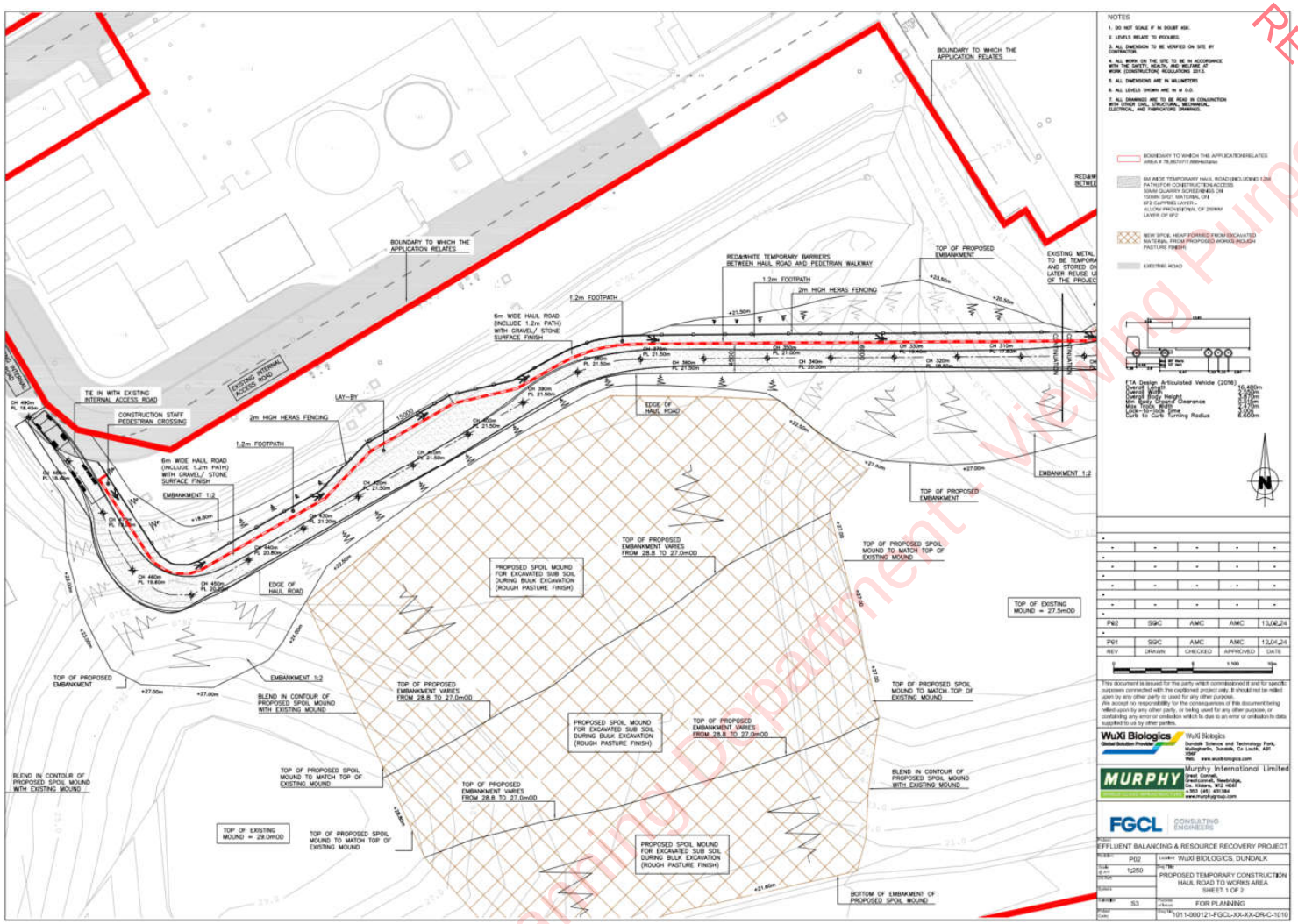


Figure 2.5 - Layout of the proposed development (5 of 6)

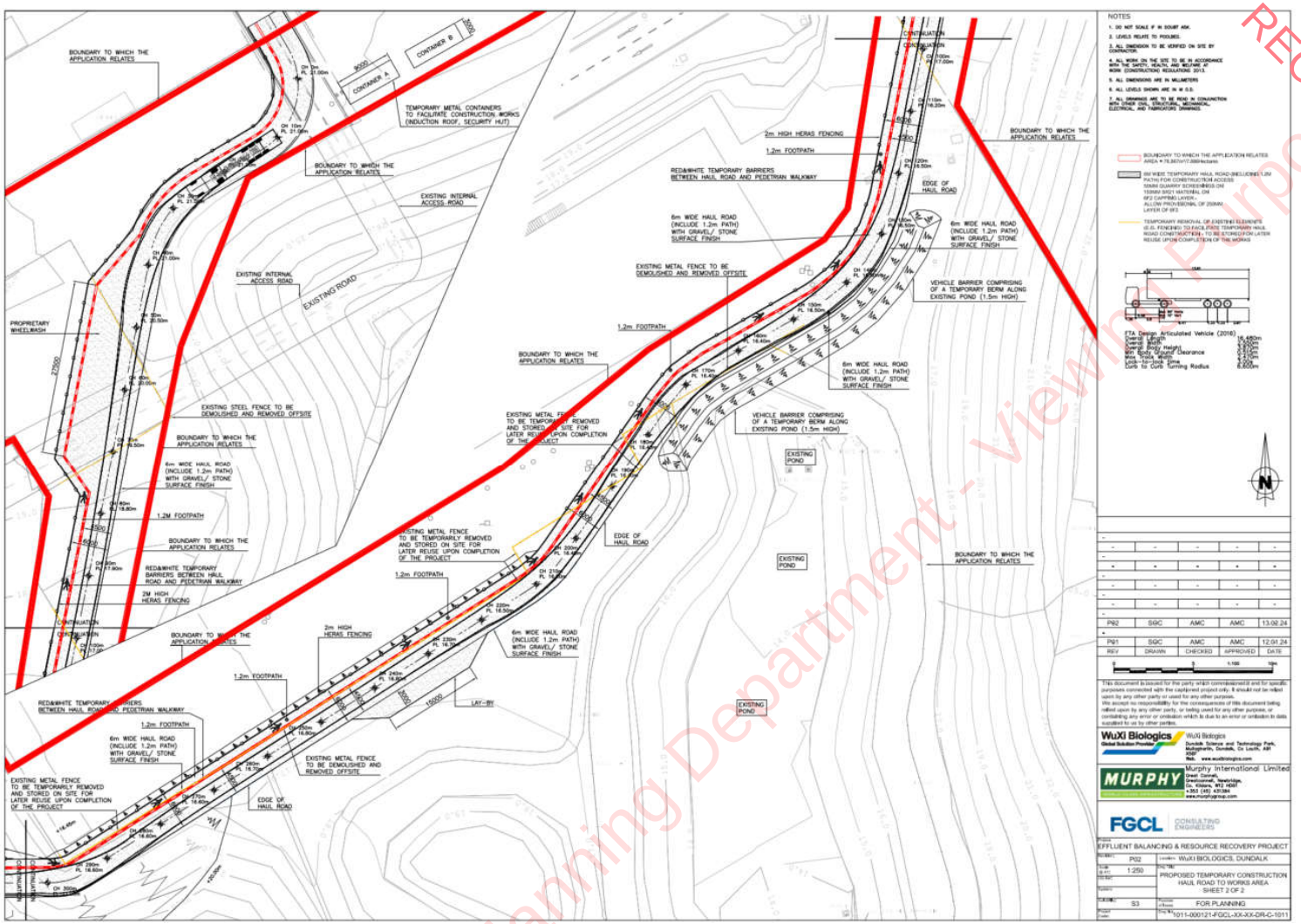


Figure 2-6 - Layout of the proposed development (6 of 6)

2.2 Construction Aspects

2.2.1 Construction Methodology

The following is the construction methodology for the Proposed Development. There are 14no. construction phases associated with the Proposed Development.

1. Mobilisation, Demolition and Site preparation (Phase 1)

Resolution of the archaeological area in vicinity of site compound will be resolved by WuXi before any works in the area is carried out. The enabling works for the project will cover the site establishment and access routes to and from the main site works location. These will be developed prior to full mobilisation of the team to site. A temporary haul road from the existing WuXi contractors' compound will be established. The preparation of the site will be via the Mullagharlin road and can facilitate cars and vans via a temporary road for the contractors' personnel and equipment. 2no. existing pillars will be demolished at this existing entrance. This joint access gate facilitating access to WuXi Biologics Facility and Gas Networks Ireland (GNI) access gates will be relocated.

To secure the site and the boundary with the existing operations on the WuXi Biologics facility, temporary fencing will be erected. Access control will be implemented to the site along with lock up and opening procedure for the site. Services will also be identified throughout the site and warning signage and procedures implement.

The site compound set up will facilitate the safe movement of vehicles, staff and unloading and offloading of large equipment. There is a facility for 50no. car parking spaces for staff and visitors. The road has been designed for a one-way traffic system to minimise three points turning and potentially dangerous manoeuvring. A set down area has been allocated for overnight plant storage and a lay down area for materials. Items including waste management, power generation and storage of materials are incorporated into the temporary design. The location of the site compound allows for close monitoring of the works in proximity.

The compound will be formed giving due consideration to the movement of vehicles for deliveries (van) and offloading of the temporary cabins. The cabins will be delivered to site with due consideration to the gradient difference and the entry and exist routes from the site for the delivery vehicles.

Pedestrian access will be provided on the haul road through a 1.2m width footpath, demarcated by red and white temporary barriers and temporary fencing. The footpath will run along the length of the haul road. A pedestrian crossing will be created for entrance into the main works area. The existing CMT building area will be modified to suit the temporary access haul road and will result in the modification to some fencing, car park area and coverings to existing service manholes.

The service road between the existing WuXi Biologics facility and the Proposed Development will be fenced off and demarcated for the construction period. Facilities will be in place to accommodate deliveries to the existing WuXi Biologics facility and ensuring daily operations are not impacted. An interface point will be identified where the haul road meets the internal road in pink (see Figure 2.7). A haul road indicated in purple will be located to the south of the site to enable the movement of heavy machinery to the spoil heap for storage. Refer to Figure 2.7.

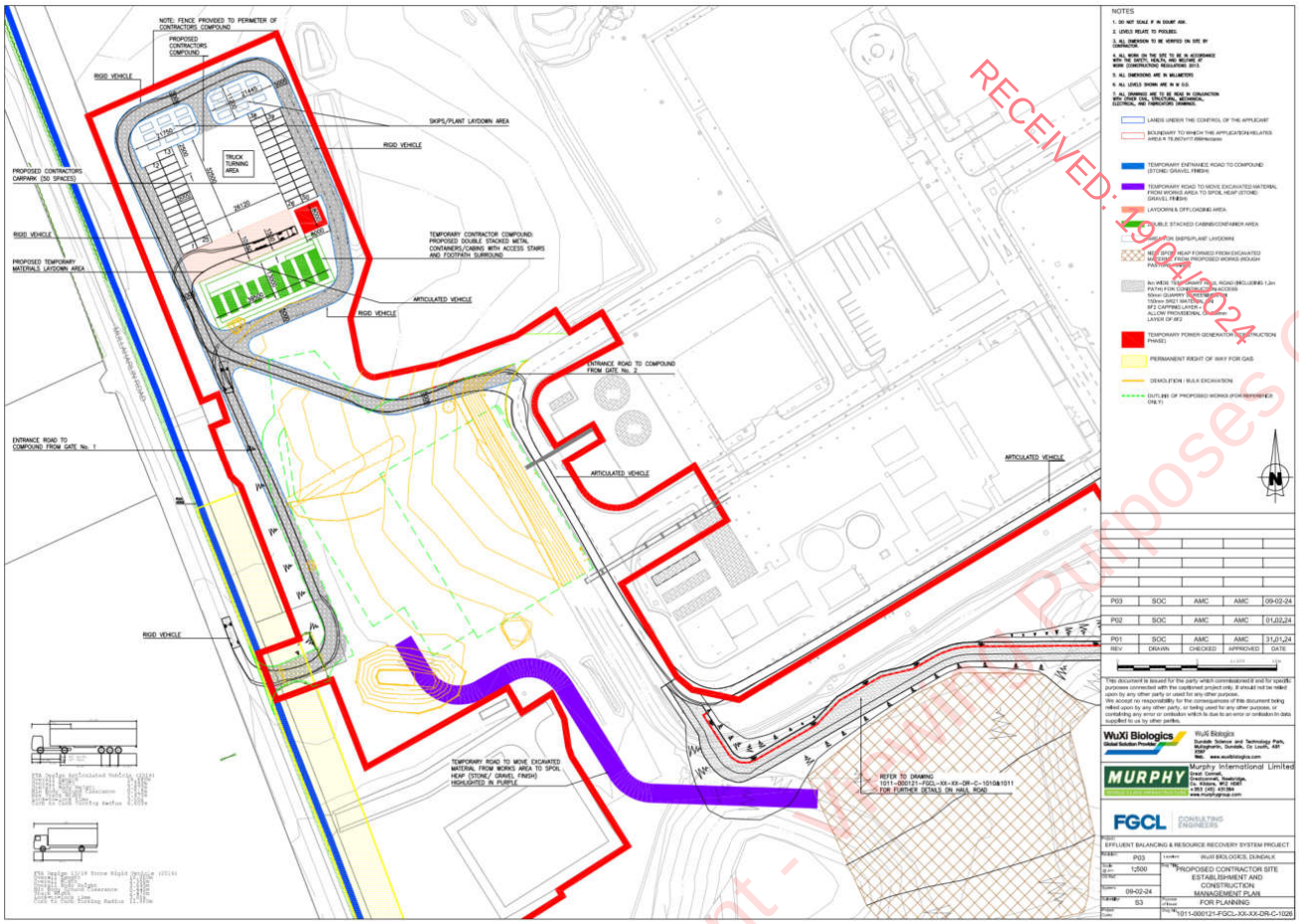


Figure 2-7 - Phase 1 works

The fire main adjacent to site will need to be diverted along with other existing services. Service continuity of the fire main will be maintained to the existing site in the event of a fire. This will be achieved through live tapping of the service. Excavation of ESB cables running through southwest of site will occur within this phase. The existing cables will be diverted away from the perimeter of the proposed project 'pinch point'. The contractor will facilitate any trenching required to enable a new ESB cable route.

Pre-survey works will be carried out including ground scanning to locate, and record and protect existing underground services as required. Temporary fencing and CCTV will be installed around the works area.

Erection and installation of temporary site lighting in the main site area during shorter light days for construction phase along with Mobile CCTV installation will be undertaken by the contractor.

Trenches will be excavated to the required depth based on the type of utility. Maximum excavation depth for utilities is 2m bgl, with any material kept on site to be used for landscaping. Pipes will be laid on pea gravel bedding and surround with such material. Marker tape will then be placed 300mm above the service pipe.

2. <u>Earthworks and early construction work (Phase 2)</u>

- The maximum excavation depth for the Proposed Development is ca. 5m bgl. Topsoil and subsoil (Volume of Excavated material is 34,407 m3) will be stripped and stockpiled in designated stockpile located within the red line boundary. Bulk excavation will have a haul length of 200m from the excavation pit to the south of the site – all within the red line boundary. The excavated soil will be located to the south of the site on

the dry meadows and grassy verges between the two large man-made mounds which have been colonised by dry meadows and grassy verges habitat. Archaeological monitoring will be carried out throughout the excavation works in conjunction with the WuXi Biologics Archaeologist.

- Excavated rock will be stockpiled within the red line boundary and removed for offsite disposal to a suitably licenced / permitted waste facility, with the appropriate soil testing carried out. Stockpiles will be located 100m from any drainage.
- There is potential for groundwater to occur during the excavation works. Dewatering measures will need to be in place during excavations.
- Grips will be constructed to redirect rainwater and may be filled with drainage stone where applicable.
- A new access road area will be excavated, and material will be moved to spoil heaps for further re-use as landscaping at the Site.
- Once excavation has been achieved to foundation level blinding will be cast to complete the construction of the large tanks.
- Installation of acoustic blankets on the fence may be installed if required.

3. Concrete works (Phase 3)

The following points detail the operations for the concrete work during construction. All work involving concrete will follow the guidelines in the Construction Environmental Management Plan (CEMP) for the Proposed Development.

- A formwork specialist contractor will be utilised to construct the concrete tanks.
- A temporary works assessment will be carried out for trafficking above the gas main at the site entrance.
- Mobile cranes will be used during construction.
- Steel will be tied and then shuttered once complete.
- Concrete will be poured, and shutters will be struck once curing period is complete (concrete mix design will be submitted for approval prior to pouring).
- The bund drainage pumps will be housed in the bund and set 500mm deeper under a perforated steel cover.
- Concrete formwork for all tanks will be the same process.
- Footings will be poured.
- Concrete foundation walls will be poured.
- Concrete floor will be poured.
- Reinforcement will be tied for the walls. Due to the excessive height scaffolding will be required to tie in situ.

- Formwork fixing will be constructed for concrete tank walls. These will be prefabbed and lifted into position and connected using MEWPs or similar.
- First pours will be done to form lower tank walls.
- Second pour will be done to complete tank walls.
- Construction joints will be placed in appropriate locations confirmed by designer.
- HDPE liner will be installed on all concrete tanks.
- Tanks will be hydro tested.
- Precast concrete roof sections will then be installed across the top of the tanks.
- Bund walls will be constructed.
- A separate bund area will be constructed for the chemical tanks to the immediate north of the bund. This bunded area will be split into two sections to create individual bunds for each chemical.
- Safety railing installation and M&E systems.
- Drainage systems are to be installed including potential attenuation tank.
- Foundations for construction of new combined pipe and cable bridge will be constructed. This will be followed by the steel erection.
- Retaining wall will be constructed between administrative building and tank farm.
- Access road and Footpath construction will begin.
- Access road construction will include laying of capping material and subbase, kerbing and surfacing the road.
- CBR testing will be conducted prior to road construction.

4. Welfare Building/Process (Phase 4)

The construction of the Welfare Building will involve the following steps.

- The central site retaining wall will delineate the building welfare from the main tank areas. This will be constructed early on to enable early welfare foundation works.
- Building foundation will be laid.
- Raft foundation will be poured, steel fixing and shuttering will then be completed.
- Steel frames will be erected.
- Roof Purlins will be constructed.

- Cladding rails will be fitted.
- Building will be roofed, and walls will be cladded.
- Partition walls will be installed.
- Internal domestic electrical and lighting will be completed.
- Internal plumbing will be completed.
- Plastering work will be completed.
- The building will be prefabricated off site and delivered in stages. A mobile crane will be utilised to lift section into position.

5. MEICA fitout (Phase 5)

MEICA fitout will involve the following steps.

- Pipe rack installation from existing plant to new plant.
- The area will be fenced off for secured access only.
- Bund area equipment install.
- 2nr. lamella and flocculation tanks will be installed.
- 1nr. storage tank for post primary balancing will be installed.
- 3nr. sludge buffering and blending tanks in the bund area fit out.
- Installation of 1nr. liquor return tank.
- Installation of 1nr. supernatant tank.
- Installation of 1nr. rainwater harvesting tank.
- Installation of mechanical & electrical equipment for the process.
- Access equipment will be constructed.
- Hydrostatic testing will be performed on all tanks before commissioning.

6. Electrical install (Phase 6)

This phase of the work will involve the installation of electrical supplies to the plant and equipment.

- Installation of electrical power and cabling to the new plant (Phase 5).

- Wiring of new motor control centre (MCC) panel.
- MCC flash testing will be completed.
- All new equipment will be field wired.
- Site lighting and bund lighting completed.
- CCTV will be installed.
- Fire and alarm system will be wired.
- Security system will be installed and commissioned.

7. Chemical dosing (Phase 7)

This stage of work for the chemical dosing system will involve the following steps.

- Installation of small-bore pipework and dosing systems associated with Kalic lime, Urea, molasses, sulphuric acid, sodium hydroxide and aluminium sulphide.
- Installation of chemical tanks for storage of chemicals.
- Dosing points for injection into the various process steams.
- Hydro testing will be performed on all chemical tanks.

8. Sludge Dewatering (Phase 8)

The sludge dewatering plant will require the following works.

- Dewatering equipment will be installed on a platform externally to the rear of the main process building.
- Installation of associated pipework and sludge cake pumps allowing transfer to the sludge cake skips for future disposal.
- The associated poly dosing system to the sludge dewatering screw presses will be installed in the main building.

9. Odour system (Phase 9)

The odour abatement plant will require the following.

- Ducting to odour system will be installed to the various closed tanks.
- Odour treatment facility will be installed and commissioned.

10. Membrane treatment plant (Phase 10)

The construction and operation of the Membrane Treatment Plant will require the following.

- Inlet pipework and pumps will be installed from the aeration tanks to the membrane facility.
- Membrane skids will be installed along with associated ancillary equipment.
- Pipework for the membrane system will be installed.
- Permeate and Backwash tanks will be installed.
- Chemical systems, including CIP will be installed.
- Backwash pumps will be installed.
- Biomass wasting pumps will be installed.

11. Works outside site area (Phase 11)

There are some works identified to be outside the main pre-treatment site area. These include:

- Tie in works to the existing treatment plant area.
- Connection to the existing foul sewer network system
- Connection to the existing surface water system.

12. Site Finishes (Phase 12)

The following site finishes will be installed/constructed during this phase of the work.

- Paved areas will be constructed on 150mm layer of well compacted CL804 material or similar pending final design. Concrete pavements are to be cast to form footways around the welfare building.
- Installation of solar panels on the roof of the administrative building.
- Gullies and drainage systems will be installed prior to road formation.
- Road Formation will consist of 6F2 capping imported material and layers of well compacted Cl804.

13. Various Finishing Works (Phase 13)

Various finishing works will include:

- Signage on tanks, and labelling of pipework.
- Landscaping Grass seeding.
- Road Surfacing.
- Security Fencing around perimeter of site to provide segregation between EBRRP the rest of the WuXi site.
- Turnstiles will be installed at exit of new plant into the WuXi site.
- General Finishing works.
- General fitout of administrative building, including the kitchen, office, and storage rooms and the laboratory.

14. Commissioning of equipment (Phase 14)

- Plant commissioning will be completed in several sequences when equipment becomes available for pretesting and wet testing.

2.2.2 Site Compound / Site Office

The contractor's main construction office, storage yard and logistics operations will be accommodated within the red line boundary of the Proposed Development to the north of the site, as described in Section 2.2.1. This area will be equipped to obtain material deliveries, storage, and parking. Figure 2.8 shows the proposed layout of the compound.

The site compound set up will facilitate the safe movement of vehicles, staff and unloading and offloading of large equipment. There is a facility for 50no. car parking spaces for staff and visitors. The road has been designed for a one-way traffic system to minimise three points turning and potentially dangerous manoeuvring. A set down area has been allocated for overnight plant storage and a lay down area for materials. Items including waste management, power generation and storage of materials are incorporated into the temporary design. The location of the site compound set up allows for close monitoring of the works in proximity.

The contractor will have a dedicated area within the compound for refuelling plant or any other equipment that is bunded and has the necessary spill kit equipment available as and when required in line with any statutory IEPA & H&S legislations.

The compound will be formed giving due consideration to the movement of vehicles for deliveries (van) and offloading of the temporary cabins. The cabins will be delivered to site with due consideration for the gradient difference and the entry and exist routes from the site for the delivery vehicles.

The compound will be set up to securely enclose within the red line boundary, limited site storage and temporary welfare facilities comprising of the following:

- Canteen;
- Serviced Toilet;
- Site office;

- Site storage container; and,
- A number of Waste Skip for containing different waste streams e.g. steel, timber, plastics etc.

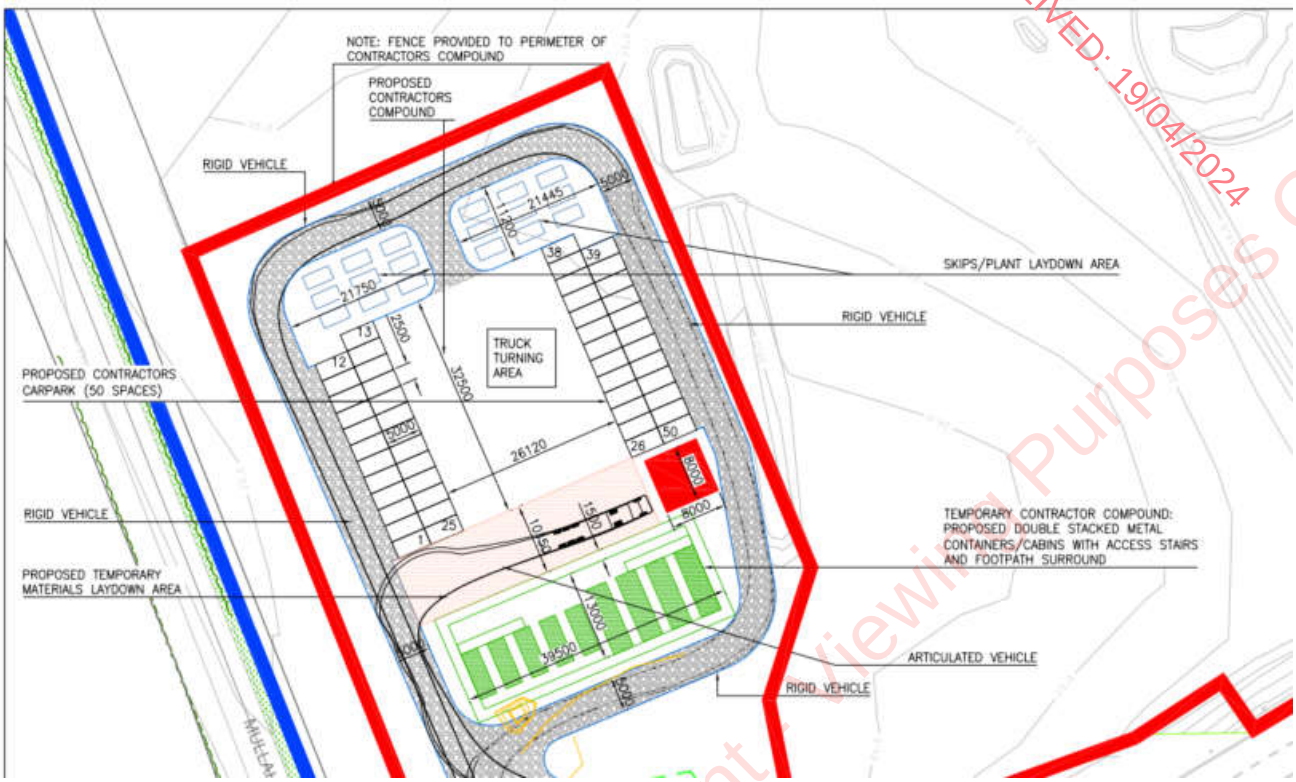


Figure 2.8 - Proposed Site Compound Location

2.3 Operational Aspects

The baseline scenario including a description of the relevant aspects of the current receiving environment has been considered as part of this EIAR through the collection and collation of baseline data including analytical data where relevant (air quality, noise levels, surface water quality). A detailed description of the current receiving environment is presented in relevant sections for each environmental topic. The predicted changing baseline (i.e. the likely future receiving environment) that could arise as a result of committed development within the vicinity has also been addressed, where relevant, and is presented under the cumulative impacts section of this EIAR.

2.3.1 Operational Phase

The Proposed Development will operate 24/7. The following sections of the EIAR provides details and calculations on the influent parameters and loading to the plant, characteristics of the influent, the stages of primary treatment and the treatment system.

2.3.1.1 Influent Parameters

In terms of flows, the Proposed Development will be developed in two stages, each of them based on a hydraulic capacity to treat and neutralise 1000 m³/day and 1500 m³/day – Stages 1 and 2, respectively. The maximum flow to the inlet works is 200 m³/h when one unit in any phase of the preliminary works is being bypassed.

Regarding design wastewater loads, these are the same for both stages and are included in the Table 2-1 as maximum loads.

Table 2-1 - Influent Load Parameters

Parameter	Unit	Value
BOD (Biochemical Oxygen Demand)	kg/day	1,551
COD (Chemical Oxygen Demand)	kg/day	2,070
TSS (Total Suspended Solids)	kg/day	300
TN (Total Nitrogen)	kg/day	60
TP (Total Phosphorus)	kg/day	115

For the design of the Proposed Development, the characteristics listed on Table 2-2 are assumed.

Table 2-2 - Influent Typical Characteristics

Parameter	Unit	Value
BOD (Biochemical Oxygen Demand)	mg/l	20-750
COD (Chemical Oxygen Demand)	mg/l	100-3,000
TSS (Total Suspended Solids)	mg/l	0-700
TN (Total Nitrogen)	mg/l	60-120
TP (Total Phosphorus)	mg/l	0-100
NH4-N (Ammonia)	mg/l	1-110
TDS (Total Dissolved Solids)	mg/l	300-1,300
FOG (Fats, Oils & Grease)	mg/l	0-200
pH	-	1-14
Temperature	°C	<40
Chloride (max.)	mg/l	2,000
Sulphate (max.)	mg/l	1,000

2.3.1.2 Effluent Parameters

The discharge flows will comply with the EPA's IED licence P1122-01 for the site, as the hourly and instantaneous flows to emission SE-1 (receiving waters Dundalk Bay via UE sewer and Dundalk WwTP) shall be limited to a maximum of 62.5 m^3/h (17.4 l/s) in Stages 1 and 2.

For the design loadings, the treated effluent will achieve the quality standards shown in Table 2-3. These quality standards are based on a 24h composite sample.

Table 2-3 - Effluent Load Parameters

Parameter	Unit	Value
BOD (Biochemical Oxygen Demand)	mg/l	295
	kg/d	392
COD (Chemical Oxygen Demand)	mg/l	392
	kg/d	392
TSS (Total Suspended Solids)	mg/l	175
	kg/d	175
TN (Total Nitrogen)	mg/l	30
	kg/d	30
TP (Total Phosphorus)	mg/l	17
	kg/d	17
Chloride	mg/l	1500
	kg/d	1,500
Sulphate	mg/l	1,500
	kg/d	1,500
FOG (Fats, Oils & Grease)	mg/l	150

2.3.1.3 Collection Network

The Proposed Development will treat wastewater flowing from four rising mains in the existing WuXi Biologics facilities (P1122-01), which in turn are equipped with flowmeters and connected to lift stations located in distinct areas of these facilities, as follows:

- DK0 - DK02 WS regens, as well as DK04 cooling tower blowdown and boiler FW regens;

- DK03 – DK03 waste flow;
- DK04 – DK04 boiler blowdowns and CUB process drains;
- DK02 – DK02 process waste;
- Surface water drainage; and,
- Attenuation pond drainage (emergency only).

2.3.1.4 Preliminary Treatment

The inlet works will consist of two sets of screens for the four rising mains carrying influent wastewater into the Proposed Development, namely an existing screen on site that will be focused on the non-process influent (combined diluted stream from DK0, DK03 and DK04) and a new screen that will treat the process waste from DK02, which shall go to full treatment. Grit and Fats, Oils & Grease (FOG) are not currently an issue for the influent wastewater.

2.3.1.4.1 Existing Screen

The existing screen (SC-0350001) is comprised of the following:

- 6 mm sized perforations, where the gross solids are retained;
- Duty/standby arrangement;
- Level sensors installed in case the screen gets clogged; and,
- Provision of a high-pressure washing facility.

Besides the non-process influent, the existing screen will also receive flows from the surface water drainage, as well as from the attenuation pond for emergency situations. After the screen, the flow can split and go either to the feed tank or to the new screen. In normal operation the flow will gravitate to the feed tank. If the spectral analyser at the existing screen shows high loading, that requires further treatment in addition to neutralisation, then flow will be pumped forward to the new screen. Duty/standby variable speed driven dry installed submersible Screen Transfer pumps will be provided.

2.3.1.4.2 New Screen

Besides process waste, the new screen will receive supernatants from the liquor balance tanks (as an alternative), as well as flows from import and treated water returned for further treatment. This screen shall be designed for a maximum flow of 200 m^3/h.

2.3.1.5 Neutralisation System (Mode of Operation 1)

The neutralisation system will be dedicated to wastewater that only requires pH correction, namely the non-process influent, since its loadings will be compliant with the effluent standards and, therefore, no full treatment is needed. The maximum daily flow discharge is 1,500 m^3/d (present neutralisation plant design flow). This mode of operation is comprised of:

- Existing screen;

- Feed tank, which is one of the existing 650 m^3 balancing tanks (TK-0350-02). Sulphuric acid dosing in this tank is planned to reduce the influent pH to acceptable values; and,

- pH correction tank (CT-0350-01/02) and IED discharge monitoring point.

The feed tank can also divert the flow to the new balance tanks if the non-process influent needs to go for full treatment. This will be based on online spectral analyser measurements and lab testing of tank contents (COD, TN and TP).

2.3.1.6 Full Treatment System (Modes of Operation 2 and 3)

2.3.1.6.1 Off-Spec and Balance Tanks

The off specification (off-spec) and balance tanks shall receive process waste from the new screen and the feed tank (TK-0350-02) for storage and flow homogenisation, being part of the full treatment line. 4 No. Balance Tanks and 2 No. Off-Spec Tanks are provided for operational flexibility. During normal operation it is envisaged that the duty Balance tank will be fed first.

Mixers will be provided to ensure tank contents are homogenous for sampling and forward feed. Septicity is not an issue at the existing neutralisation plant, therefore mixers to provide aeration are no longer proposed.

In normal operation, a single duty Balance Tank will be fed over a set period (operator adjustable). The tank contents will then be mixed for a period. Sampling and testing (for COD, TP and TN) will be carried out to determine whether primary treatment is required, optimum poly and lime/alum dose or, in some cases, whether further dilution with “non-process” waste is required. This tank would then be ready for forward feed to treatment and feed from the new screen would move on to the next Balance Tank.

Side-access manways are provided into each Off-Spec and Balance Tanks (to de-risk the confined space).

Duty/assist/standby variable speed driven dry installed submersible pumps are located downstream of the Balance Tanks to transport the wastewater to the lime dosing tank or directly to the post primary balance tank (bypass of the primary treatment) or back to the off-spec tanks in an emergency, at a maximum flow of 64.8 m3/h (as in Stage 2 mass balance).

Duty/standby variable speed driven dry installed submersible pumps are provided to convey flows from the Off-Spec Tank to the duty Balance Tank.

2.3.1.6.2 Lime Dosing Tank

The lime dosing tank is provided to remove phosphorus from the influent wastewater by dosing with lime, or aluminium sulphate as an alternative. The characteristics of this tank are the following:

- The liquid volume is 35 m3, allowing a retention time of approximately 30 minutes for the maximum flow of 64.8 m3/h;

- A flash mixer and flow splitter will be located at the inlet and outlet of the lime dosing tank, respectively; and,

- The lime dosing tank may receive the supernatant returns from the liquor return balance tank. A fixed lime dose (determined via jar testing) will be dosed on a flow proportional basis in the flash mixer. Aluminium sulphate is also provided as an alternative coagulant.

2.3.1.6.3 Primary Treatment

The primary treatment step will consist in two lamella clarifiers arranged in a duty/standby basis, as well as flocculation tanks (where a polymer is dosed) located upstream of each clarifier. A fixed poly dose (determined via jar testing) will be dosed on a flow proportional basis. The inlet flow passes through a set of lamellas, where the flocs formed previously are retained and then settled at the bottom of the clarifiers as primary sludge, while the treated water flows into the next treatment step over the top of these settlers. The use of lamella allows a lower volume of the clarifier compared to a conventional clarifier.

Primary sludge produced in the lamella clarifiers will be comprised of BOD, COD, TSS and lime as a result of phosphorus removal at the lime dosing tank upstream. Regarding sludge production with lime, the agreed design basis is a liquid lime (Kalic) dose rate of 600 mg/l to flows of 400 and 600 m^3/d for Stages 1 and 2, respectively, as well as 1 kg of dry solids produced for 1 kg of hydrated lime dosed. Table 2-4 shows the assumptions considered in the mass balance for primary sludge production.

Table 2-4 - Assumptions for Primary Sludge Production

Parameter	Unit	Value
BOD removal efficiency	%	25
COD removal efficiency	%	40
TSS removal efficiency	%	50
Liquid lime concentration	%	45
Liquid lime density	kg/m3	1.4
Lime sludge production	1 kg DS/kg hydrated lime	1

2.3.1.6.4 Post Primary Balance Tank

The post primary balance tank shall consist in cylinder tank with a liquid volume of 60 m^3 to allow a retention time of approximately 1 h for Stages 1 and 2 flows.

- Chemicals and nutrients are dosed upstream of and in the post primary balance tank, respectively, to enhance the performance of the secondary treatment, located downstream of this tank.
- Molasses (or alternative carbon source), urea (or alternative nitrogen source) and phosphorus to maintain an adequate C:N:P ratio in the biological tanks. These nutrients shall be provided from bunded IBC tanks.

The post primary balance tank shall also be designed to accommodate the supernatants flowing from the liquor return balance tank, serving as an alternative for the lime dosing tank.

2.3.1.6.5 Secondary Treatment Feed pumps

Duty/assist/standby variable speed driven dry installed submersible pumps are provided to convey flows from the Post Primary Balance Tank to the secondary treatment process via the filtering/screening step.

2.3.1.6.6 Filtering/Screening

A filtering/screening step will be added upstream of the secondary treatment to meet the requirements of the membrane supplier. It is anticipated that screening will be required to the order of 250 microns, which is in line with the proposed design of the secondary treatment step. This design includes a basket strainer included within each membrane bank loop to give precautionary protection from debris in the bioreactor contents.

2.3.1.7 Secondary Treatment

The secondary treatment step will consist of a membrane bioreactor system (MBR) with three biological tanks and membrane banks, from which biomass (sludge) is separated from treated water (permeate) and is recirculated back into the tanks, with the surplus sludge sent for dewatering.

The inlet flow will be split into the biological tanks (via flow split weirs with outlet flow measurement or flowmeters and flow control valves), which will be compartmentalized into anoxic and aerobic reactors to allow for nitrogen removal as well. The following table shows the size of these reactors for each biological tank. Table 2-5 shows the permeate characteristics.

Table 2-5 - Permeate Characteristics

Parameter	Unit	Stage 1	Stage 2
Flow	m3/d	1,057	1,553
Temperature	°C	15-25	15-25
pH	-	6.5-8.5	6.5-8.5
COD concentration	mg/l	≤100	≤100
BOD concentration	mg/l	<10	<10
TSS concentration	mg/l	<10	<10
Ammonia as N	mg/l	≤5	≤5
TN concentration	mg/l	≤28	≤19
TP concentration	mg/l	≤11	≤7

2.3.1.7.1 Treated Water Storage Tank

The treated water storage tank will be comprised of one of the existing 650 m^3 balancing tanks (TK-0350-01), with the feed tank being the other existing balancing tank (TK-0350-02). Both these tanks will use the same existing set of pumps to transport water to the pH correction tank.

2.3.1.7.2 Existing pH Correction Tank and IED Discharge Monitoring Point

The 6 m^3 pH correction tank (CT-0350-01/02) will be converted into a monitoring and polishing chamber, since pH correction shall already occur upstream of this tank, namely in the feed tank (for the neutralisation system - mode of operation 1) and upstream of the post primary balance tank (for the full treatment system - mode of operation 3). This will facilitate greater throughput of the treated water in the pH correction tank.

The treated water shall then flow into the IED discharge monitoring point, or back into the inlet works (existing screen) if the existing pH analyser or proposed spectral analyser, located in the pH correction tank, measure parameter values that are out of specification.

2.3.1.7.3 Treated Water Reuse

Treated water shall be reused for:

- Carrier water for chemical dosing.
- Inlet works.
- Washdown for the dewatering units.

Potable water should be provided for poly dosing and safety showers.

2.3.1.7.4 Sludge Blending and Buffer Tanks

The sludge blending tank will receive and combine both primary and secondary sludge, which will then flow into duty/standby buffer tanks. The combined sludge will have a minimum dry solids content of 0.8%.

2.3.1.7.5 Sludge Dewatering

Sludge dewatering will be designed to achieve an agreed dry solids concentration based on the final chosen dewatering technology and the availability of primary and secondary sludge of sufficient and adequate proportion and combined characteristics. The final dewatering technology will consider energy consumption, noise, washwater consumption and product dry solids.

2.3.1.7.6 Supernatant Return

The produced supernatants will flow into a sump and then to the liquor return balance tank. Return liquors are pumped to one of three locations. The supernatants are comprised of:

- Supernatants from the sludge dewatering step.
- Laboratory and CIP waste.
- Drainage from sludge skip area.
- Supernatants from odour control.
- Drainage from chemical delivery area.

The currently proposed total size for the supernatant sump is 5 m^3, while the liquor return balance tank has total and operating volumes of 98 and 88 m^3, respectively.

For the mass balance, the flow of the supernatants is based on total outlet flows of 1,000 and 1,500 m^3/d for Stages 1 and 2, respectively, quantities of 108 and 162 kg/d for Stages 1 and 2, respectively (equivalent to 600 mg/l liquid lime dose rates to 400 and 600 m^3/d flows), and assuming the dewatered sludge shall achieve 20% dry solids.

2.3.1.7.7 Odour Treatment

The proposed stack is 7.1 m high (1.6 m above maximum Administration Building ridge level).

2.3.1.7.8 Hazardous Area Classification

The current proposal has identified the balance and sludge tanks to have the potential of an explosive atmosphere. In order to mitigate this the ventilation through the odour management system has been provided and all equipment installed within the potential areas are to be ATEX rated. Further review will be required during detailed design stage and development of ATEX register for the proposed development.

2.3.1.7.9 Sulphuric Acid Dosing

The sulphuric acid dosing system will be comprised two bulk storage tanks and respective dosing points, including:

- The existing 5 m3 storage tank (T-0350601) that is currently connected to the pH correction tank (CT-0350-01/02).
- A new 35 m3 storage tank to dose the feed tank (TK-0350-02), upstream of the post primary balance tank, as well as upstream of the lime dosing tank (if aluminium sulphate is used).

2.3.1.7.10 Caustic Dosing

The caustic dosing system shall use the existing 5 m^3 bulk storage tank (T-0350701) on site (the existing plant has had negligible dosing of caustic), which is currently connected to the pH correction tank (CT-0350-01/02), and it is also planned to dose upstream of the post primary balance tank.

Caustic will be used to increase the pH and to add alkalinity to the treated water. In this case, this chemical may be dosed:

- For lower pH waste than the influent wastewater, namely CIP flows that are produced from cleaning the membranes or that come directly from the WuXi facilities.
- To increase the pH or alkalinity for secondary treatment when aluminium sulphate is used for phosphorus removal in the lime dosing tank located upstream, as sulphuric acid may be required to depress the pH in this tank.

2.3.1.7.11 Aluminium Sulphate Dosing

Aluminium sulphate shall be provided as an alternative to lime for phosphorus removal in the lime dosing tank, being stored in a new 35 m^3 bulk tank. Laboratory tests shall be carried out for aluminium sulphate dosing as this will be later described during the detailed design phase.

2.3.1.7.12 Poly Dosing

The poly dosing system will be comprised of two automatic polyelectrolyte preparation units to produce polymer, each connected to the flocculation tanks (located upstream of the lamella clarifiers) and the dewatering units, in order to promote a higher aggregation of the flocs and dewatered sludge, respectively.

Laboratory tests show that for poly dosing in the flocculation tanks, a dosing rate of 2 mg/l will be applied, as higher rates will most likely lead to an increase of the COD concentration in the treated water.

A dose rate requirement of 10 kg poly/tonne dry solids is assumed for sludge dewatering.

2.3.1.7.13 Lime Dosing

Lime is planned to remove phosphorus in the lime dosing tank, where it will be dosed in the form of liquid (Kalic) with 45% concentration in solution. This will be stored in a 35 m^3 bulk tank. This chemical is successful for phosphorus removal at the existing balance system and pH correction system. The use of liquid lime (Kalic) rather than powder lime (external silo or bagging system) has many advantages, as:

- Powder lime causes dust Health and Safety issues.
- A bagging system for powdered lime may need an operative 7 days a week.
- Powder lime would require a building to encapsulate the storage tank/bagging system to avoid condensation and moisture.

Due to its high solution (45%), liquid lime dosing is suggested to be carried out in short runs of pipework to avoid blockages. If the tanker delivery connection and the lime bulk storage tank are far apart then a flushing system is required to prevent the liquid lime from accumulating in the bulk storage tank feed pipe, considering the following:

- Long sweeping bends required.
- The flushing water can flow into the liquid lime bulk storage tank.
- High velocity pumping system is required for the flushing line.

Further testing will be carried out to optimise the dosing parameters and the lime dosing system

2.3.1.7.14 Bund Drainage

The existing and new bunds will be used to retain spillages from the treatment plant, for example, directing the flow into a sump that shall feed the existing screen.

2.3.1.7.15 Attenuation Pond

A facility to treat water from the attenuation pond shall be provided at the proposed development and a new set of pumps shall direct the flow to the existing screen at a flowrate of 30 to 40 m^3/h.

2.3.1.8 Process Interfaces

The process interfaces between the existing Wuxi equipment and the proposed development are as follows:

- DK02 process waste to new screen (DK02 stream to existing screen also to be valved).
- Attenuation pond pumped to inlet of existing screen (2 compartments).
- New bund surface water drainage to existing screen (2 compartments).
- Existing screen to Screen Transfer pump sump.
- Washwater to new screen.
- Feed Tank recirculation loop for sulphuric acid dosing.
- Link from existing Sulphuric Acid storage tank outlet to a new dosing pump (to feed the Feed Tank recirculation loop).
- New connection to the Feed Tank to allow Treated Water Storage Tank to be taken out of service.
- New pH monitor at the Feed Tank.
- Outlet from the Feed Tank to Feed Tank outlet pumps (to feed new Balance/Off-spec tanks).
- Secondary Treatment to Treated Water Storage Tank.
- Treated Water Storage Tank to Final Effluent Chamber.
- Link from existing Caustic Storage Tank outlet to new dosing pumps (to feed Post-Primary Balance Tank).
- New spectral analyser at pH Correction Tank.
- Facility to connect IBC to outlets from existing caustic storage and sulphuric acid storage tanks.

2.3.2 Environmental Management

The construction of the Proposed Development will be in accordance with the Preliminary Construction Environmental Management Plan (PCEMP) that will be submitted as part of this planning application (which takes account of the Schedule of Environmental Commitments presented within this EIAR). This document will be further developed and added to within the detailed site specific CEMP which will be prepared by the Contractor in advance of the construction phase. The requirements of the CEMP will be fully implemented onsite for the duration of the construction phase of the project. Environmental monitoring will be carried out during the construction phase as detailed in Chapter 16 - Schedule of Environmental Commitments.

2.3.3 Traffic Management

The proposed transport routes of all machinery entering and egressing the site, for the full duration of the 15no. month phased construction period will be through the new temporary access route within the existing WuXi facility. This access point will include access control and security fencing.

As part of the Proposed Development, the existing agricultural gate on the Mullagharlin road will be repurposing to facilitate the access to the plant for small vehicles (cans /vans) for both the construction and operation phases.

All construction activities will be managed and informed by a Construction Traffic Management Plan (CTMP). The details of the CTMP will be agreed with the roads department of the Local Authority in advance of construction activities commencing on-site.

2.3.4 Waste Management

The Contractor will prepare a detailed C&D Resource and Waste Management Plan (RWMP) in accordance with the relevant following guidance '*Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects'* (EPA, 2021) which will take full account of the CEMP submitted as part of this planning application. The Construction RWMP will provide a mechanism for monitoring and auditing waste management performance and compliance for the duration of the project. The document will also provide a detailed overview of key waste management considerations for the project and will be fully implemented onsite for the duration of the construction phase of the project.

2.4 Consideration of Cumulative Effects with other Projects

The consideration of reasonable alternatives is discussed further in Chapter 3 – Alternatives. Cumulative effects in relation to other developments are addressed in Chapter 14 – Cumulative Effects.

2.5 Consultation

As part of the EIAR assessment process, consultation was undertaken with statutory organisations at various stages of the pre-planning process for the current application. Environmental consultees were issued a scoping report via. email in December 2023 (during the Environmental Scoping phase of EIAR) regarding any environmental or planning interests that they may have in relation to the development. This scoping report is presented in Appendix 1.

A summary of the relevant feedback in relation to the Proposed Development is presented below. A copy of the pre-application consultation correspondence received from statutory organisations as part of the EIAR process is presented in Appendix 2.

All relevant comments from the various consultees have been fully addressed as required within this EIAR and the accompanying AA Screening Report.

2.5.1 Pre- Application Consultation

The following bodies/ interest groups have been consulted at pre-application stage as part of the preparation of this EIAR:

- An Chomhairle Ealaíon (The Arts Council);
- An Taisce;
- Birdwatch Ireland;
- Department of Agriculture, Food and the Marine;

- Department of Transport, Tourism and Sport;
- Environment Protection Agency (EPA);
- Failte Ireland;
- Geological Survey of Ireland;
- Iarnród Éireann (Irish Rail);
- Inland Fisheries Ireland (IFI);
- Irish Water (Uisce Éireann);
- Irish Wildlife trust;
- Louth County Council Biodiversity Department;
- Louth County Council Environmental Department;
- Louth County Council Planning Department;
- Louth County Council Traffic/Road Department;
- National Monuments / Architecture;
- National Parks and Wildlife Service (NPWS);
- National Transport Authority (NTA);
- The Department of Culture, Heritage and the Gaeltacht;
- The Eastern & Midland Regional Assembly;
- The Health and Safety Authority;
- The Health Services Executive, Environmental Health;
- The Heritage Council;
- The Minister for Communications, Climate Action and Environment;
- The Minister for Housing, Planning, Community and Local Government; and,
- Transport Infrastructure Ireland (TII).

A synopsis of the responses received as part of the EIAR consultation and scoping stage are presented as follows. Refer to Appendix 2 for a copy of all relevant responses.

2.5.1.1 Geological Survey Ireland (GSI)

In the GSI's reply dated 28th of February 2024, the GSI noted:-

- **Geoheritage** - '*Our records show that there are no CGSs [County Geological Sites] within the project boundary of the proposed Effluent Balancing and Resource Recovery System.'*

- **Groundwater** - '*The Groundwater Data Viewer indicates an aquifer classed as a 'Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones' underlies the proposed development. The Groundwater Vulnerability map indicates the range of groundwater vulnerabilities within the area covered is variable. We would therefore recommend use of the Groundwater Viewer to identify areas of High to Extreme Vulnerability and 'Rock at or near surface' in your assessments, as any groundwater-surface water interactions that might occur would be greatest in these areas.'*

- **Geohazards** - *'We recommend that geohazards be taken into consideration, especially when developing areas where these risks are prevalent, and we encourage the use of our data when doing so.'*

- **Natural Resources (Minerals/Aggregates)** - *'We would recommend use of the Aggregate Potential Mapping viewer to identify areas of High to Very High source aggregate potential within the area. In keeping with a sustainable approach we would recommend use of our data and mapping viewers to identify and ensure that natural resources used in the proposed development are sustainably sourced from properly recognised and licensed facilities, and that consideration of future resource sterilization is considered.'*

- **Geochemistry of soils, surface waters and sediments** - *'Baseline geochemistry data can be used to assess the chemical status of soil and water at a regional scale and to support the assessment of existing or potential impacts of human activity on environmental chemical quality. Tellus is a national-scale mapping programme which provides multi-element data for shallow soil, stream sediment and stream water in Ireland. At present, mapping consists of the border, western and midland regions.'*

- **Other Comments -** '*Should development go ahead, all other factors considered, Geological Survey Ireland would much appreciate a copy of reports detailing any site investigations carried out. The data would be added to Geological Survey Ireland's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector.'*

The above comments from GSI have been addressed within Chapter 11 – Land, Soils and Geology.

2.5.1.2 Department of Housing, Local Government and Heritage / National Monuments Service

In an email correspondence dated 15th February 2024, the Department of Housing, Local Government and Heritage noted that the Proposed Development is located within an area of known archaeological significance and is located beside the following recorded monuments, '*all of which are subject to statutory protection in the Record of Monuments and Places, established under section 12 of the National Monuments (Amendment) Act 1994. Given the scale, extent and location of the proposed development it could impact on subsurface archaeological remains. '*

- Souterrain (LH012-055----);

- Enclosure (LH012-102----);

- Ring ditch (LH012-101----); and,

- Habitation site (LH012-116----).

The Department notes that the National Monuments Service has reservations regarding the construction of a temporary construction compound within an area of known archaeological significance and notes that '*the temporary construction compound will result in the disturbance of known archaeological features and deposits'* and will result in '*the encroachment on recorded monuments for the construction of a temporary construction compound*.'

Test trenching was conducted along the Mullagharlin Road, Haynestown, Co. Louth by Donald Murphy of Archaeological Consultancy Services Unit Ltd. (ACSU) between the 31st of July to 8th August 2023 (licence no. 23E0452), the summary of which is included in Appendix 13.

The above comments from the Department of Housing, Local Government and Heritage / National Monuments Service have been addressed where relevant to the Site within Chapter 13 – Cultural Heritage.

2.5.1.3 Inland Fisheries Ireland

In email correspondence dated 1st March 2024, Inland Fisheries Ireland noted that '*We understand that treated wastewaters on site will be discharged to sewer and surface water will be discharged to the storm water network'* and based on this their observation are '*limited to a recommendation that suitable mitigation measures are put in place at commencement of site works to ensure no poor quality discharges to the storm water network.'*

2.5.1.4 Transport Infrastructure Ireland

In an email correspondence dated 1st March 2024, Transport Infrastructure Ireland provided the following relevant information for preparation of EIAR (refer to Appendix 2 for full correspondence):

'With respect to EIAR scoping issues, the recommendations indicated below provide only general guidance for the preparation of an EIAR, which may affect the national road network.

- *Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes.*
- *TII would be specifically concerned with potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development, including the potential delivery route of components.*
- *It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment (TTA) be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads.*
- *In relation to national roads, TII's Traffic and Transport Assessment Guidelines (2014) should be referred to in relation to proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the NRA/TII TTA Guidelines which addresses requirements for sub-threshold TTA.*
- *Any improvements required to facilitate development should be identified. It will be the responsibility of the developer to pay for the costs of any improvements to national roads to facilitate the private development proposed as TII will not be responsible for such costs.*

- *EIAR shall include provision for travel planning/mobility management planning in the interests of protecting national road capacity and in the interests of sustainable travel policy during and after construction. Transport analysis should also consider:*

  a. *A mobility management plan should accompany the transport assessment,*

  b. *Modal share targets should be outlined and how any PT modal share is accommodated,*

  c. *Measures proposed to reduce car dependency should be outlined including during construction,*

  d. *Detailed phasing proposals of development with associated transport infrastructure provision are required,*

  e. *Consider and address cumulative impacts of other development and impacts on limited national road capacity,*

  f. *The traffic and transport assessment should consider all road users,*

  g. *Mitigation measures should be aligned with the phasing of road infrastructure improvements and required public transport interventions; all clearly outlined.*

- *Assessments, design and construction and maintenance standards and guidance are available at TII Publications. In particular, the developer is advised to address the requirements for a Road Safety Audit (RSA).*

- *The developer, in conducting an Environmental Impact Assessment, should have regard to TII Environment Guidelines that deal with assessment and mitigation measures for varied environmental factors and occurrences, in particular:*

  i. *TII's Environmental Assessment and Construction Guidelines, including the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority, 2006),*

  ii. *The EIAR should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and how the development will affect future action plans by the relevant competent authority as well as the Guidelines for the Treatment of Noise and Vibration in National Road Schemes (1st Rev., National Roads Authority, 2004)).*

- *The developer is advised that any additional works/structures required because of the Assessment should be funded by the developer. TII will entertain no future claims in respect of impacts (e.g. noise, dust, visual and air), due to the presence of the existing road or any road scheme.*

- *Any proposals related to future public transport provision are a matter for the NTA.*

- *Any Greenway and National Cycle Network Plan (NCN) proposals in the vicinity of the proposal or haul route, consultation with the local authority internal project and/or design staff is recommended.'*

Full details are presented in Appendix 2. All relevant comments have been addressed within Chapter 10 – Traffic.

2.5.1.5 Uisce Éireann

In an email correspondence dated 13th March 2024, Uisce Éireann provided the following relevant information for preparation of EIAR (refer to Appendix 2 for full correspondence):

- *At present, Uisce Éireann does not have the capacity to advise on the scoping of individual projects. However, in general the following aspects of Water Services should be considered in the scope of an EIA where relevant;*

  a) *Where the development proposal has the potential to impact an Uisce Éireann Drinking Water Source(s), the applicant shall provide details of measures to be taken to ensure that there will be no negative impact to Uisce Éireann's Drinking Water Source(s) during the construction and operational phases of the development. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified as part of the report.*

  b) *Where the development proposes the backfilling of materials, the applicant is required to include a waste sampling strategy to ensure the material is inert.*

  c) *Mitigations should be proposed for any potential negative impacts on any water source(s) which may be in proximity and included in the environmental management plan and incident response.*

  d) *Any and all potential impacts on the nearby reservoir as public water supply water source(s) are assessed, including any impact on hydrogeology and any groundwater/ surface water interactions.*

  e) *Impacts of the development on the capacity of water services (i.e. do existing water services have the capacity to cater for the new development). This is confirmed by Uisce Éireann in the form of a Confirmation of Feasibility (COF). If a development requires a connection to either a public water supply or sewage collection system, the developer is advised to submit a Pre-Connection Enquiry (PCE) enquiry to Uisce Éireann to determine the feasibility of connection to the Uisce Éireann network.*

  f) *The applicant shall identify any upgrading of water services infrastructure that would be required to accommodate the proposed development.*

  g) *In relation to a development that would discharge trade effluent – any upstream treatment or attenuation of discharges required prior to discharging to an Uisce Éireann collection network.*

  h) *In relation to the management of surface water; the potential impact of surface water discharges to combined sewer networks and potential measures to minimise and or / stop surface waters from combined sewers.*

  i) *Any physical impact on Uisce Éireann assets – reservoir, drinking water source, treatment works, pipes, pumping stations, discharges outfalls etc. including any relocation of assets.*

  j) *When considering a development proposal, the applicant is advised to determine the location of public water services assets, possible connection points from the applicant's site / lands to the public network and any drinking water abstraction catchments to ensure these are included and fully assessed in any pre-planning proposals. Details, where known, can be obtained by emailing an Ordnance Survey map identifying the proposed location of the applicant's intended development to datarequests@water.ie*

k) *Other indicators or methodologies for identifying infrastructure located within the applicant's lands are the presence of registered wayleave agreements, visible manholes, vent stacks, valve chambers, marker posts etc. within the proposed site.*

l) *Any potential impacts on the assimilative capacity of receiving waters in relation to Uisce Éireann discharge outfalls including changes in dispersion / circulation characterises. Hydrological / hydrogeological pathways between the applicant's site and receiving waters should be identified within the report.*

m) *Any potential impact on the contributing catchment of water sources either in terms of water abstraction for the development (and resultant potential impact on the capacity of the source) or the potential of the development to influence / present a risk to the quality of the water abstracted by Uisce Éireann for public supply should be identified within the report.*

n) *Where a development proposes to connect to an Uisce Éireann network and that network either abstracts water from or discharges wastewater to a "protected"/ sensitive area, consideration as to whether the integrity of the site / conservation objectives of the site would be compromised should be identified within the report.*

o) *Uisce Éireann does not permit building over of its assets. As an applicant you are required to;*

- *survey the site to determine the exact location of the assets. Any trial investigations should be carried out with the agreement and in the presence of Uisce Éireann.*

- *Provide evidence of separation distances between the existing Uisce Éireann assets and proposed structures, other services, trees, etc. have to be in accordance with the Irish Water Codes of Practice and Standard Details.*

p) *Where a diversion of Public Infrastructure may be required subject to layout proposal of the development and separation distances, the applicant is required to submit a Diversions Enquiry to diversions@water.ie*

q) *Mitigation measures in relation to any of the above ensuring a zero risk to any Uisce Éireann drinking water sources (Surface and Ground water).*

Full details are presented in Appendix 2. All relevant comments have been addressed within Chapter 11 -Water.

2.5.1.6 Other correspondence received

The following consultees responded with automated receipt notifications or noted that they had no comments, queries, or observations at this time:

- Fáilte Ireland via. email dated 21st February 2024;
- Irish Wildlife Trust via. email dated 21st February 2024; and,
- Health and Safety Authority via. letter dated 20th February 2024

A copy of all correspondence is presented in Appendix 2.

2.5.1.7 Louth County Council (LCC)

In addition, a Pre-Application Consultation Meeting was held with Louth County Council with AtkinsRéalis and WuXi Biologics personnel. The meeting was held via TEAMs on 8th December 2023, ref. PP 23/273, with the Louth County Council planner, Brian Brooks, who indicated that the principle of the Proposed Development was acceptable.

All observations, where relevant, from the Louth County Council pre-application consultation meeting have been addressed within this EIAR and the accompanying AA Screening Report.

2.6 Risk of Major Accidents and / or Disasters

This section describes the risk of major accidents and disasters on the Proposed Development, and the risk of the Proposed Development in creating a new source of a major accident. This includes vulnerability of the Proposed Development to natural disasters or a major accident from on and off-site sources, existing and future sources of hazards taking account of existing assessments under other regimes where applicable. Further potential effects on air, climate, noise emissions, soil, natural heritage, water, visual and traffic are addressed in relevant chapters of the EIAR.

A Construction Environmental Management Plan (CEMP) (Murphys, 2024) will be submitted as part of this planning application. This document will be added to by the Contractor and will list all environmental mitigation measures that will be implemented by all site personnel during the construction of this development, including the appointment of an Environmental Manager during the construction phase.

The Environmental Manager will be responsible for the preparation of an Environmental Incident Emergency Response Plan which should be made available to all relevant site staff. Typically, emergency procedures would include contact details of key personnel in local authorities and statutory authorities including the National Parks and Wildlife Services (NPWS), Inland Fisheries Ireland (IFI), LCC and the Environmental Protection Agency (EPA).

The Proposed Development will tie into the existing WuXi Biologics IED Facility (P1122-01)[3] and will be treating the wastewater from this facility. This facility is subject to an IED licence (P1122-01) which sets out in detail the conditions under which WuXi Biologics can operate and manage the facility. There are monitoring schedules for emission to air, emission to sewer and noise emissions within the IED Licence, where all monitoring must be carried out as per the schedule C of the P1122-01 licence and reports are submitted to the EPA Leap Online portal. It also lists what the licensee needs to do in the event of an incident.

The existing WuXi Biologics IED Facility (P1122-01), has an Accident Prevention Procedure in place that addresses the hazards on-site, particularly in relation to the prevention of accidents with a possible impact on the environment. The IED facility has an Emergency Responses Procedure in place that addresses any emergency situation which may originate on the IED facility. This procedure includes provision for minimising the effects of any emergency on the environment. The Emergency Response Procedure will be updated to include the Proposed Development. An IE licence review with the EPA will be necessary.

[3] Note – WuXi Biologics have been in contact with EPA in relation to the proposed development. EPA have informed WuXi Biologics that a review of the current IED EPA licence (P1122-01) will be required.[4] It is noted on CSO (2024) that Dundalk Rural (Louth) ED was one ED in 2011 and 2016, but has been divided into 2no. EDs in the 2022 census; Dundalk Rural (South) and Dundalk Rural (North). For purposes of comparison, both EDs have been combined for 2022 data.

A hazard identification (HazID) study was carried out for the Proposed Development on the preliminary design to provide inputs into the project development decisions and to uncover and identify hazards. The purpose of the HazID was to determine the adverse effects of exposure to a hazard while also providing suggestions for mitigating risks. The HazID study for the Proposed Development identified hazards and put actions in place to design out the hazard. One example of a deviation as part of the HazID was the extended site security, the action was *finalise the construction stage arrangement to safely allow the construction personnel segregated access to the construction site via the existing facility (e.g. shuttle bus, segregated pedestrian footpath along the haul road).* A Hazard and Operability (HAZOP) study will be undertaken as part of the detailed design. The HAZOP is a form of risk management to identify, evaluate, and control hazards and risks in complex processes.

2.6.1 Potential Sources of Offsite Hazards

Two offsite (i.e. beyond the site boundary) hazards exist. These include 2no. Environmental Protection Agency (EPA) licenced facilities as follows:

- Wuxi Vaccines Ireland Limited (P1146-01) which is located ca. 140m north of the Proposed Development and is licenced for the production of pharmaceutical products including intermediates. This facility provides drug substance manufacturing capability, material and product storage, and laboratory areas for quality control testing and technical support. It is a contract manufacturing installation capable of producing 45 million doses of vaccine per annum; and,

- Xerox (Europe) Limited (P0508-02) which is located ca. 1.3km northeast of the Proposed Development within Xerox Technology Park and is licenced for the powder coating manufacture with a capacity to produce at least 50 tonnes per year and the manufacture of inks where the production capacity exceeds 1,000 litres per week.

These 2no. facilities are subjected to an EPA licence that contain strict conditions on how their activities must operate to protect the environment from pollution that might otherwise arise. The EPA Act, 1992 specifically prohibits the EPA from granting a licence if emissions from the activity would cause pollution.

There are no Lower or Upper Tier Seveso site within 10km of the Proposed Development.

Therefore, the potential risk posed by a major accident and/or disaster has been considered within the EIAR in accordance with the requirements of the relevant guidelines (EPA *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'*, 2022).

3. Consideration of Reasonable Alternatives

3.1 Introduction

This Chapter outlines the alternatives considered to meet the identified requirements outlined in Chapter 1 – Introduction and Methodology, of this EIAR.

The requirement to consider alternatives in an EIAR is set out in Article 5(1)(d) of EIA Directive (2014/52/EU). Annex IV (2) of the Directive provides for the information required in relation to reasonable alternatives as follows:

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

3.2 Assessment Methodology

3.2.1 Types of Alternatives

The EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022) (hereafter referred to as 'the EPA Guidelines') outlines different types of alternatives that should be considered in an EIAR. These include: a 'do nothing' scenario; alternative processes and alternative locations (where feasible); alternative layouts; alternative designs; and alternative mitigation measures.

The approach adopted for this assessment was first to identify reasonable alternatives to all elements of the Proposed Development, then to consider the impact of these alternatives (if any) on the environmental factors used in this EIAR. Where an impact was identified, this effect was compared with the anticipated effect of the 'Proposed Development' on this topic/area.

An indication for the preferred option chosen, taking into account the requirements of the EIA Directive and the effects of the project on the environment and including a comparison of their environmental effects is presented in the flowing sections. As the EPA notes: "It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each option. A detailed assessment (or 'mini-EIA') of each alternative is not required."

3.2.2 Limitations and Assumptions

The degree to which it is possible to assess alternatives depends on the amount of information available for each alternative. Alternatives discarded at an early stage of the design process necessarily will not have the same level of information as is available for the Proposed Development.

3.3 Consideration of Reasonable Alternatives

3.3.1 Alternative Location

Potential locations for the Effluent Balancing and Resource Recovery project were examined, and 2no. options were presented during the optioneering stage.

- Alternative Location Option 1: Land adjacent to the WuXi Biologics facility (P1122-01). This land is not owned by WuXi Biologics. Refer to Figure 3.1.

- Alternative Location Option 2: The Proposed Development to be located to the west of the existing WuXi Biologics facility (P1122-01) within WuXi Biologics land ownership.

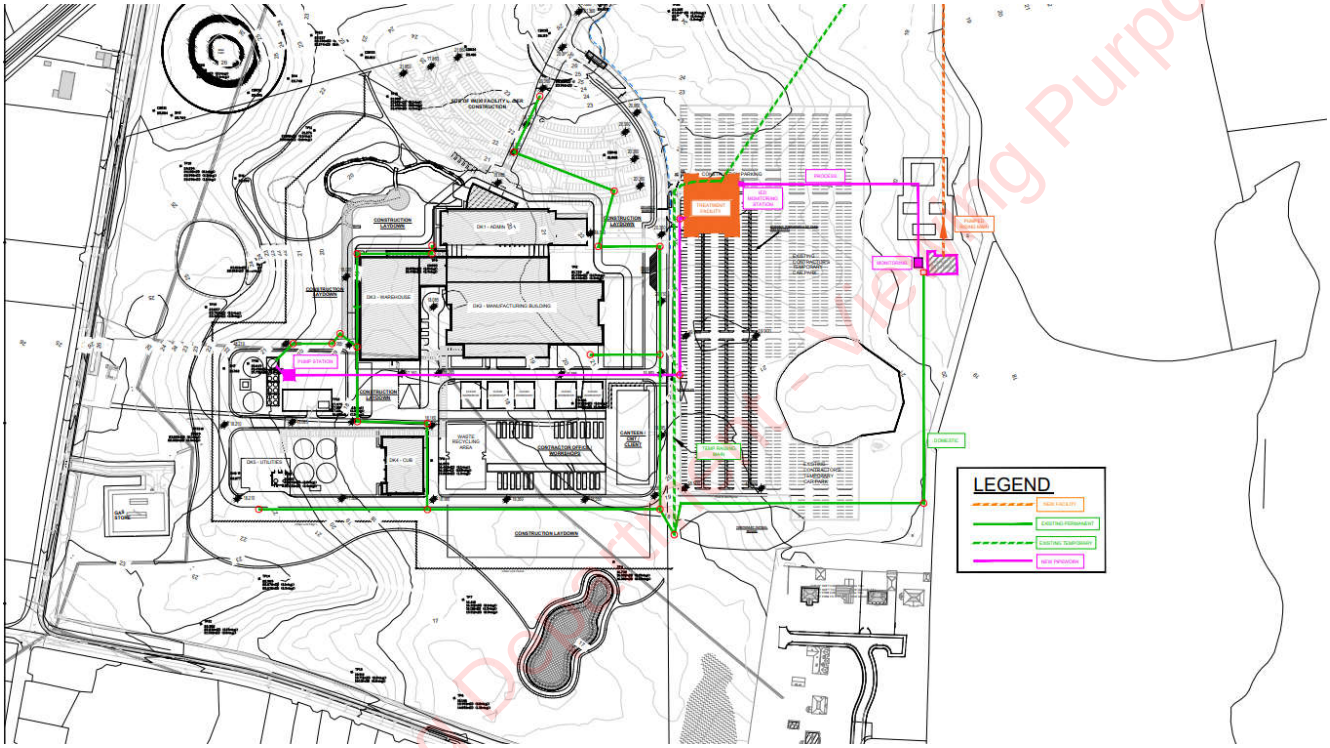


Figure 3.1 - Alternative Location Option 1

The alternative location option 2 was chosen as the location for the Proposed Development. The alternative location option 1 has been considered as part of this EIAR and the outcome for environmental topics are summarised below.

Population and Human Health

This option would have a more significant environmental effect on the receiving human health environment, due to the close proximity to residential properties to the south and also this location is not within the existing WuXi Biologics Facility land ownership which is subject to an EPA IED Licence (P1122-01).

Landscape & Visual

This option would have a more significant environmental effect on landscape character and visual amenity due to the proximity to residential properties to the south.

Noise & Vibration

This option would have a more significant environmental effect on noise and vibration due to the proximity to residential properties to the south.

Land, Soils and Geology

This option would have no likely significant effect on land, soil and geology, as the location is within an area of hardstanding.

Cultural Heritage

This option would have no likely significant effect on cultural heritage.

Biodiversity

This option would have no likely significant effect on biodiversity.

Traffic & Transport

This option would have no likely significant effect on traffic.

Air Quality and Climate.

This option would have a more significant environmental effect on air quality, due to the significant distance from the IED discharge point would result in high energy costs for wastewater transportation, which would result in an increase in greenhouse gas emissions.

Material Assets (Waste)

This option would have a more significant environmental effect on material assets (waste), as the area is hardstanding.

Material Assets (Built Services)

This option would have a more significant environmental effect on material assets (built services), due to the significant distance from the IED discharge point would result in high energy costs for wastewater transportation, which would result increased utilities services.

Water

This option would have had no likely significant effect on water.

Major Accidents & Disasters

There would be little difference in this scenario based on the findings of this assessment.

After a thorough design review, alternative location for option 1 were determined unsuitable also due to the following engineering and economic factors:

- Cost and Energy Implications: Its significant distance from the IED discharge point would necessitate extensive, costly infrastructure and result in high energy costs for wastewater transportation;
- Expansion Constraints: Potential interference with future campus expansion plans;
- Ownership: The land is not owned by WuXi Biologics, creating ownership complications; and,
- Containment Requirements: Increased need for containment infrastructure.

3.3.2 Design Iterations

3no. design iterations were presented during the design stage:

The first design iteration was a concept design located to the west of the existing WuXi Biologics facility. Refer to Figure 3.2. This concept design solution was informed by the User Requirements Specification (URS) and direct communication with plant personnel. From the initial concept design further iterations of the design was undertaken each incrementally improving on the initial concept to achieve the core design principles.

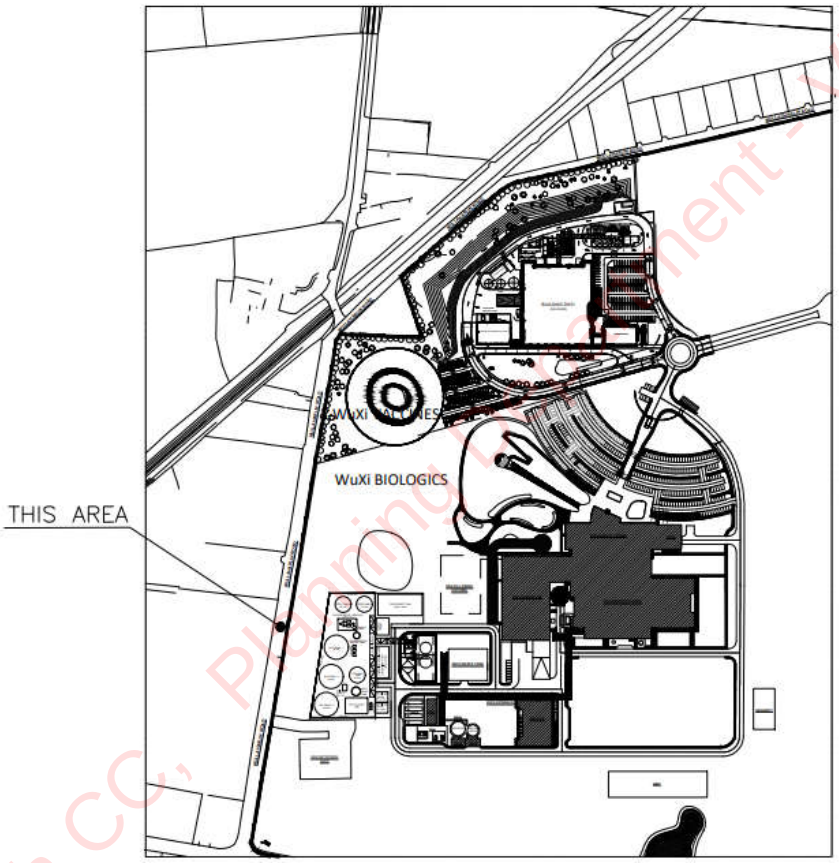


Figure 3.2 - First Design Iteration

Second Design Iteration

The designer first design for the Proposed Development was for the provision of a 4,000m³ flow balancing capacity tank upstream of primary and secondary treatment. This would allow the operator to control the waste transferred to treatment. It allows peaks (or troughs) in flow, pH, load, nutrients etc to be balanced in the first instance. This will minimise chemical usage and enable the operator to provide the most consistent forward feed characteristics. The design is based on reusing one of the existing flow balance tanks as an initial Feed Tank of 650m³, followed by 4no. 1,000m³ Balance Tanks and 2no. 500m³ Off Spec Tanks. Flow to and from the tanks is controlled using actuated valves. This allows the operator significant flexibility, when balancing flows, to ensure a consistent feed downstream. Any or all of the cells in the Balance Tank may receive flow and separately forward feed pumps may draw from any or all balance tanks. Good pH control is critical to the success of the downstream treatment processes. The preliminary design includes for a two-stage pH correction. Chemical dosing to the feed tank will be used to limit the range of pH sent forward. This has benefits, both in terms of equipment protection but also in allowing a more consistent feed for fine pH correction. The provision of up to 4,000m³ of flow balancing allows an element of self-correction of pH and will further assist in ensuring the waste presented to the fine pH correction does not undulate widely over the course of the day. Fine pH control will be provided using chemical dosing to two static mixers, upstream of primary treatment. The provision of the Off Spec Tanks provides the operator with a significant tool to protect downstream treatment from sudden shocks and/or toxic or inhibitory substances. This is a key tool for the operator and successful operation will depend on collaboration with the WuXi operation team and careful monitoring of waste streams. It provides significant benefit to WuXi, by protecting the biological plant, while also facilitating the disposal of some materials. Where appropriate, off spec waste can be drip fed back to the process, without impacting on final effluent quality. The provision of a post primary balance tank gives the operator a location which can be used to:

- Sample and assess the waste being fed to biological treatment; and,
- Facilitate supplementary dosing of nutrients or P removal chemicals.

This flexibility is required to ensure that regardless of the influent waste characteristics, the feed to the biological stream has the necessary nutrients to ensure a healthy biomass and successful treatment. Where possible, treatment processes have been provided with bypass facilities. This is to allow the operator to optimise the process and cater for the requirements of the waste stream. For example, a bypass is provided for the primary treatment stream. This may be used where the influent characteristics are such that the full influent load is required to maintain the biomass in the activated sludge plant. Providing the operator with maximum flexibility is key to maintaining final effluent quality under the widest range of conditions. Layout schematics for Option 2 is presented in Figure 3.3.

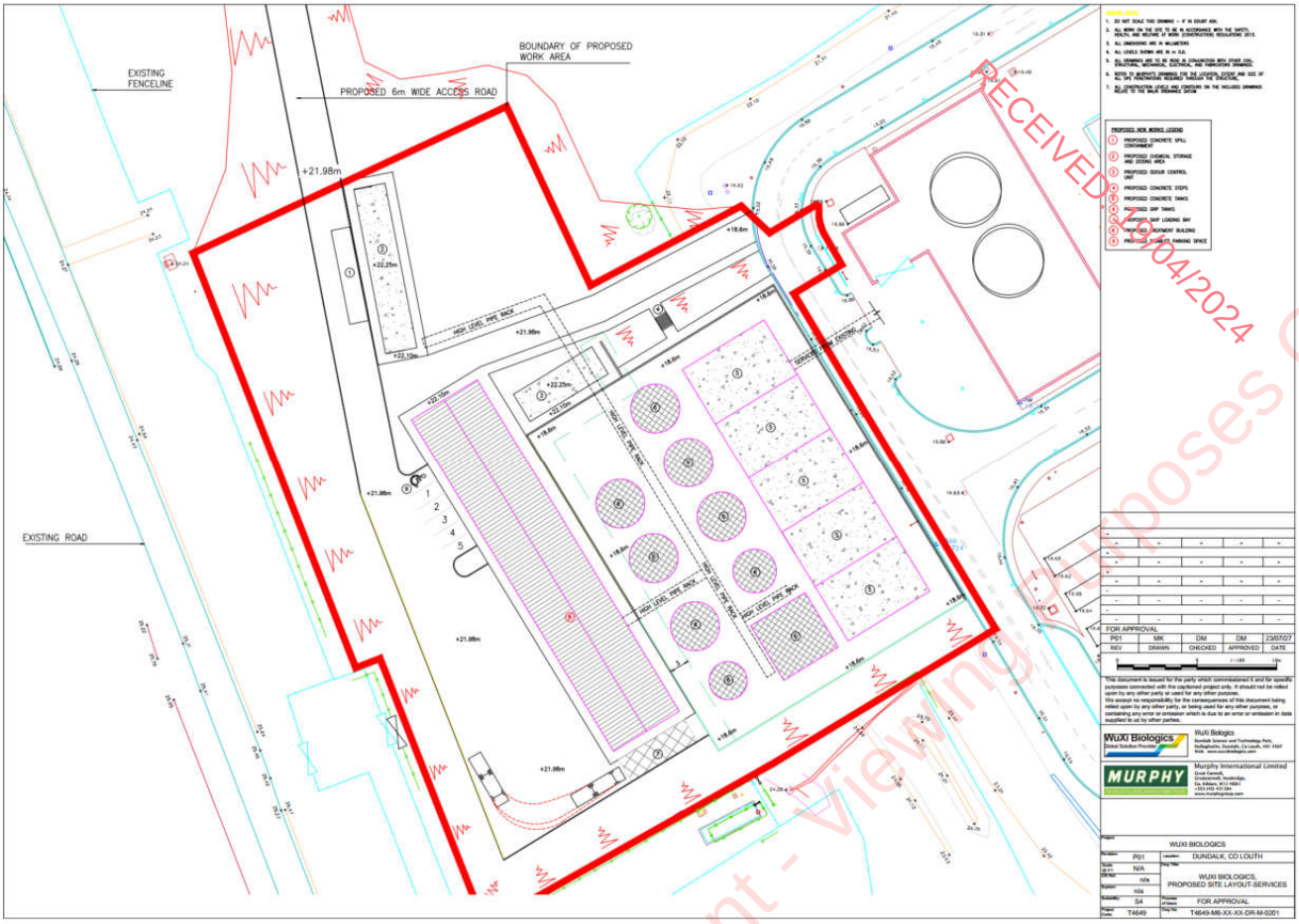


Figure 3.3 – Second Design Iteration

The preferred solution was the third design iteration, which is presented in Chapter 2. This second design iteration has been considered as part of this EIAR and the outcome for environmental topics are summarised below.

Population and Human Health

This option would have a more significant environmental effect on the receiving human health environment, as the construction traffic would be utilising the existing Mullagharlin road and would have a negative effect on population and human health and air quality, and increasing greenhouse gas emissions within the atmosphere.

Landscape & Visual

This option would have no likely significant effect on landscape character or visual amenity.

Noise & Vibration

This option would have a more significant environmental effect on the noise and vibration, as the construction traffic would be utilising the existing Mullagharlin road and would increase the baseline noise conditions within the surrounding area.

Land & Soils

This option would have a potential less effect due to the reduction of the footprint hence a decrease in waste soils generated, as this design would ultimately have involved less construction, therefore a reduction in materials use/ waste generation etc.

Cultural Heritage

There would have no difference in this scenario as the Proposed Development will not have any effect on cultural heritage.

Biodiversity

There would be no difference in this scenario as the Proposed Development site is located within an existing facility and is of low ecological value.

Traffic & Transport

This option would have a more significant environmental effect on traffic and transport as this design does not include a temporary haul through the WuXi Biologics facility hence there would be included construction traffic volume within the local roads.

Air Quality

This option would have a greater potential for air quality effects, as this design would ultimately have involved construction traffic volume adjacent residential properties which would decrease the air quality and increase greenhouse gases.

Material Assets (Waste)

This option would have less potential for waste soils generation, as this design would ultimately have involved less construction and associated materials use/ waste generation etc.

Material Assets (Built Services)

This option would have a no effect on built services impact.

Water

This option would have a less potential for water quality impacts, as this design would ultimately have involved less construction.

Major Accidents & Disasters

There would be little difference in this scenario based on the findings of this assessment.

3.3.3 Do Nothing Scenario

Do-nothing scenario would result in the subject lands remaining undeveloped. The supporting rationale for the Proposed Development is provided in Section 1.8. Doing nothing has therefore been rejected as an alternative.

Notwithstanding this, the environmental effects of doing nothing have been assessed as part of this EIAR and the outcome for all environmental topics are summarised below.

Population and Human Health

The site is located within WuXi Biologics lands. The 'do-nothing' scenario will have a long-term moderate adverse effect (with regards to Population and Human Health) on WuXi staff and people within the surrounding area.

The Site is zoned 'Business and Technology' in the County Development Plan and the Site of the Proposed Development is within the ownership of WuXi. The proposed increase in manufacture at the Site requires the installation of the treatment system and is necessary for the company, and to ensure compliance with their IED Licence. A 'Do Nothing' scenario would adversely impact on the commercial success of the company and the employment and social benefits for the local area would not be realised.

Biodiversity

In the absence of development, in the short-term it is assumed that the proposed development site will remain as predominantly grassland bordered by treelines and the 'Do-Nothing' effect is likely to be continued semi-natural habitat on the Proposed Development site. The potential value of the proposed development site to species such as nesting birds, foraging mammals (e.g. hares, hedgehog) and commuting bats would continue, provided that the linear landscape features (treelines) would not be lost due to other forms of development.

Currently, the proposed development site is not under any significant threats and there are no apparent threats to the fauna that may utilise the land, such as hares and nesting birds.

Should no development be undertaken on the proposed development site it could be expected that these species would remain.

Landscape & Visual

Were the Proposed Development not to proceed it is expected that the existing lands within the site limits would remain under grassland cover and continue to be managed as part of the overall site's ongoing landscaping maintenance. Thus, not alternating the existing landscape and visual baseline.

Noise & Vibration

The existing noise climate will remain unchanged on site and at nearby noise sensitive locations, site will remain operational and in compliance with EPA licence noise limits.

Land & Soils

The Site is located within Wuxi Biologics lands. In the 'do-nothing' scenario the existing site will not be changed. The do-nothing scenario will have a neutral and imperceptible effect on the Site with regards to land, soils and geology.

Cultural Heritage

The 'do-nothing' scenario seeks to describe the consequences that are reasonably likely to occur without the proposed development. If the Proposed Development was not to proceed, no potential impact to the Archaeological, Architectural or Cultural Heritage would occur.

Traffic & Transport

No construction traffic would be generated.

Air Quality

There will be no change in air quality impacts if no change takes place. In the absence of the development proposal, the air quality is unlikely to change.

Material Assets (Waste)

The disposal of excavation and other construction wastes associated with the Proposed Development would not occur. There will likely be significant effects regarding waste under the 'Do-Nothing' scenario as the current flow of and concentration of the waters arising from the production processes on site (P1122-01) is variable and could limit the potential treatment capacity of the sewer system due to this variability. UÉ has indicated that there is insufficient headroom in the Dundalk WwTP (in accordance with the wastewater discharge licence D0053-01) to treat the expected loads arising from the facility due to both capacity issues and an inability to accommodate fluctuations in loading. To maintain production capacity, the current pre-treatment capacity will need to be increased, as will effluent balancing/storage to ensure that the site maintains compliance with proposed end user agreement effluent limits.

Material Assets (Built Services)

The material assets assessment assumes that under the 'Do-Nothing' scenario the Proposed Development would not be developed. Thus, there would be a neutral effect on built assets within the vicinity of the Proposed Development. There will be no likely significant effects regarding built services under the 'Do-Nothing' scenario. The environmental effects of this are negligible.

Water

The 'Do-nothing' scenario describes the circumstances where no development occurs. The baseline environment is unlikely to change in the absence of the development as there will be no impact on hydrological or hydrogeological features on the site. Therefore, there will be no impact on the receiving water environments if the 'Do-nothing' scenario is followed.

Major Accidents & Disasters

There would be no difference in the 'do nothing' scenario as the proposed development will not have any effect with regards to major accidents and disasters.

4. Population and Human Health

4.1 Introduction

This chapter assesses the likely significant effects of the Proposed Development on the Population and Human Health setting in the general area of the Proposed Development at the existing WuXi Biologics facility in Dundalk, Co. Louth. This assessment addresses the potential effects (both direct and indirect likely significant effects) of the construction and operation of the Proposed Development on Population and Human Health. A more complete description of the Proposed Development is presented in Chapter 2 – Project Description.

This chapter considers demographics, economic activity, tourism and recreation, community and amenities and human health.

This chapter has been prepared by AtkinsRéalis.

4.2 Legislation, Policy, Guidance

The following legislation, policy and guidance are relevant to this chapter and were considered during the assessment process:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports, Environmental Protection Agency (EPA), 2022 highlights the amendments to Article 3(1) of amended European Union (EU) Environmental Impact Assessment (EIA) Directive 2011/92/EU as amended by Directive 2014/52/EU (the "EIA Directive") which states that:

  "The environmental impact assessment shall identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a project on the following factors: a) population and human health; […]"

- The Guidelines on the Information to be contained in Environmental Impact Assessment Reports, hereafter referred to as the EPA Guidelines 2022 state that: *'in an EIAR, 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 this EIAR e.g. under the environmental factors of air, water, soil etc'*

- Moreover, Annex IV, paragraph 5(d) of the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) requires an EIAR to contain:

  "A description of the likely significant effects of the project on the environment resulting from, inter alia, "the risks to human health"

- When outlining the scope of environmental factors covered by the EIA Directive within Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017), "population and human health" is defined as follows:

  "*Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of 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. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population."

- Planning and Development Regulations 2001-2023.
- Planning and Development Act, 2000, as amended 2017 (S.I. No. 20 of 2017), 2018 (S.I. No. 16 of 2018), 2020 (S.I. No. 92 of 2020), 2021 (S.I. No. 18 of 2021) and 2022 (S.I. No. 75 of 2022).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018).

The following publications and data sources were consulted in the preparation of this Chapter:

- IEMA (2022) Effective Scoping of Human Health in Environmental Impact Assessment;
- IEMA (2022) Determining Significance for Human Health in Environmental Impact Assessment;
- Central Statistics Office (CSO) data website (2011, 2016 data and 2022 results) (www.cso.ie);
- Department of Education data website (www.education.ie/en/find-a-school);
- Louth County Development Plan (2021-2027);
- Eastern and Midlands Regional Assembly Regional Spatial and Economic Strategy (2019 -2031);
- Failte Ireland (www.failteireland.ie);
- Google Street Mapping;
- Health Service Executive data website (www.hse.ie); and,
- Project Ireland 2040 - National Planning Framework.

All data sources were consulted the week commencing 26th February 2024 except where otherwise stated.

4.3 Assessment Methodology

This Population and Human Health Assessment has been undertaken in accordance with relevant Environmental Protection Agency's (EPA) Guidance, as follows:

- Assessment of baseline, including identification and assessment of receiving environment and relevant receptors;
- Identification of environmental design and mitigation measures included in the construction methodology;
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance;
- Consideration of mitigation measures; and,

- Assessment of residual effects.

Where relevant, assessment findings have been incorporated from the following chapters:

- Air Quality (Chapter 7);
- Noise and Vibration (Chapter 8);
- Traffic (Chapter 9);
- Land, Soils and Geology (Chapter 10); and,
- Water (including Hydrology and Hydrogeology) (Chapter 11).

4.3.1 Limitation and Assumptions

There are no limitations to the assessment of potential effects on Population and Human Health presented in this chapter.

4.4 Receiving Environment

The Proposed Development is located at the existing WuXi Biologics facility in Dundalk, Co. Louth. The site is located within Louth County Council (LCC) and entirely on land owned by WuXi Biologics. The proposed site is located within a greenfield site adjacent to the existing WuXi Biologics IED Facility (Ref. No. P1122-01). Refer to Figure 4.1 for the site location and surrounding residential and commercial/industrial properties. Refer to Figure 10.5 within the Chapter 10 – Soils, Geology and Land, for the EPA licenced facilities and discharges in the regional vicinity of the Site (EPA, 2024). The site is bounded to the north and east by the existing WuXi Biologics IED Facility, to the west by Mullagharlin road, residential dwellings and agricultural land and to the south by Marlbog Road, residential dwellings and agricultural land. The site lies ca. 480m east of the M1.

A review of the Louth County Development Plan 2021-2027 shows that the Proposed Development and much of the land surrounding the Proposed Development is land-use zoned as '*Business and Technology'*. The land to the south of the proposed development is zoned as '*Existing Residential'*, '*Open Space', 'Agriculture'* and *'Strategic Reserve'* while the area north of the proposed development is zoned as *'Existing Residential'*.

For this chapter, the assessment of the receiving environment has been conducted with regard to the location of the site and has been assessed on a national, regional and local level.

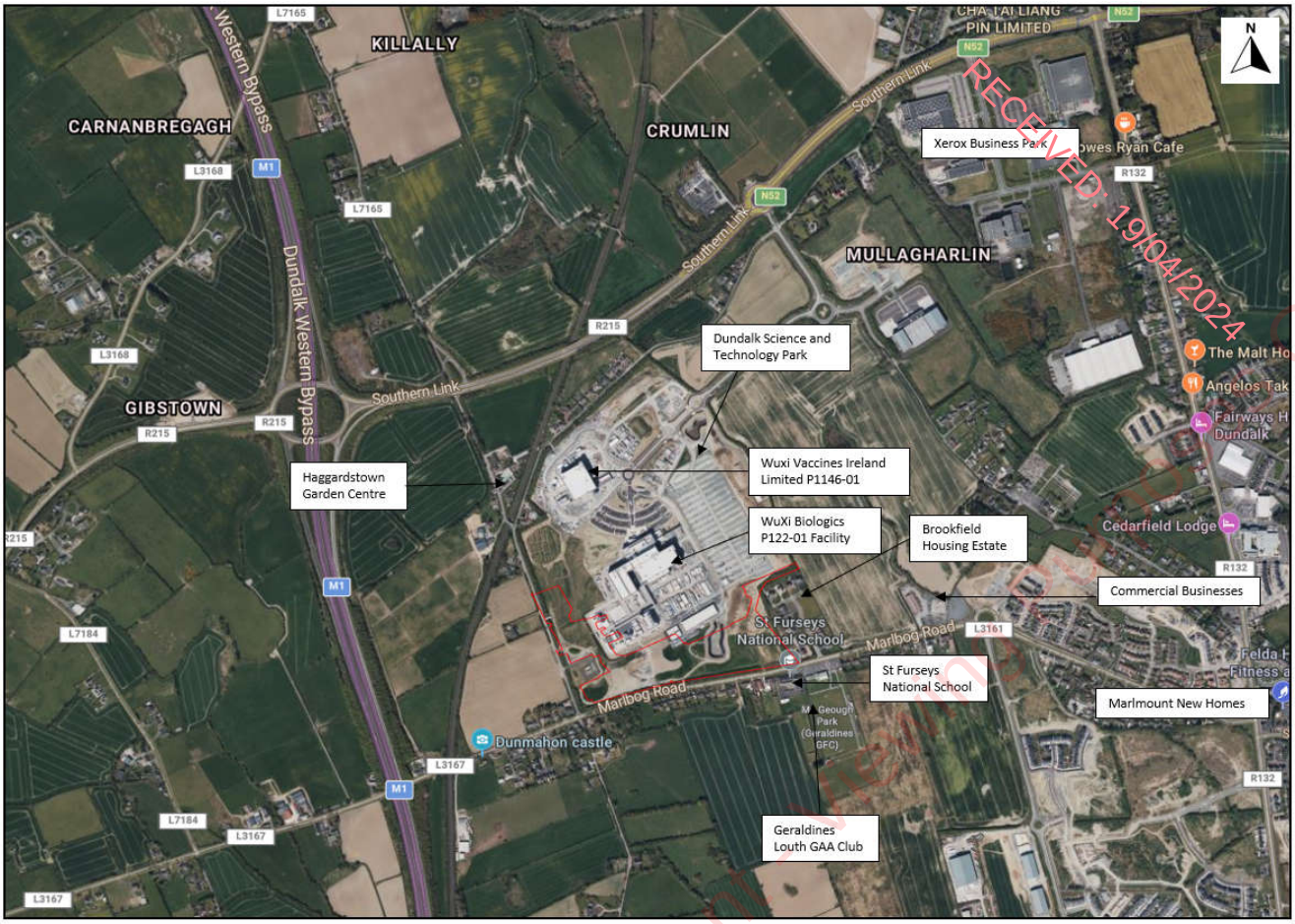


Figure 4.1 - Infrastructure in the vicinity of the Proposed Development

4.4.1 Demographic Profile

The most recent Census of Population was undertaken in April 2022, with previous data dating from 2016. 2022 CSO data indicates that the national population increased by ca. 8% since 2016 to 5,149,139. Demographic trends are analysed at national, regional and local levels for the purposes of the EIAR. Electoral Divisions (ED) which are wholly or partially included within the site were examined. In this regard the site falls within two ED's; Haggardstown ED and Dundalk Rural (South) ED.

Given the nature of the Proposed Development it is considered the key areas associated with the site are the 'Local Area' (comprised of Haggardstown and Dundalk Rural (South) EDs) and the County Area (consisting of Louth). Population growth within the state, County Louth, and Haggardstown and Dundalk Rural (South) EDs are shown in Table 4-1 for the 2011 – 2022 period.

Table 4-1 Population Growth 2011-2022

Area	2011	2016	2022	% Change 2011 - 2022
State	4,581,269	4,761,865	5,149,139	+12.4%
County Louth	122,897	128,884	139,703	+13.7%
Haggardstown ED	6,390	6,932	9,301	+45.5%
Dundalk Rural ED4	18,160	19,265	21,293	+17.3%

Source: cso.ie

There has been a consistently high level of population growth within the state, County Louth, Haggardstown ED and Dundalk Rural EDs over this period, with this growth anticipated to continue in the future. There has also been significant population growth in County Louth with a growth of 13.7%, higher than the overall national population growth of 12.4%.

The CSO has a Small Area Population Statistics which are statistics produced for a range of geographical levels from State to Small Areas[5]. The Proposed Development is located within Small Areas: A147025025, which has a total population of 273 (CSO, 2022).

4.4.2 Economic Profile

The 2022 Census of Population was examined to determine trends in relation to employment including the number of persons at work, unemployment levels and the sectoral composition of the population, based upon principal economic status.

Table 4-2 shows the overall unemployment rate as measured by the responses from the 2011, 2016 and 2022 Census. The unemployment rate is calculated by adding the number of persons unemployed to first time job seekers, and then dividing the total by the overall labour force (i.e., total amount of unemployed persons and employed persons).

The unemployment rate across the state and County Louth has decreased significantly between 2011 and 2022. The largest decrease occurred in County Louth where the unemployment rate decreased by 12.5%, from 23.8% in 2011 to 10.9% in 2022.

More recent data on employment is provided in the CSO Labour Force Survey published quarterly. This shows that in Q4-2023 the national unemployment rate was 4.5%[6].

[4] It is noted on CSO (2024) that Dundalk Rural (Louth) ED was one ED in 2011 and 2016, but has been divided into 2no. EDs in the 2022 census; Dundalk Rural (South) and Dundalk Rural (North). For purposes of comparison, both EDs have been combined for 2022 data.

[5] https://visual.cso.ie/?body=entity/ima/cop/2022&boundary=C04172V04943&guid=4c07d11e-06d6-851d-e053-ca3ca8c0ca7f

[6] https://www.cso.ie/en/releasesandpublications/ep/p-lfs/labourforcesurveyquarter42023/labourforce/

Table 4-2: Principal Economic Status (Profile) 2011-2022

	State 2011	State 2016	State 2022	Louth 2011	Louth 2016	Louth 2022
At work	1,807,360	2,006,641	2,320,297	44,232	50,317	59,140
Looking for First Regular Job	34,166	31,434	34,526	1,067	1,145	2,654
Unemployed or given up on Previous Job	390,677	265,962	176,76	12,725	8,913	12,573
Overall Unemployed	424,843	297,396	210,802	13,792	10,058	15,227
Labour Force	2,232,203	2,304,037	2,531,099	58,024	60,375	74,367
Unemployment Rate (%)	19.0%	11.5%	8.3%	23.8%	16.7%	10.9%

Source: cso.ie (2022)

From the Small Area Population Statistics, the main occupations in the A147025025 small area are professional occupations, followed by managers, directors and seniors officials, and skilled trades occupations (CSO, 2022).

4.4.2.1Employment Opportunities in the Surrounding Area

Opportunities for employment exists within the surrounding area, with a range of services including:

- **Tourism**
  - Fairways Hotel.
  - Geraldines Louth GAA Club; and,
  - Number of B & Bs in the surrounding area.

Commercial

- Meath Farm Machinery Ltd Dundalk; and,
- Haggardstown Garden Centre.

Industrial

- Dundalk Science and Technology Park;
- WuXi Vaccines Ireland Limited (site code: P1146-01);
- Xerox (Europe) Limited (site code: P0508-02);
- Macardle Moore & Co. Limited, t/a Dundalk Packaging (site code: P0441-01);
- Diageo Ireland Limited t/a The Great Northern Brewery (site code: P0440-01);
- Great Northern Distillery Limited (site code: P0996-01);
- O'Hanlon and Sons Contractors Limited (site code: P1007-01);

- Oxigen Environmental (Coes Road) (site code: W0144-01); and,
- Dundalk landfill & civic waste facility – Dundalk Town Council (site code: W034-02).

4.4.2.2Existing Employment

The Proposed Development will enable production at the plant to increase and continue to support local employment and the local economy.

4.4.3 Community

The Proposed Development is located within lands which have been zoned in the Louth County Development Plan as 'Business and Technology'. The existing facility has been in operation since 2021. It is envisaged that the Proposed Development will result in the employment of ca. 50no. people during construction and 5no. people during operation. This would result in a significant benefit for the local community.

4.4.4 Human Health

Overall life expectancy and self-assessed health statistics are included below.

The Department of Health's report 'Health in Ireland Key Trends 2023' provides statistical analysis on health in Ireland over the last ten years. Chapters 1 and 2 of the report deal specifically with life expectancy and health. According to this report the average life expectancy trends are as follows:

- Life expectancy for women (continual upward trend since 1996): 84 years
- Life expectancy for men (continual trend since 2006): 81 years

It is also noted in the report that the gap between male and female life expectancy has continued to narrow over the last decade. An upward trend is evident in the life expectancy of older age groups reflecting decreasing mortality rates from major diseases. Older Irish people's life expectancy (65 years of age) to be lived in good health, is higher for both men and women compared with the EU average.

The report also states that *"Ireland has the highest self-perceived health status in the EU, with 80.0% of people rating their health as good or very good"*. Overall population health at the national level shows decreasing mortality and a rise in life expectancy over the last ten years. The health in Ireland report also goes on to state, "*age-standardised mortality rates have declined for all causes over the past decade by 10.3%."*

According to the most recently published data from the CSO 2022, 81.6% of people in Co. Louth reported that their health was 'good' and 'very good', while 3% reported themselves in 'bad' or 'very bad' health.

As stated above the Proposed Development is within the Small Areas: A147025025[7]. Under the category 'Disability, Carers and General Health', it states that 57no. persons have a disability and population by general health is recorded as follows: 142no. very good, 97no. good health and 20no. fair health, 3no. bad, 3no. very bad and 8no. not stated.

[7] https://visual.cso.ie/?body=entity/ima/cop/2022&boundary=C04172V04943&guid=4c07d11e-06d6-851d-e053-ca3ca8c0ca7f

4.4.5 Safety

WuXi operates under health and safety requirements, and they have an ISO 45001 Health and Safety Standard and Environmental Management Standard - ISO 14001. The company operates to health and safety standards. A Health and Safety Plan will be prepared by the Contractor for the construction of the Proposed Development. The company is licenced by the Environmental Protection Agency and is required to have a Site Emergency Plan in place, as a condition of their licence. Emergency systems, like fire alarms are checked weekly and emergency escape drills are carried out frequently.

4.5 Future Receiving Environment

The aforementioned baseline for public health is unlikely to change significantly from that outlined in Section 4.4 of this EIAR. The full description of the development is described in Chapter 2 – Project Description.

The population growth (both in terms of demographic profile and employment) is expected to continually increase Nationally and in Co. Louth, which will necessitate the need for the proposed development at WuXi Biologics Facility.

4.6 Likely Significant Effects on Population and Human Health during the Construction Phase

This section examines the potential effects of the Proposed Development on Population and Human Health during construction and operation. Details on specific effects are provided in different chapters of this EIAR for example, traffic, noise, and air quality etc. The potential construction likely significant effects on human health are described in Table 4-3. AtkinsRéalis use the source – pathway – receptor model to identify potential impacts on humans. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

Table 4-3 -Potential Likely Significant Effects to Human Health during Construction

Source	Pathway	Receptor	Significant of Effect
Visual Impact during construction	Visual	Residential receptors within the surrounding area.	This is discussed in Chapter 6 - Landscape and Visual.
Dust generation during construction	Air	Air quality and odour sensitive receptors in the Industrial Estate, residential areas, and surrounding area.	This is discussed in Chapter 7 – Air Quality.
Emissions generated from construction vehicles and machinery	Air	Air quality and odour sensitive receptors in the Industrial Estate, residential areas, and surrounding area.	This is discussed in Chapter 7 -Air Quality.

Noise generated during construction	Air	Noise sensitive receptors in the Industrial Estate, residential areas, and surrounding area.	This is discussed in Chapter 8 – Noise and Vibration.
Noise generated from construction traffic	Air	Noise sensitive receptors in the Industrial Estate, residential areas, and surrounding area.	This is discussed in Chapter 8 – Noise and Vibration.
Soil contamination during construction	Direct contact, ingestion or inhalation of contaminated soils	Direct health effect to sensitive receptors – construction works etc.	This is discussed in Chapter 10 – Land, Soils and Geology.
Soil removal and earth works	Surface water runoff	Surface water and Groundwater	This is discussed in Chapter 11 – Water.
Surface or Groundwater Impact during construction	Contaminated water impact to sensitive receptors	Surface water and Groundwater.	Discussed in Chapter 11 – Water.

The minor demolition phase and construction phase of the Proposed Development will lead to temporary increases in traffic, noise and vibration, dust generation and visual impact within the site and the general vicinity. There will be no effects to existing connections or amenities because of the construction works associated with the Proposed Development, provided the proposed mitigation measures are implemented. No significant effects on populations are predicted, and any likely effects will be short term in nature, as determined by the assessments included in the aforementioned chapters. Further details of the construction phase are discussed in Chapter 6 – Landscape and Visual, Chapter 7: Air Quality, Chapter 8: Noise and Vibration, Chapter 9: Traffic, Chapter 10: Land, Soils and Geology and Chapter 11 - Water. As a result, the proposed development will result in temporary construction related Population and Human Health effects (minor adverse), but mitigation measures will be applied.

4.7 Likely Significant Effects on Population and Human Health during Operational Phase

The potential likely significant effects on human health during operations are described in Table 4-4. It identifies the potential source of the effect; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential effect.

Table 4-4 -Likely Significant Effects on Population and Human Health during Operation

Source	Pathway	Receptor	Significant of Effect
Modified Land Use	Visual	Residential receptors within the surrounding area.	This is discussed in Chapter 6 - Landscape and Visual.
Visual Impact from Operation phrase	Visual	Residential receptors within the surrounding area.	This is discussed in Chapter 6 - Landscape and Visual.
Air Quality Impact from Operation	Air	Air quality and odour sensitive receptors in the Industrial Estate, residential areas, and surrounding area.	This is discussed in Chapter 7 -Air Quality.
Odour Impact from Operation phase	Air	Air quality and odour sensitive receptors in the Industrial Estate, residential areas, and surrounding area.	This is discussed in Chapter 7 -Air Quality.
Noise from Operation	Air	Noise sensitive receptors in the Industrial Estate, residential areas, and surrounding area.	This is discussed in Chapter 8 – Noise and Vibration.

4.8 Cumulative Effects

The Proposed Development will not have any significant negative effects on population and human health and it is considered that the mitigation measures and monitoring requirements outlined in regard to the other environmental topics will ensure that the Proposed Development is unlikely to result in any significant cumulative effects in relation to population and human health.

4.9 Mitigation and Monitoring

The Proposed Development will have minor adverse effects during the construction and operation phases on population and human health as stated above in Table 4-3 and Table 4-4. However, mitigation measures as presented within the relevant technical chapters (Chapter 7 - Air Quality; Chapter 8 – Noise and Vibration; Chapter 10 – Land, Soils and Geology; and Chapter 11 – Water) and Chapter 16 - Schedule of Commitments, will be implemented as part of the proposed development.

4.10 Do Nothing Scenario

The Site is zoned 'Business and Technology' in the County Development Plan and the Site of the Proposed Development is within the ownership of WuXi. The proposed increase in manufacture at the Site requires the installation of the treatment system and is necessary for the company, and to ensure compliance with their IED Licence. A 'Do Nothing' scenario would adversely impact on the commercial success of the company and the employment and social benefits for the local area would not be realised.

4.11 Residual Effects

All construction phase activities are temporary in nature. No significant adverse residual effects are likely during the construction and demolition phases, and the operational phase of the proposed development.

4.11 Difficulties encountered during preparation of this chapter

No difficulties were encountered during preparation of this chapter.

5. Biodiversity

5.1 Introduction

The following chapter outlines the baseline conditions for biodiversity within the Proposed Development site and assesses potential impacts associated with the Proposed Development from an ecological perspective. The identification of ecological constraints associated with the Proposed Development involved a combination of desk study, field surveys and collated information to identify ecologically significant areas and features within the project site and within the zone of influence of the development site.

Details of baseline ecological conditions and information on the key ecological features of interest found within and around the Proposed Development site has been collated with specific consideration given to statutorily designated sites, habitats and species of conservation value.

A list of the key ecological features found within the Proposed Development site was compiled and an indication as to the likely value of each feature was determined in a geographical context. Collated ecological information was used to undertake an assessment of potential ecological impacts which have been used to inform key aspects of the Proposed Development such as ecological mitigation measures with the intention of avoiding significant effects on European sites, sites of conservation value and protected habitats and species.

This chapter was prepared by AtkinsRéalis.

5.2 Methodology

This assessment has been undertaken in accordance with and has regard to the following relevant guidelines, legislation, policies and plans:

- EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Local Government and Heritage, 2018);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009);
- Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018; 2022 reprint);
- Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017);
- A Guide to Habitats in Ireland. The Heritage Council. The Heritage Council (Fossitt, 2000);
- Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council, Church Lane, Kilkenny, Ireland (Smith et al., 2011);
- European Commission (EC) Habitats Directive 92/43/EEC;

- European Commission (EC) Birds Directive 2009/147/EC;
- European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended);
- Flora (Protection) Order, 2022;
- Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification), as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014;
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018);
- The Wildlife Act, 1976 (as amended);
- The Planning and Development Act, 2000 (as amended);
- Third National Biodiversity Action Plan 2017 – 2021 (Department of Culture, Heritage and the Gaeltacht, 2017);
- Louth Local Biodiversity Action Plan 2021-2026;
- Planning for Watercourses in the Urban Environment. Inland Fisheries Ireland 2020; and,
- All-Ireland Pollinator Plan 2021-2025. National Biodiversity Data Centre.

The methodology used to evaluate the ecological value and baseline ecological environment, and to prepare this impact assessment is outlined as follows.

5.2.1 Desk Study

The locations of conservation sites, protected species occurrences and areas of ecological interest were reviewed in context of the Site using online sources such as Google Earth, Google maps[8] and Bing maps[9] (last accessed on 26/02/2024).

Sources of data including; published reports, records, datasets and on-line mapping, which were used to collate and compile information of ecological features of interest and importance within and around the proposed development site include:

- National Parks and Wildlife Service (NPWS) webpage / data;
    - Information on sites designated for nature conservation, including spatial data (NPWS);
    - Habitats and species data;
    - Wildfowl Sanctuaries; and,

[8] https://www.google.ie/maps

[9] http://www.bing.com/maps/

- Red List of Terrestrial Mammals (Marnell *et al*, 2019).

- National Biodiversity Data Centre (NBDC)
  - Protected species records; and,
  - Invasive species records.
- Environmental Protection Agency
  - Watercourses and lake spatial files;
  - Water quality data; and,
  - Corine land cover data.
- Geological Survey of Ireland
  - Underlying geology, soils and hydrogeology.
- Ordnance Survey Ireland (OSi) mapping and aerial photographs.
- OSi Historic mapping.
- Birdwatch Ireland
  - Bird count data from the Irish Wetland Bird Survey (I-WeBS); and,
  - Birds of Conservation Concern in Ireland (Gilbert *et al*. 2021).
- Bat Conservation Ireland
  - Bat monitoring data.
- Wetland Survey Ireland
  - Information on identified wetland habitats within the study area.
- Inland Fisheries Ireland (IFI) - Eastern River Basin District River Surveys.[10]

5.2.2 Ecological Field Surveys

The Proposed Development site was subject to a multidisciplinary ecological walkover by AtkinsRéalis Ecologist Daniel Blake on the 1st of August 2023. The site walkover survey informed the scope of this assessment. Surveys were undertaken within the proposed development site and its surrounding treelines.

During the walkover surveys the Proposed Development site was evaluated for the presence of and suitability for birds, mammals, amphibians and insect groups such as lepidoptera and hymenoptera. Incidental sightings of

[10] http://wfdfish.ie/index.php/category/river-surveys-2017/

species were noted during the walkover survey to further evaluate the importance of the proposed development site to flora and fauna in line with the approach set out in the *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018, 2022 reprint).

Site survey evidence is presented in this report. Site surveys were undertaken within seasonally appropriate windows, within suitable weather conditions and full access to the site was available. There were no limitations posed which would influence the site surveys. The site surveys are considered sufficient to assess the predominant habitats and ecological feature of interest within the proposed development site.

5.2.3 Zone of Influence

The 'zone of influence' for a development is the area over which ecological features may be subject to significant effects because of the Proposed Development and associated activities. This is likely to extend beyond the proposed development site, for example where there are ecological or hydrological links beyond the proposed development site boundaries. The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change (CIEEM, 2018, 2022 reprint).

It follows that given the nature of the Proposed Development at the WuXi Biologics facility , the zone of influence will be limited to the proposed development site and immediate environs as well as areas connected via hydrological and hydrogeological pathways (surface or ground water) and landscape features such as hedgerows, treelines and watercourses.

Determining the potential for impacts and the zone of influence is based on the source-pathway-receptor chain principle and involves assessing likely significant effects on ecological receptors within the zone of influence in relation to three pathways:

- Surface water;
- Groundwater; and,
- Land and Air.

5.2.4 Evaluation of Ecological Receptors

Ecological features can be important for a variety of reasons. Importance may relate, for example, to the quality or extent of the site or habitats found within, or the rarity of the habitat and / or species, the extent to which such habitats and / or species are threatened throughout their range, or to their rate of decline[11].

The importance of an ecological feature was considered within a defined geographical context. The frame of reference used to determine ecological value relied on known and published accounts of the feature's ecological importance, rarity and distribution combined with professional judgement.

The following geographic frame of reference was used for evaluating the importance of ecological features within the Site:

[11] NRA's *Guidelines for Ecological Impact Assessment of National Road Schemes* (NRA, 2009), *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland* (CIEEM, 2018, 2022 reprint).

- International importance;
- National importance;
- County importance;
- Local importance (higher value); and,
- Local importance (lower value).

The geographical context for determining the value of ecological receptors followed recommendations as outlined in the *Guidelines for Assessment of Ecological Impacts of National Roads Scheme* (NRA, 2009). This methodology is consistent with the *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018, 2022 reprint).

5.2.5 Determining Ecological Significant Effects

CIEEM (2022) defines an ecologically significant impact as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographic area.

The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified (2022). The significance of predicted effects has been assessed in line with *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009) and best scientific knowledge in the field. The evaluation of significant effects should always be based on the best available scientific evidence. If sufficient information is not available, further survey or additional research may be required. In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EIAR.

5.2.6 Mitigation and Overall Residual Ecological Effect

Where significant effects have been identified, the mitigation hierarchy has been followed, as outlined in the 2018 CIEEM EcIA Guidelines and 2022 reprint EPA Guidelines, which set out a sequential approach of avoidance of impacts where possible, application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures at source and project level have been applied, along with any necessary compensation measures, and opportunities for enhancement incorporated, residual impacts have then been identified.

Overall residual, or mitigated, ecological effects are assessed by taking account of any expected beneficial ecological effects and those measures which have been integrated within the development proposals in order to avoid, eliminate or reduce the significance of ecological impacts (and any further recommended measures which have a high probability of successful implementation). The following widely accepted strategy for mitigation (Chapter 6 of the CIEEM Guidelines) has been employed (see Table 5-1).

Table 5-1 - Approach to Mitigation

Avoidance	**Where viable, the project has been re-designed to significant negative ecological effects.**
Elimination	Where possible and feasible, measures which eliminate adverse ecological effects are employed.
Reduction	Measures intended to reduce the significance of adverse ecological effects are employed where options for avoidance or elimination have been exhausted or are deemed to be impractical.
Compensation	Where adverse ecological effects cannot be avoided or eliminated or reduced in significance to an acceptable level, consideration is given to compensating for significant negative effects.
Remediation	Where adverse ecological effects are unavoidable, consideration is given to undertaking limiting remedial works.
Enhancement	Consideration is given to providing opportunities for ecological improvement, enhancement and the realisation of beneficial ecological effects.

5.2.7 Uncertainty in Assessment

In Impact Assessment, uncertainty is associated with both the prediction and assessment of environmental effects. The precautionary principle, a central feature of environmental legislation, planning policy and professional guidance, provides a mechanism for managing uncertainty in ecological assessment – the precautionary principle requires that where there is a lack of full scientific certainty, the protection of the environment is prioritised.

Where confidence or uncertainty is expressed, an objectively defined scale, as detailed in Table 5-2[12] is employed. Decisions as to confidence in predictions are necessarily based primarily on expert judgement.

Table 5-2 - Confidence & Uncertainty

Confidence Level	**Details**
Certain	Probability estimated at 95% chance or higher.
Probable	Probability estimated at above 50% but below 95%.
Unlikely	Probability estimated at above 5% but below 50%.
Extremely Unlikely	Probability estimated at less than 5%.

[12] The confidence levels employed were originally set out in an earlier (2006) version of the CIEEM guidelines, have been adapted and reproduced in several other guidance documents since then, and are widely applied and accepted in Ecological Impact Assessment.

5.2.8 Appropriate Assessment (AA)

An Appropriate Assessment (AA) Screening Report was prepared with respect to the Proposed Development (AtkinsRéalis 2024, Document ref: 100085897DG0002) and is included in Appendix 5. The purpose of an AA is to assess the implications of the proposed development for European sites / Natura 2000 sites. An AA considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any necessary mitigation measures.

5.2.9 Difficulties Encountered in Completion of this Chapter

No difficulties were encountered in completing survey work to inform this ecological assessment. Habitat surveys and protected and invasive surveys were undertaken during the appropriate times of year.

5.3 Description of Existing Environment

5.3.1 General Description of Existing Environment

The proposed development site is largely greenfield in nature bordered by treelines with areas of amenity grassland present within the central portions of the proposed development site. The proposed development site is bordered on the west and south by public roads and, north and east by the WuXi Biologics facility. Outside of this industrial area the surrounding lands are agricultural in nature. To the northeast of the proposed development site is the town of Dundalk and to the west is the M1 motorway. The proposed development site is ca. 2km west of the coast and is located within the functional area of Louth County Council.

Figure 5.1 below illustrates the redline boundary for the proposed development site.

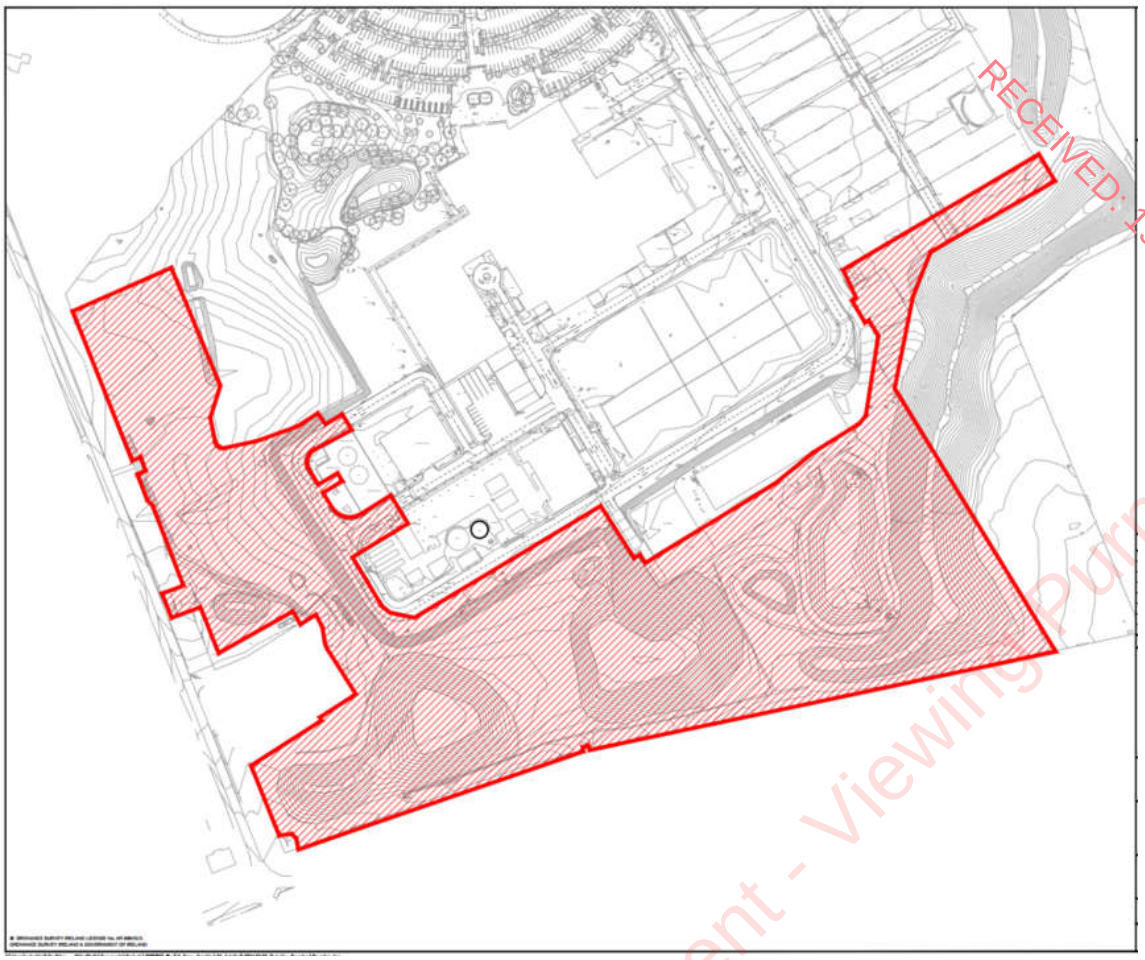


Figure 5.1 – Proposed development site boundary

5.4 Designated Conservation Areas

5.4.1 European Designated Sites

The proposed development site does not lie within any European site. There are 5 no. European sites within the potential ZoI of the proposed development; 3 no. Special Areas of Conservation (SACs) and 2 no. Special Protection Areas (SPAs) for birds, as outlined in Table 5-3 below.

Table 5-3 - European sites with potential ZoI of the proposed development site.

European Site (site code)	Distance from Works
Dundalk Bay SAC (000455)	ca. 2km east
Dundalk Bay SPA (004026)	ca. 2km east
Carlingford Mountain SAC (000453)	ca. 9.9km north east
Stabannan-Braganstown SPA (004091)	Ca. 8.8km south

European Site (site code)	Distance from Works
Slieve Gullion SAC (UK0030277)	ca. 14.1km north

The nearest European sites are Dundalk Bay SAC and Dundalk Bay SPA which are located along the coastline ca. 2km east of the proposed development site.

Dundalk Bay SAC is designated for the conservation of the following habitats within the bay; Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], Perennial vegetation of stony banks [1220], *Salicornia* and other annuals colonising mud and sand [1310], Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] and Mediterranean salt meadows (*Juncetalia maritimi*) [1410].

Dundalk Bay SPA is designated for the conservation of wetland habitats and the following waterbirds; Greylag Goose (*Anser anser*) [A043], Light-bellied Brent Goose (*Branta bernicla hrota*) [A046], Shelduck (*Tadorna tadorna*) [A048], Teal (*Anas crecca*) [A052], Mallard (*Anas platyrhynchos*) [A053], Pintail (*Anas acuta*) [A054], Common Scoter (*Melanitta nigra*) [A065], Red-breasted Merganser (*Mergus serrator*) [A069], Oystercatcher (*Haematopus ostralegus*) [A130], Ringed Plover (*Charadrius hiaticula*) [A137], Golden Plover (*Pluvialis apricaria*) [A140], Grey Plover (*Pluvialis squatarola*) [A141], Lapwing (*Vanellus vanellus*) [A142], Knot (*Calidris canutus*) [A143], Dunlin (*Calidris alpina*) [A149], Black-tailed Godwit (*Limosa limosa*) [A156], Bar-tailed Godwit (*Limosa lapponica*) [A157], Curlew (*Numenius arquata*) [A160], Redshank (*Tringa totanus*) [A162]. Black-headed Gull (*Chroicocephalus ridibundus*) [A179], Common Gull (*Larus canus*) [A182] and Herring Gull (*Larus argentatus*) [A184].

There is no direct connectivity from the proposed development site to Dundalk Bay SAC or Dundalk Bay SPA or any other European site via woodlands, treelines or any other vectors. The proposed development site has no surface water features (i.e. watercourses, drainage ditches) within or bordering its boundaries and during the construction and operational phases of the proposed development there is no connectivity to any watercourse.

The proposed project involves the treatment of effluent from the WuXi Biologics facility (P1122-01). During the operational phase of the proposed development (following the proposed treatment) treated waters will be discharged to the local IDA pumping station, via SE-1 (as per the EPA Licence) which connects to Dundalk Wastewater Treatment Plant (WwTP) (Licence No: D0053-01). Following treatment, treated waters from the WwTP are discharged to Dundalk Bay therefore providing a hydrological link from the project site to Dundalk Bay SAC/SPA.

Surface water drainage from the majority of the proposed development site; i.e. roadways, pathways and buildings outside of the treatment plant area, will connect in the existing surface water drainage network within the WuXi Biologics facility (P1122-01) which includes silt traps, interceptors and attenuation to green field rates. Outfall, from the Wuxi Biologics facility drainage network, is to a public sewer which connects to Dundalk WwTP. There is therefore indirect connectivity from these hardstanding areas within the proposed development site via the existing surface water drainage infrastructure to Dundalk Bay SAC/SPA.

Surface water drainage for the remainder of the project site; i.e. the bunded treatment plant process area, is captured and circulated into the treatment process with eventual discharge (after treatment) to the local foul sewer which connects to Dundalk WwTP. As noted above, treated waters from Dundalk WwTP discharge to Dundalk Bay SAC/SPA.

Dundalk Bay is ca. 2km from the proposed development site and as such is sufficiently remote to negate any potential connectivity via groundwater pathways.

Figures 5.2 and 5.3 depict the locations of the European Sites within the potential ZoI of the proposed development site.

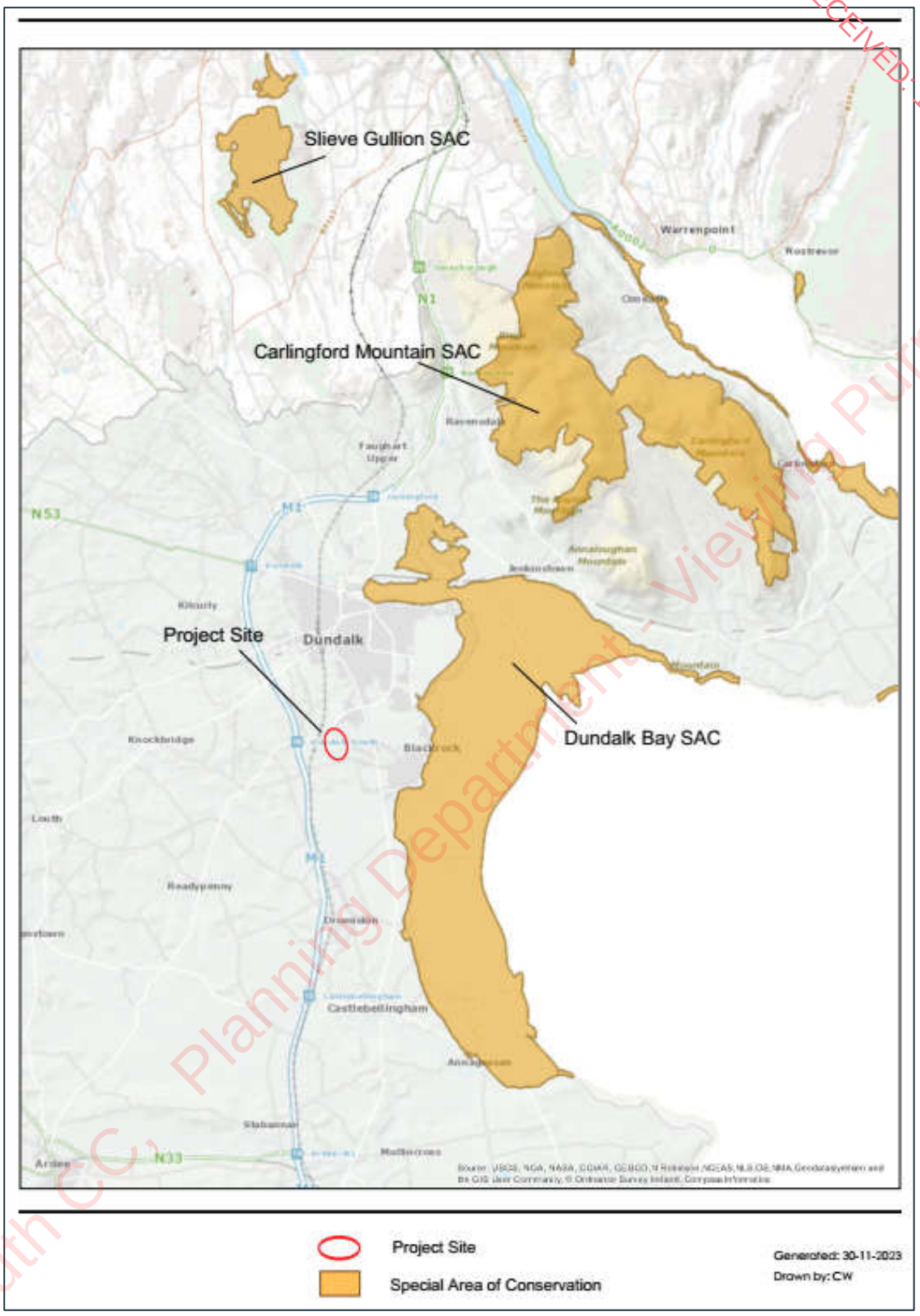


Figure 5.2 - SACs within the ZoI of the Proposed Development

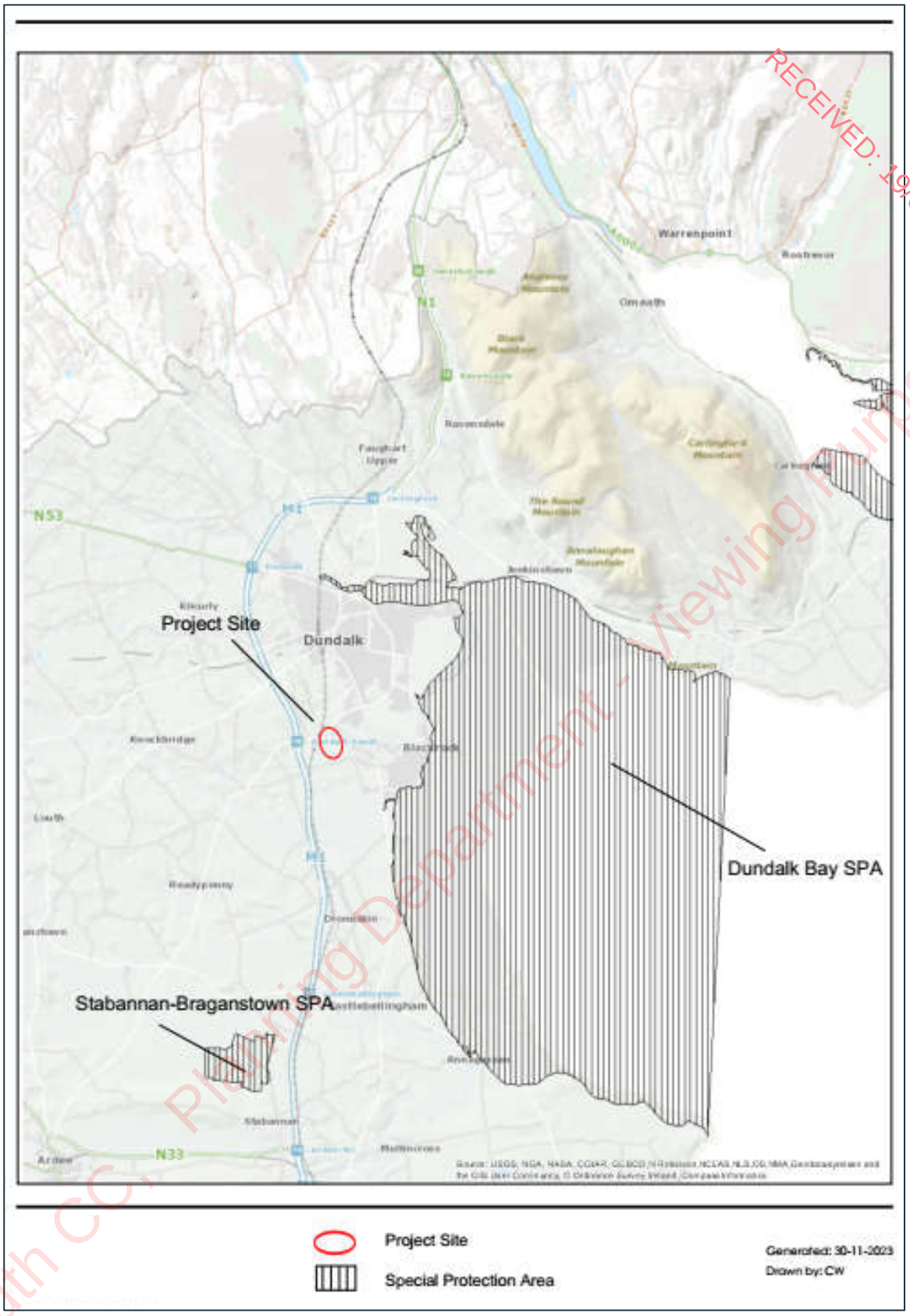


Figure 5.3 - SPAs within the ZOI of the Proposed Development

5.4.2 Natural Heritage Areas

Natural Heritage Areas (NHAs) are nationally designated sites, which are considered important for the habitat, species or geological heritage. NHAs are legally protected under the Wildlife Act, 1976 (as amended). Proposed Natural Heritage Areas (pNHAs) are sites that are of significance for wildlife and habitats, but which have not (as yet) been statutorily designated; however, their ecological value is recognised by Planning and Licencing Authorities.

The Proposed Development does not lie within any NHA or pNHA site.

There are no NHAs within 15km of the Proposed Development site and 6 no. pNHAs located within 15km of the proposed development site as outlined in Table 5-4 below.

Table 5-4 - Proposed Natural Heritage Areas within 15km of the proposed development site.

proposed National Heritage Area (site code)	Distance from project
Dundalk Bay pNHA (000455)	ca. 2km
Stephenstown Pond pNHA (001803)	ca. 2.9km
Darver Castle Woods pNHA (001461)	ca. 5.5km
Drumcah, Toprass and Cortial Loughs pNHA (001462)	ca. 7km
Strabannan Braganstown pNHA (00456)	ca. 7.7km
Louth Hall and Ardee Woods pNHA (001616)	ca. 10.5km

There is no direct connectivity from the project site to Dundalk Bay pNHA or any other pNHA via physical means such as woodlands, treelines or hedgerows.

There is indirect connectivity to Dundalk Bay pNHA from the proposed project site via the surface water drainage infrastructure and foul sewer water network as identified above for Dundalk Bay SAC/SPA. There is no indirect hydrological connectivity to any other pNHA.

Figure 5.4 illustrates the locations of the pNHAs within 15km of the Site.

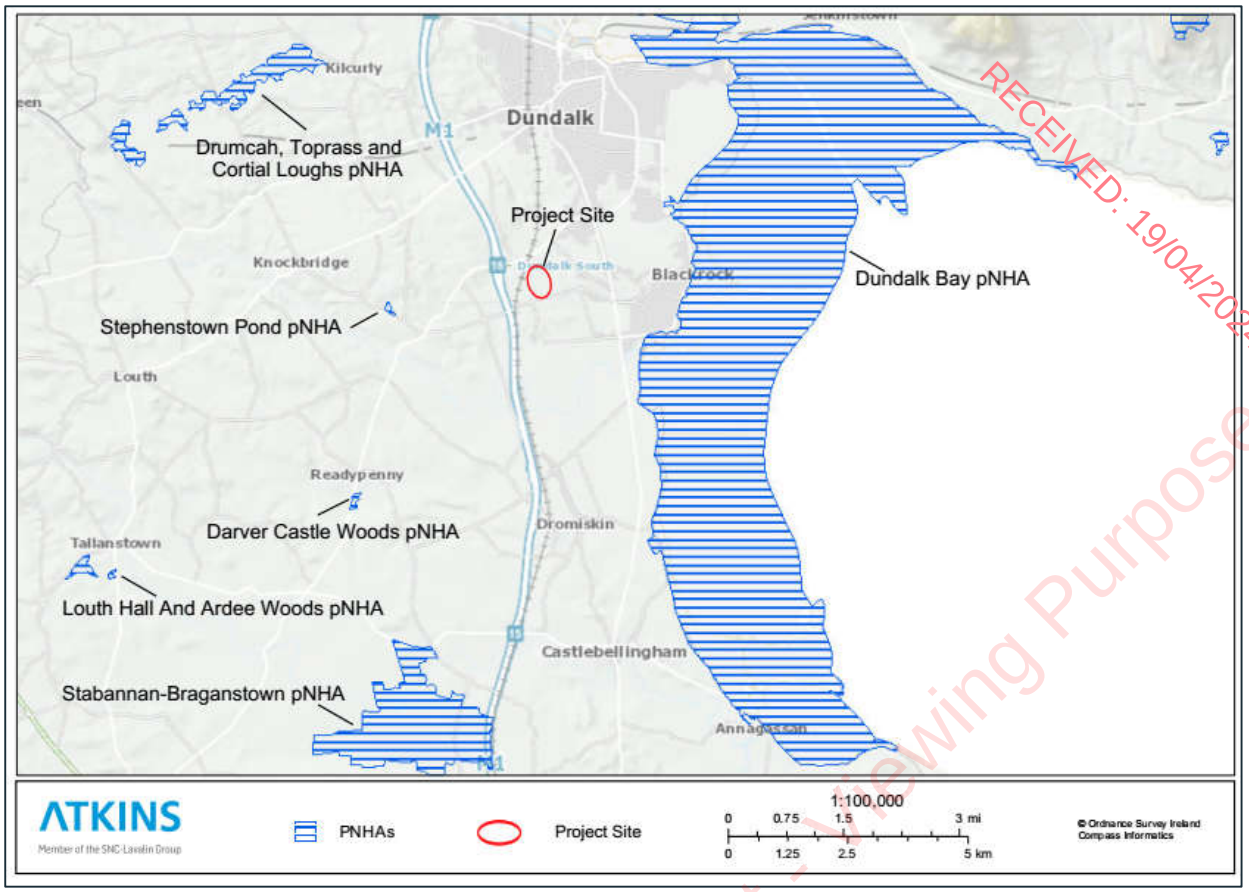


Figure 5.4 - pNHAs within 15km of the Proposed Development site (Map source: NPWS, 2024)

5.5 Surface Water Features

There are no watercourses or surface water features within the proposed development site. The nearest watercourses to the proposed development site are discussed below.

The closest watercourse is the Carnabreagh Stream located ca. 700m west of the proposed development site and is separated from the proposed development site by the physical barrier of the M1 motorway. The Carnabreagh Stream flows into the Tates and Carrans Park Stream which outfalls into the larger watercourse of the Fane River which outfalls to Dundalk Bay. EPA datasets identify the Fane River has a Q-value score of 4 during 2020 which indicates a good water quality.

The Haggardstown River is located ca. 750m east and is separated from the proposed development site by the L3161 Marlbog Road. This river outfalls directly into Dundalk Bay. EPA dataset identify the proposed development site is predominantly within the Haggardstown catchment.

The Haynestown Stream is located ca. 1.1km south of the proposed development site. and is separated from the proposed development site by the L3161 Marlbog Road. This stream is a tributary of the larger Fane River.

Inland Fisheries Ireland (IFI) undertakes surveys along lakes and large order rivers and associated catchments areas throughout Ireland as part of assessments for the Water Framework Directive (WFD). The latest IFI surveys for the River Fane[13] were undertaken in 2018 and details the following; '*The Fane River catchment is located within the Neagh Bann International River Basin District and covers an area of approximately 140 km^2. The Fane River flows in a south-easterly direction through Co. Monaghan, with some of its tributaries flowing from Co. Armagh. The Fane River reaches the sea just south of Dundalk within Dundalk Bay SAC. Ten fish species were recorded at six sites surveyed on the Fane River Catchment in 2018. Brown trout was the most abundant species captured.'* Fish species captured as part of the 2018 survey included; Brown trout (*Salmo trutta*), Eel (*Anguilla anguilla*), Gudgeon (*Gobio gobio*), Lamprey spp., Perch (*Perca fluviatilis*), Pike (*Esox lucius*). Salmon (*Salmo salar*), Stone loach (*Barbatula barbatula*) and Three-spined stickleback (*Gasterosteus aculeatus*).

The surface water features within the vicinity of the proposed development site are illustrated in Figure 5.5 below. Chapter 12 Water details the Water Framework Direct (WFD) water quality status and Risk as identified within EPA datasets.

There is no connectivity from the proposed development site, during either the construction phase or operational phase, to any of the aforementioned watercourses.

[13] http://wfdfish.ie/wp-content/uploads/2019/10/ERBD_Fane_2018-2.pdf

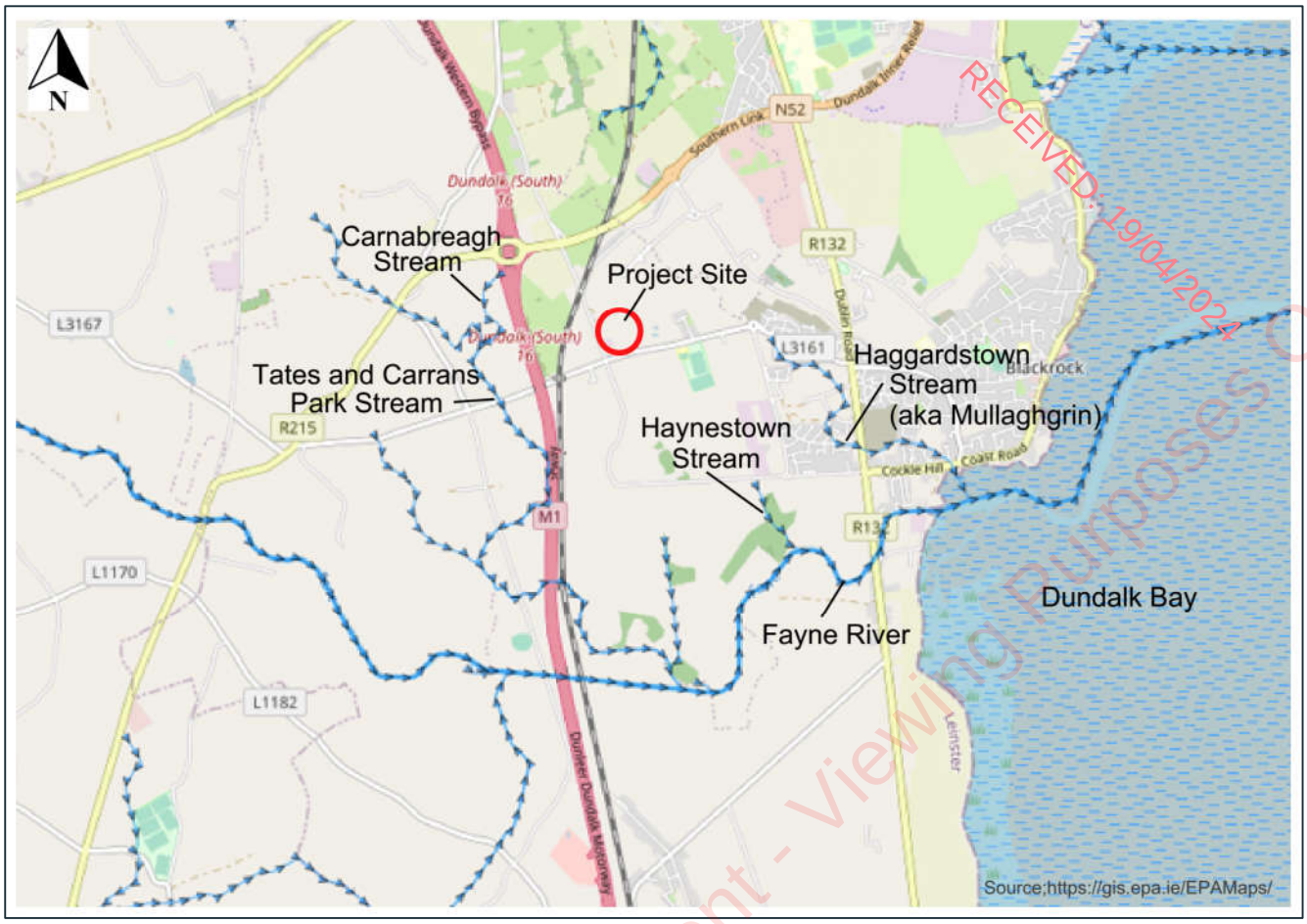


Figure 5.5 - Surface water features within the vicinity of the proposed development site

5.6 Other Known Sites of Ecological Value

There are no National Parks or statutory Nature Reserves within the immediate vicinity of the proposed development site.

Habitats outside of Natura 2000 Sites but which conform to types listed on Annex I to the Habitats Directive were examined using the Article 17[14] reports (2019) and spatial data from the NPWS. There are no Annex I habitats within or in the vicinity of the proposed development site.

A review of wetland sites, as provided by Wetland Survey Ireland datasets[15], did not identify any wetlands within or adjacent to the proposed development site. There are no wetland sites within the proposed development site designated under the Convention on Wetlands, i.e. Ramsar Sites. The nearest Ramsar site to the proposed development site is Dundalk Bay 2km east.

[14] Under Article 17 of the Habitats Directive each member state is obliged to report to the EC every 6 years on the status of the natural habitats and species in the Annexes and on the implementation of the measures taken under the Directive.

[15] http://www.wetlandsurveysireland.com/wetlands/map-of-irish-wetlands--/map-of-irish-wetlands---map/index.html

A review of datasets for the Inventory of Long Established and Ancient Woodlands of Ireland[16], the National Survey of Native Woodlands[17] and aerial imagery did not identify any woodlands within or adjacent to the proposed development site.

Datasets were reviewed of the Irish Semi-natural Grassland Survey 2007-2012, published by Department of Culture, Heritage and the Gaeltacht[18]. A review of survey datasets did not identify any areas of semi-natural grasslands within proposed development site.

A review of Irish Wetland Bird Survey (I-WeBS) datasets did not identify any I-WeBS count sites within or adjacent to the proposed development site. The closest recorded I-WeBS count site is the Fane River Plain count site (code 0Z397) located 2.1km south of the proposed development site, this I-WeBS site may not be subject to regular counting as no bird count data is available. Dundalk Bay is the largest I-WeBS count site (code;0Z472) within the vicinity of the proposed development site and, as detailed for Dundalk Bay SPA, hosts a wide range of wintering waterbirds.

5.7 Desktop Research

5.7.1 Documented Rare and Protected Flora and Fauna

This section of the report outlines species that have been previously recorded within and around the proposed development site. NBDC datasets of rare and protected species records[19] for the OSi 2km grid square; J00L, which covers/encompasses the entire proposed development site, were examined to provide a detailed account of species previously recorded within the proposed development site within the last 10 years (2014-2024).

Birds

Within the OSi 2km grid square J00L no records of bird species listed on Annex I to the Bird Directive were recorded.

No Red or Amber listed bird species on the Birds of Conservation Concern Irelands (BOCCI 4) were recorded in the 2km buffer within the past 10 years.

Badger

Badger (*Meles meles*) is protected under the Wildlife Acts. No records of badger were recorded within the proposed development site or within the 2km grid square of the proposed site according to NBDC datasets (2022).

Bats

All bat species in Ireland are protected under Wildlife Acts and all bats, and their breeding and resting places, are strictly protected under Regulation 51 of the Habitats Regulations (SI No. 477/2011, as amended), pursuant to Article 12 of the Habitats Directive. No records of bats were recorded within the proposed development site or

[16] Perrin, P.M. & Daly, O.H. (2010) A provisional inventory of ancient and long-established woodland in Ireland. *Irish Wildlife Manuals*, No. 46. National Parks & Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

[17] https://maps.biodiversityireland.ie/Map

[18] https://data.gov.ie/dataset/irish-semi-natural-grassland-survey-2007-2012

[19] https://maps.biodiversityireland.ie/Map

within the 2km grid square of the proposed site according to NBDC datasets (2022). A lack of records is not necessarily a indictor of species absence.

Other mammals

One mammal species listed as protected under the Wildlife Acts has been recorded within the 2km buffer of the proposed development site; Hedgehog (*Erinaceus europaeus*).

Flora

The NBDC database and NPWS datasets were consulted to determine the presence of rare plant species and species protected under the Flora (Protection) Order, 2022. There have been no recordings of protected floral species within the immediate vicinity of the proposed development site nor within the lands within the 2km buffer of the site.

There are no records of invasive plant species within the 2km buffer of the proposed development site.

Other Species

Although not within the proposed development site of the proposed development, the following vulnerable[20] insect species have been reported within the wider environs of the Site within the last 10 years: - Dark Green Fritillary (*Argynnis aglaja*), *Andrena* (*Melandrena*) *nigroaenea* and Large Red Tailed Bumble Bee (*Bombus (Melanobombus) lapidarius*).

It must be noted that the under-reporting of a protected and / or invasive species does not indicate its absence but rather that sightings have not been reported on the NBDC database.

5.8 Field Survey Results

5.8.1 Habitats and Flora

The habitats within the proposed development site are illustrated in Figure 5.6 and are individually described and evaluated in the following text. The approach to determining ecological importance of the proposed development site is set out in Section 5.2.4 of this report and is based on CIEEM (2018) guidance.

The following habitats are found within and bordering the proposed development site:

GS2 Dry meadows and grassy verges

The proposed development site is predominantly composed of dry meadows and grassy verges (GS2), including two large man-made mounds which have been colonised by GS2 habitat. The mounded areas have been formed from site clearance works associated with the construction of the WuXi Biologics facility directly bordering the north of the proposed development site. The species diversity of the grasslands is low with rye grass and clovers being dominant. Other typical grassland species found in this area include dock (*Rumex crispus*), dandelion (*Taraxacum officinale*), thistle (*Cirsium vulgare*) and ragwort (*Jacobaea vulgaris*).

[20] Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010) Ireland Red List No. 4 – Butterflies. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland

GA2 Amenity grassland (improved)

Surrounding the central WuXi Biologic facility are areas of amenity grassland (GA2). These grass verges are well managed / mown landscaped areas are of low ecological value and contain only common grass and herb species (bents, clovers etc.).

WL2 Treelines

On the west and south the proposed development site is bordered by treelines. These treelines predominantly consist of Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), bramble (*Rubus fruticosus*) and ivy (*Hedera helix*). These treelines are dense, uniform with no gaps.

ED2 Spoil and bare ground

There are small sections of bare ground within central area of the proposed development site. These sections consist of areas of exposed rocky soil likely caused by vehicles on site.

BL3 Buildings and artificial surfaces

The Wuxi Biologic facility is comprised of large building with associated roads and carparks. Some of the artificial surfaces (roadways, pathways) associated with the WuXi Biologic facility are within the proposed development site.

FL8 Other artificial lakes and ponds

An attenuation pond is located to the south eastern side of the proposed development site, this lined pond was constructed as part of the WuXi Biologic facility. At the time of the survey this pond was dry but floral species bulrush (*Typha latifolia*) was present indicating the pond does receive and hold water.

Figure 5.6 below illustrates the locations of habitats within the proposed development site and Plates 5-1 – 5.6 below are photographs of these habitats.

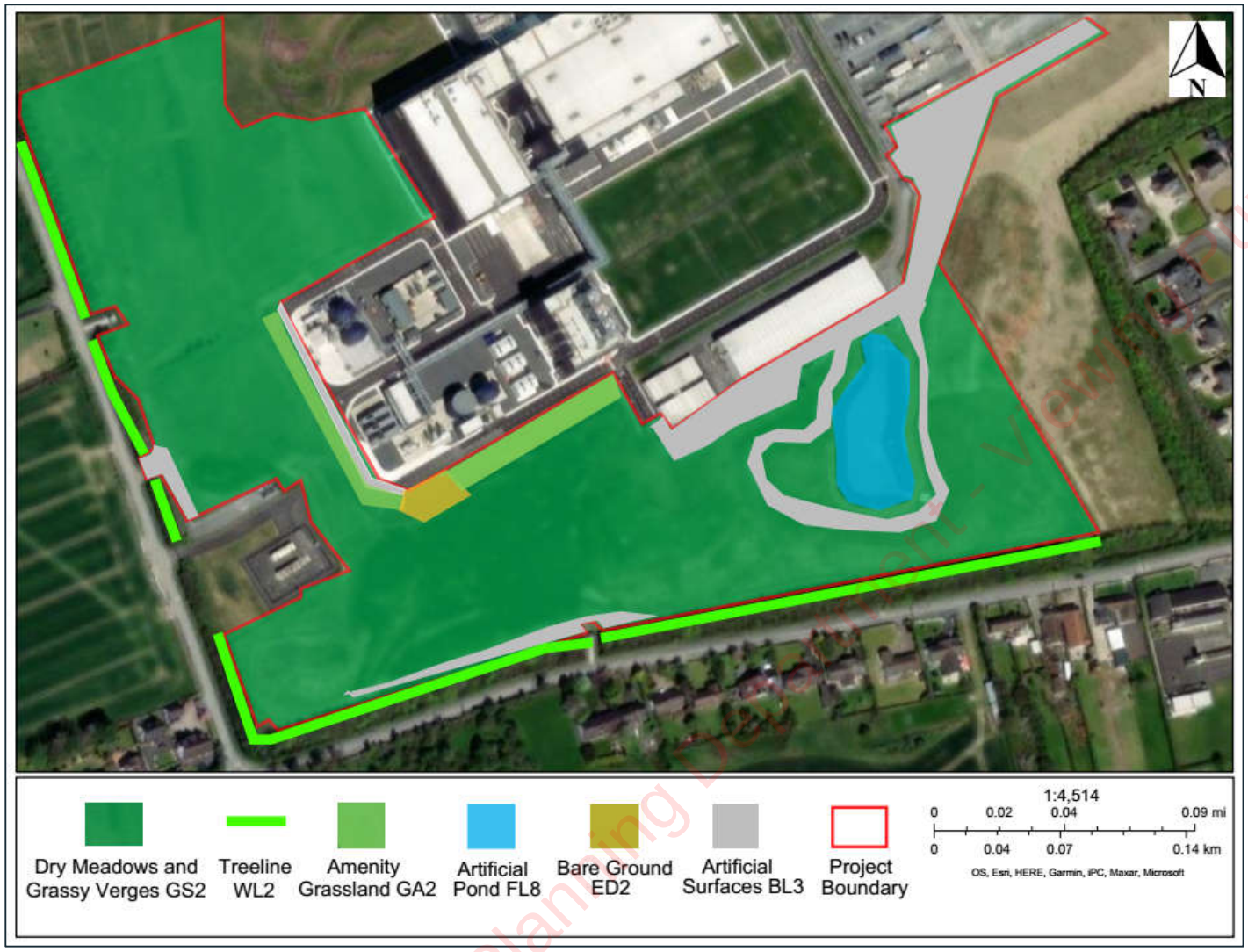


Figure 5.6 – Predominant habitats within and bordering the proposed development site

Plate 5-1 Dry meadows and grassy verges (GS2)

Plate 5-2 Amenity grassland (GA2)

Plate 5-3 Treelines (WL2)

Plate 5-4 Spoil and bare ground (ED2)

Plate 5-5 Buildings and artificial surfaces (BL3)

Plate 5-6 Artificial pond (FL8)

5.8.2 Invasive Species

The proposed development site was surveyed for invasive plant species listed restricted under Regulation 49 of the Habitats Regulations (SI No. 477/2011, as amended) and IAS of Union concern for the EU IAS Regulation. Species surveyed for included Japanese knotweed (*Fallopia japonica*) and associated hybrids, as well as other invasive plant species. Surveys were undertaken during August 2023 which is within the seasonally appropriate window to assess the proposed development site for the presence of invasive plant species.

No evidence of legally restricted invasive plant species was recorded within the extents of the proposed development site.

5.8.3 Fauna

Bats

Trees within the proposed development site were inspected and assessed for potential bat roost features (holes, cracks, crevices etc.). No trees with bat roost potential were noted. The treelines bordering the western and southern boundaries of the proposed development site have potential to act as a linear feature for commuting bats and the grassland area provided potential foraging habitat.

Badgers and other large mammals

The proposed development site and bordering lands were surveyed for evidence of terrestrial mammal activity and mammal refugia (badger setts, fox dens etc.) during August 2023. Surveying for evidence of badger foraging activity included for evidence of setts, prints, faecal deposits, trails etc. No badger setts were found within the proposed development site extents. The proposed development site does not contain any mammal refugia (e.g. badger sett, fox den) and no evidence of badger activity was recorded.

A hedgehog (*Erinaceus europaeus*) skin was found on the southern boundary of the site demonstrating use of the proposed development site by the species. This skin suggests predation of the animal in the area which may indicate foxes occur in the region.

Two hares (*Lepus* spp.) were seen within the proposed development site during the 2023 survey near the eastern boundary beside the attenuation pond. This indicated that this species is using this proposed development site to forage but no evidence of resting areas for this species were found within proposed development site.

Birds

The bird species noted within the proposed development site during the site surveys are Sparrow (*Passer domesticus*), House martin (*Delichon urbicum*), Kestrel (*Falco tinnunculus*), Swallow (*Hirundo rustica*) and Starling (*Sturnus vulgaris*).

The treeline encompassing the proposed development site provides valuable nesting and foraging habitat for a variety of bird species and the undisturbed GS2 grassland also provides foraging habitat for local passerine species. As noted on the site walkover survey, a kestrel was present on proposed development site suggesting the site has suitability for hunting for this and other birds of prey in the area.

5.8.4 Overall Evaluation of the Site

In summary, the proposed development site does not lie within any area that has been designated for nature conservation at an international or national level. There are no habitats listed on Annex I of the Habitats Directive or records of rare or protected plants within the proposed development site. There are no plants which are listed as alien invasive species[21]. Boundary features in the form of treelines are of local significance for a range of fauna, including protected species; passerine birds and potentially bats.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). The ecological evaluation of the various habitats found within the proposed development site is detailed in Table 5-5 below.

Table 5-5 - Ecological evaluation of habitats within the proposed development site

Habitats	Evaluation
Treeline (WL2)	Local Importance (Higher Value)
Dry meadows and grassy verges (GS2) Amenity Grassland (GA2) Artificial Pond (FL8)	Local Importance (Lower Value)
Artificial surfaces (BL3) Spoil and Bare Ground (ED2)	No ecological importance

The treelines bordering the proposed development site are considered to be the main feature of ecological value and these treelines are of Local Importance (Higher Value) for their importance for breeding birds and as a valuable ecological corridor. Breeding birds are considered to be sensitive ecological receptor. The trees within the treeline have no bat roost potential however they can provide for a commuting feature for bats.

The grasslands within the proposed development site are considered to be local importance (lower value) and have the capability to provide foraging habitat for hares, hedgehog, birds and bats.

5.9 Predicted Effects

The potential effects arising from the construction and operation of the proposed Effluent Balancing and Resource Recovery System are discussed in the following sections.

5.9.1 Characteristics of Proposed Development

The Proposed Development will comprise of the construction and operation of an effluent balancing and resource recovery system which will treat effluent from the WuXi Biologics facility (P1122-01). The WuXi Biologics facility site currently discharges effluent to the public sewer system through an existing balance system and pH correction system. However, the flow of and concentration of the waters arising from the production

[21] As listed on the Third Schedule to the EC (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477/ 2011).

processes on the WuXi Biologics facility site is variable and could possibly limit the potential treatment capacity of the downstream Dundalk WwTP due to this variability.

The effluent balancing and water recovery system will help to address this problem by storing effluent during periods of high flow and concentration and following treatment releasing it to the sewer system during periods of low flow and concentrations. This will aid to ensure that the sewer system is not overloaded. The sewer connects to Dundalk WwTP as such there are no untreated operational phase emissions from the proposed development.

Surface water (rain water) drainage from the proposed development site is separated into 2no. catchment units as follows;

- the bunded treatment plant area; and,
- the remaining hardstanding areas (roadways, pathways and buildings).

During the operational phase rain fall / surface water run-off from the bunded treatment plant area will be captured and channelled back into the treatment plant process with eventual outfall to the public sewer following treatment. Note; Surface water run-off from the roof of the Proposed Treatment / Control Building (which is within the bunded area) is proposed to be collected via a rainwater harvesting tank which will be used as wash water within the proposed Process Tank Area. Any overflow / excess water from the harvesting tank will be redirected to a dedicated surface water network (detailed below).

During the operational phase surface water drainage from the hardstanding areas of the proposed development site, which are outside of the treatment plant area, will be discharged following treatment through a dedicated surface water network (including silt traps, hydrocarbon interceptors and attenuation) to the public sewer.

As such all water emissions (i.e. effluent and surface water) from the proposed development are treated and are discharged to a public sewer and there is no discharge from the proposed development site to any watercourse.

5.9.2 Potential effects assessed

In the absence of mitigation measures the Proposed Development could have a range of potential effects on the ecological receptors within the zone of influence of the proposed development during the construction and operational phases. The categories below describe the possible impacts which may occur through development onsite. These effects are further assessed considering desktop and field survey data in Sections 5.4 - 5.8.

5.9.3 Physical Damage/ Habitat Loss

Physical damage includes the degradation to, modification, fragmentation or loss of habitats. Direct physical damage of habitats could occur within working areas of the proposed development and along access routes where construction works are undertaken. Physical damage of habitats can also be an indirect effects and could occur, for example, through the introduction of fine sediments into an aquatic system, causing changes to the particle composition of the benthic habitats. Physical damage may be temporary or permanent in nature.

5.9.4 Disturbance

Disturbance can cause sensitive species to deviate from their normal and preferred behaviour, resulting in stress and increased energy expenditure. Disturbance can result in species being displaced from suitable habitat areas

that provide areas for feeding and foraging, commuting routes, and resting and breeding sites. Physical disturbance of species can also result in direct mortalities of species and thus, disturbance impacts can be both direct and indirect and may be temporary or permanent in nature. Examples of direct disturbance includes activities such as damage to a breeding or resting site of a protected species, e.g. a bat roost or badger sett. Indirect disturbance may result from the presence of works crews and personnel on site during construction, noise emanating from a construction site or artificial lighting of a bat foraging area, causing bats to avoid the area.

5.9.5 Dispersal of Invasive Species

Non-native invasive species can have negative impacts on biodiversity. Negative effects of non-native invasive species on native biota occur through competition, predation, herbivory, habitat alteration, disease and genetic effects such as hybridisation. In the cases of non-native invasive species such as Japanese knotweed or Giant Hogweed, the main impacts are a reduction in species diversity due to dense plant growth, heavy shading and disruption of trophic levels. These species can potentially be spread via plant fragments and soil containing plant material, and by vectors such as machinery and personnel.

5.9.6 Do nothing Scenario

In the absence of development, in the short-term it is assumed that the proposed development site will remain as predominantly grassland bordered by treelines and the 'Do-Nothing' effect is likely to be continued semi-natural habitat on proposed development site. The potential value of the proposed development site to species such as nesting birds, foraging mammals (e.g. hares, hedgehog) and commuting bats would continue, provided that the linear landscape features (treelines) would not be lost due to other forms of development.

Currently, the proposed development site is not under any significant threats and there are no apparent threats to the fauna that may utilise the land, such as hares and nesting birds.

Should no development be undertaken on the proposed development site it could be expected that these species would remain.

5.9.7 Construction Phase

5.9.7.1 Effects on Sites Designated for Nature Conservation

Potential negative effects on European sites are discussed in the accompanying Appropriate Assessment (AA) Screening Report (AtkinsRéalis, 2024).

The AA Screening Report notes the Proposed Development is not located within the boundaries of any European site. During the construction phase there will be no direct impacts to European sites; i.e. no land take or the permanent removal of habitat supporting qualifying interest and ecological features of the designated sites.

There are no watercourses, drains or ditches within the proposed development site. During the construction phase there is no indirect hydrological connectivity to Dundalk Bay SAC/SPA/pNHA and as such there will be no effects on these designated sites from construction activities via hydrological pathways. Dundalk Bay is located ca. 2km from the proposed development site and as such the proposed development site is sufficiently remote so that potential effects via groundwater pathways on Dundalk Bay are negated.

The project site is sufficiently remote from Dundalk Bay so as not to cause any disturbance to waterbirds accommodated within Dundalk Bay SPA/pNHA during the construction phase. The proposed development will not impact upon the migratory flight paths of SPA species nor restrict any mobility between wetland sites. Potential effects on ex-situ SPA waterbirds has also been considered. Some species associated with Dundalk Bay SPA (e.g. geese, oystercatcher) are known to forage within agricultural lands outside the SPA site extents, however, the project site is not a terrestrial site known for supporting roosting or foraging waterbirds. As such, there will be no likely disturbance or displacement effects on ex-situ waterbirds.

Effects to sites designated for conservation are therefore assessed to be imperceptible during the construction phase of the proposed development.

5.9.7.2Effects on Habitats

There are no habitats within the proposed development site of greater than local importance. No ecological features of regional, national or international importance will be directly impacted by the proposed development.

The proposed development will result in a permanent loss of areas of Dry Meadows and Grassy verges (GS2) and Amenity grassland (GA2). The overall project site is 7.886hectares and it is estimated that ca. 0.8hectares of these grassland habitats will be lost as a result of construction activities. Adverse impacts to these semi-natural habitats would be restricted to within the proposed development site. There will be no long-term significant effects as a result of this habitat loss, however the grasslands of the project site are of some importance for hares, hedgehogs, birds and bats. These potential effects are discussed below.

The habitat with the highest ecological value is noted to be the treelines bordering the proposed development site. These treelines will remain in situ and no clearance of treelines or trees is necessitated to facilitate the construction of the effluent balancing and resource recovery system. Similarly the man-made attenuation pond will remain in situ and as such there will be no loss of pond habitat.

There will be additional noise and light added to this area for the construction of this facility. This will be a small footprint and have an imperceptible effect on the wider environment.

Indirect habitat loss/damage via proximity of construction works

The proposed development site is bordered by treelines noted to be of local importance (higher value), in the absence of mitigation there is potential for a temporary slight adverse effect from construction activities to these features along the development site's boundaries.

Indirect habitat/species loss/damage via spread of invasive species

No invasive plant species listed on the third schedule have been recorded during ecological surveys within the extents of the proposed development site. There is the potential for the introduction of invasive plant species during the construction phase which would result in an moderate adverse effect over the short term at local geographical level.

5.9.7.3Effects on Species

Bats

Site surveys did not identify any evidence of bat roosts within the proposed development site and the proposed development will not require the loss of any trees or structures which could develop potential bat roost features.

The treelines, which could provide for commuting corridors for local bats will be retained and such there will be no interruption to local commuting routes.

There will be a loss of ca. 0.8 hectares of grasslands which could be used as a forging area of bats, however, given relatively small area of the proposed development site and the wide availability grasslands within the local environs, the loss of the relatively small areas of grasslands will not have any significant effect on local bat populations. Effects to bats during the construction phase are imperceptible at a local geographical level.

Other mammals

Terrestrial mammal surveys undertaken within the proposed development site did not find any evidence of badger setts, fox dens or any other large mammal refugia within the proposed development site extents. The proposed development will have no impact on mammal refugia.

There will be a loss of grasslands which will result in a loss of foraging areas for mammal species such as badger, fox, hare and hedgehog, however, as detailed above for bats, given relatively small area of grassland loss within the proposed development site and the wide availability grasslands within the local environs, the loss of the relatively small areas of grasslands will not have a significant effect on terrestrial mammals. Effects to terrestrial mammals from the loss of grassland foraging areas during the construction phase are considered to be permanent slight adverse at a local geographical level.

Birds

Bird species recorded during site surveys (2023) are common and no rare or uncommon species or species of high conservation value were recorded. Historic records of protected bird species within the area are mainly associated with the coastal waters around Dundalk Bay. Site surveys undertaken in winter 2023 did not record any waterbirds or wildfowl within the proposed development site.

Given the distance of the proposed development site from areas of high avian usage, the construction of the treatment plant will not impact upon the migratory flight paths of waterbirds or wildfowl nor restrict their mobility between wetland sites. The building of the treatment plant will not present a collision risk to birds.

The treelines bordering the proposed development site provide for valuable nesting habitat for local bird populations and these habitats will be retained, as such there will be no significant effects to high value nesting habitat. There will be a net loss of semi-natural habitats; grasslands within the proposed development site and the loss will have a localised adverse effect on feeding resources for local passerine species. The loss of foraging habitat for local breeding birds within the proposed development site is considered a permanent slight adverse effect on passerine bird species at a local geographic scale. No effects on wintering and native waterbirds and wildfowl are anticipated.

5.9.7.4Disturbance and/or displacement of faunal species

Nesting Birds

Some disturbance/displacement of passerine birds may occur during construction due to increased noise and disturbance, this will be a temporary slight adverse effect at a local scale.

Terrestrial mammals

Mammal species recorded within the project site included 2 no. hares and a hedgehog carcass. During construction activities there is the potential for disturbance and disruption to the foraging habits and commuting routes of terrestrial mammals.

It is considered that the disruption to foraging and commuting for terrestrial mammals would be a temporary slight adverse effect on mammals at the local geographic scale.

Other Species

A number of historic records have been recorded within the wider area, outside of the development site. It is not expected that impacts on Hymenoptera and Lepidoptera species will be significant.

It is considered that disturbance or displacement of insect species will be short term imperceptible at a local geographic level.

5.9.8 Operational Phase

5.9.8.1 Effects on Sites Designated for Nature Conservation

There is no direct connectivity from the proposed development site to any internationally or nationally designated sites and as such during the operational phase of the proposed development there will be no direct effects on European sites or nationally designated conservation sites.

During the operational phase, effluent arising from the WuXi Biologics facility will be treated by the new effluent balancing and resource recovery system which will generate solids (sludge) and treated water. Any solids associated with the treatment process will removed from site to a licenced waste facility. Treated waters will be discharged to the local sewer which connects to Dundalk WwTP. Following treatment, discharge from the WwTP is to the Irish Sea (Dundalk Bay SAC/SPA/pNHA). Discharge from the WwTP is not anticipated to have any impact on any habitats or species associated with any designated conservation site given that it will be treated and given the dilution and dispersal that will occur within the Irish Sea. The core principle of the design of the proposed development will be to maintain compliance at the Industrial Emissions Directive (IED) discharge point, within the licence requirements (P1122-01). To comply, the design has been developed to include monitoring and recycling of flow capabilities should the system require additional treatment.

During the operational phase, surface water run-off (rainfall) from the proposed development site will either be treated and attenuated via the exiting WuXi Biologics facility drainage infrastructure (silt traps, interceptors) before discharge to a public sewer or will be redirected to the new effluent balancing and resource recovery system before discharge to a public sewer.

Given the levels of treatment occurring to water emissions from the proposed development and that all discharged waters are to the public sewer (and ultimately Dundalk WwTP) no direct or indirect adverse effects are anticipated on internationally or nationally designated conservation areas during the operational phase of the proposed development. Once the treatment process is operational reducing the risk of overloading the WwTP is considered a positive effect of the development over the long term.

The AA Screening Report development for the proposed development has assessed potential effects on Dundalk Bay SAC/SPA which concludes; '*This Screening for Appropriate Assessment report is based on the best available scientific information. It is concluded by the authors of this report that the proposed Effluent*

Balancing and Resource Recovery System poses no likely significant effects on European sites. Thus, it is recommended that it is not necessary for the proposed project to proceed to Appropriate Assessment'.

5.9.8.2 Effect on Habitats

No further effects on local terrestrial habitats are predicted during operation of the proposed development. The operation of the proposed development will have no effects to freshwater or marine environments.

5.9.8.3 Effect on Species

There will be a direct loss of foraging habitat associated with the proposed development in the form of grassland areas. This loss if considered to be permanent slight adverse at a local site level.

The operational phase of the proposed development will not result in the disturbance or displacement of volant mammals, terrestrial mammals or birds.

5.10 Mitigation Measures

5.10.1 Construction Phase

Mitigation of habitat loss/damage during construction

Boundary treelines are to be retained on-site. WuXi Biologics land boundaries (treelines) will be protected from any accidental damage during construction by means of exclusion through use of fencing around delineated works areas. No excavated materials will be stockpiled within 10m of treelines.

Construction and construction related activities (including the deposition of excavated soil) shall not take place outside of the red line boundary of the proposed development site.

Following the inclusion of the aforementioned mitigation measures the effects to retained habitats; treelines will be imperceptible.

As noted above, there will be a permanent loss of ca. 0.8 hectares of grassland habitat. The design of the proposed development includes for areas of wildflower planting around the internal roadway leading to the treatment plant (Refer to Site Layout Drawing 1011-000121-FGCL-XX-XX-DR-C-1005B submitted with this application). The wildflower planting includes species attractive to pollinators and as such the planting will attract feeding invertebrates, including moths, butterflies and bees. The mixtures of flowering plants will encourage a diversity of insects which in turn could help to sustain birds, bats and other wildlife.

Following the establishment of the wildflower planting the loss of 0.8heactares of grassland is mitigated to a slight adverse effect over the long term at a local site level.

Invasive species prevention

No legally restricted invasive species, such as Japanese knotweed, were found within the proposed development site. Strict bio-security protocols will be implemented during the construction phase so as to ensure no imported materials potentially contaminated with invasive plant species are brought to the development site. All imported soil materials will be visually inspected by the Contractor/Contractors Environmental Manager/Contractors Ecologist for signs of invasive plant contamination (such as root fragments, rhizome material) prior to arrival on site.

The Contractors Environmental Manager/Contractors Ecologist will develop biosecurity mitigation / control measures that are required to be implemented in liaison with the Site Manager. Such measures include, but are not limited to the following:

- The contractor will be obliged to prepare a method statement which shall include the following biosecurity measures (non-exhaustive list);
  - If preconstruction surveys identify invasive species within the proposed development site, including access routes, no works will commence until a management plan is drawn up by a relevant specialist;
  - Before arriving on site, all vehicles and machinery will be thoroughly cleaned via. a high pressure steam clean with water temperatures of at least 60°C where possible. If a steam clean is not feasible then a normal power hose shall be used. All vehicles and machinery will be visually inspected after being washed to ensure all material and debris has been removed;
  - All equipment (including footwear) will be visually inspected, while entering and exiting the site, for evidence of attached plant or animal material and mud or debris should they come into contact with water or soils. Should material be attached, it will be removed as appropriate;
  - Cleaning should not be undertaken on the site or near watercourses but at locations which have appropriate facilities such as garages or where a specially designed and drained area is provided on site with discharge through settlement ponds; and,
  - The contractor will be obliged to sign a form detailing the cleaning that has been carried out and the date on which it was conducted.

Given the inclusion of the biosecurity measures no adverse effects are anticipated from invasive plant species.

Faunal species mitigation

The following mitigation measures will be implemented during the construction phase of the proposed development;

- Any large excavations will be created with sloping sides to ensure terrestrial mammals do not get trapped in excavated areas. Any smaller excavations will be covered outside of working hours to ensure mammals do not get trapped.
- Non-essential lighting (non-security/safety) will be kept to a minimum. Construction phase lighting (e.g. site compound lighting) will be switched off during night-time hours during spring and summer months so that foraging and/or commuting bats are not negatively affected by construction phase lighting.

Given there will be a direct loss of foraging habitat associated with the construction of the proposed development in the form of grassland areas, overall effects to faunal species will be permanent slight adverse at a local site level.

5.10.2 Operational Phase Mitigation

During the operational phase all the emissions from the Effluent Balancing and Resource Recovery System are limited to sludge, treated waters and odours.

The sludge derived from the treatment process will be dried and transported off site to a licenced waste facility.

The treated waters that remain from the treatment process will be discharged from the development site to the local sewer network for treatment at Dundalk WwTP which has the capacity to accommodate the loads.

Once the treatment process is operational reducing the risk of overloading the WwTP is considered a positive effect on receiving coastal waters over the long term.

Proposed and existing surface water drainage infrastructure will ensure surface water run-off from the development site is treated prior to discharge to the local public sewer where it is then subject to further treatment at Dundalk WwTP. Effects to the receiving coastal waters from surface water run-off from the development site are therefore considered to be imperceptible over the long term.

5.11 Residual Effects

The residual ecological effects of the proposed development are not expected to be significant and are expected to be localised to the development site. Local populations of mammals and birds may suffer some very minor disruption in the short term and there will be a permanent loss of grassland foraging habitat but, as the greater part of the development site is of low ecological value, habitat losses to the proposed development are not significant.

5.12 Cumulative Effects

Given the inclusion of design, construction phase and operational phase mitigation measures, no significant effects will occur on sites designated for conservation value, protected habitats, protected species, watercourses or features of high ecological value as a result of the construction and/or operation of the proposed development.

Other plans and projects within development site area and also within the wider environs of the WuXi Biologics facility were reviewed in context with the proposed development and have been assessed for their potential to act in-combination with the proposed development to give rise to cumulative effects on local biodiversity. Refer to Chapter 14 for details of the other plans and projects which have been assessed.

No cumulative or in-combination effects on sites designated for conservation value, protected habitats, protected species, surface water features or features of high ecological value will occur as a result of the proposed development.

5.13 Difficulties encountered during preparation of this chapter

No difficulties were encountered in completing survey work to inform this ecological assessment. Habitat surveys and protected and invasive surveys were undertaken during the seasonally appropriate times of year.

5.14 Risk of Major Accidents and/or Disasters

The risk of a major accident onsite is low and would be confined to the operational phase of the proposed development e.g. accidents with the treatment chemicals (i.e. sulphuric acid, caustic materials). Events such as a large spill or release of high volumes of contaminants during the operational phase could potentially have a

negative impact on local habitats. However, given the lack of connectivity of the development site to watercourses (nearest is ca. 700m), there is no potential that an accident would occur that would negatively impact on surface water features, aquatic habitats or the marine environment of Dundalk Bay. While impacts to local soil and groundwater could conceivably occur, WuXi Biologics facility preventative measures and emergency response measures would limit any impact to the project site. Thus, allowing for the above, the magnitude of a major accident on site is likely to be significant at a Site level only and imperceptible in relation to any ecologically important features such as Dundalk Bay.

6. Landscape and Visual

6.1 Introduction

The Landscape and Visual Impact Assessment (LVIA) prepared by Cunnane Stratton Reynolds (CSR) was informed by a desktop study and a survey of the site and receiving environment in August 2023. The assessment is in accordance with the methodology prescribed in the Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA) published by the UK Landscape Institute and the Institute for Environmental Management and Assessment.

The report identifies and discusses the landscape and visual constraints effects in relation to the proposed development of the Site located within the grounds of WuXi Biologics in Dundalk Science and Technology Park, Haynestown Dundalk, Co. Louth. The Proposed Development will consist of the installation of an Effluent Balancing and Resource Recovery System, a new access road and screening in the form of landscaped berms with planting, all of which will be located next to the existing WuXi Biologics facility.

A full description of the Proposed Development and all associated project elements is provided in Chapter 2 of this EIAR. This LVIA chapter is supported by photomontages which are provided in Appendix 6 in Volume 3 which accompany this application.

6.1.1 Competency of Assessor

This Landscape and Visual Impact Assessment was carried out by chartered landscape architect Ronan Finnegan, BSc, PG Dip, CMLI of CSR. He has over thirteen years' experience as a Landscape Architect, which has involved undertaking Landscape and Visual Impact Assessments (LVIA) for a broad range of development types including renewable energy, large residential and infrastructure projects located across Ireland and the UK. Oversight of the LVIA chapter was provided by Evelyn Sikora, MILI and Senior Landscape Planner of Cunnane Stratton Reynolds.

6.2 Methodology

6.2.1 Introduction

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental, and economic benefits to individuals and society.

It is also important to note that this definition of landscape applies not only to all types of rural landscape, marine and coastal landscapes (seascapes) but also to the landscape of villages, towns and cities (Section 2.5, LI, IEMA, 2013).

6.2.2 Guidelines

The Guidelines for Landscape and Visual Impact Assessment 2013 (abbreviated to GLVIA 2013) notes that as a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreational and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by

individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys, and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

The GLVIA (2013) notes that landscape is not unchanging. Many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement or townscape.

Many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is also described as an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs.

Climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly primary production) and society. The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

6.2.2.1 Key Guidance Documents

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity.

The methodology for assessment of the landscape and visual effects is informed by the following key guidance documents, namely:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition Landscape Institute and the Institute of Environmental Management and Assessment (2013) (hereafter referred to as the GLVIA 2013).
- Guidelines on the Information to be Contained in Environmental Impact Statements. (EPA, 2022)

This guidance is authored by the Landscape Institute in the UK and the IEMA, which contains a network of members in UK and Ireland and internationally. The guidance was prepared within the parameters of relevant EU directives at the time and is updated, where necessary, by Landscape Institute bulletins online. The GLIVA 2013 is used internationally and is the industry standard for LVIA in Ireland.

The EPA guidance (2022) refers to the use of topic specific guidance and specifically references the GLVIA 2013 in relation to professional judgement. It recognises (at para 3.72) that:

"Some uncertainty is unavoidable in EIA, especially about matters that involve an element of judgement, such as assigning a level of significance to an effect. Such judgements should be explicit and substantiated rather

than presented as objective fact. This is best done using agreed referable approaches, e.g. the Guidelines on Landscape and Visual Impacts Assessment provide guidance on what constitutes a severe visual effect".

6.2.2.2 Policy Documents

Other documents referred to include:

- Louth County Development Plan 2021-2027
- Mullagharlin Framework Plan 2008.

References are also made to the 'Landscape and Landscape Assessment – Consultation Draft of Guidelines for Planning Authorities' document, published in 2000 by the Department of Environment, Heritage and Local Government.

6.2.3 Landscape and Visual Assessment Process

The GLVIA 2013 outlines the assessment process, which combines judgements on the sensitivity of the resource, and the magnitude of the change as a result of the proposed development. These are then combined to reach an assessment of the significance of the effect.

Another key distinction to make is that in the GLVIA methodology, a distinction is made between landscape effects and the visual effects of a proposed development.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and 'visual amenity' refer to the interrelationship between people and the landscape. The GLVIA 2013 prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

6.2.3.1 Establishment of the Baseline

The process set out in the GLVIA (2013) and in the EPA (2022) involves the preparation of the baseline or receiving environment characteristics. This includes two stages, which are a desk-based study and site visit/field study. These allow the assessor to establish the existing receiving environment and key landscape and visual characteristics and their sensitivities.

The desk-based study includes:

- Review of preliminary proposals and identification of preliminary study area
    - Review of current Development Plan (within the study area, and any other plans as appropriate, to identify relevant national and local designations and polices.

- This may include designations such as scenic routes, protected views and other landscape designations including any Landscape Character Assessments International designations such as UNESCO designations would also be relevant here, if present.

- Other information that may be consulted include aerial imagery, OSI Discovery series mapping, historic (6-inch and 25 inch) mapping and CORINE Landcover Maps (2018).

A site visit was then carried out to review and confirm the findings of the desk based study and provide a more detailed description of the landscape and visual character of the study area. Based on both the desk study and site visit, the assessor identifies landscape and visual receptors and their relative sensitivity. The site visit was carried out on 28th September 2023.

6.2.3.2 Assessment of Effects

Once the Baseline is established, and the proposed development drawings and descriptions reviewed, the assessment process is commenced, as outlined in Section 6.2.3.2 and 6.2.3.3.

Use of 'Impact and 'Effect'

Section 1.16 of the GLVIA (referring to the EIA Directive), advises that the terms 'impact' and effect' should be clearly distinguished and consistently used in the preparation of an LVIA.

'*Impact*' is defined as the action being taken. In the case of the proposed development, the impact would include the construction of the buildings and associated boundaries and external areas.

'*Effect*' is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focusses on these effects.

6.2.3.3 Methodology for Landscape Assessment

In Section 6.4 of this report, the landscape effects of the proposed development are assessed. The nature and scale of changes to the landscape elements and characteristics are identified, and the consequential effect on landscape character and value are discussed. Trends of change in the landscape are taken into account. The assessment of the significance of the effects takes account of the sensitivity of the landscape resource and the magnitude of change to the landscape, which resulted from the proposed development.

Definitions and descriptions of sensitivity, magnitude of change and quality and longevity of effects are derived from the GLVIA (2013). The GLVIA (2013) does not set out specific definitions of descriptions used but contains widely used principles and case studies / examples that are intended to inform a professional's methodology, supported by their experience and judgements in relation to landscape and landscape change. These descriptions expand and complement the EPA guidelines as intended, in relation to topic-specific guidance.

Sensitivity of the Landscape Resource

Sensitivity is a combination of Landscape Value and Landscape Susceptibility:

- Landscape values can be identified by the presence of landscape designations or policies, which indicate particular values, either on a national or local level. In addition, a number of criteria are used to assess the value of a landscape. These are described further below, in Section 6.3.3.1.

- Landscape susceptibility is defined in the GLVIA as, “the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline scenario and/or the achievement of landscape planning policies and strategies.” Susceptibility is a function of its land use, landscape patterns and scale, visual enclosure and distribution of visual receptors, scope for mitigation, and the value placed on the landscape. Susceptibility also relates to the type of development – a landscape may be highly susceptible to certain types of development but have a low susceptibility to other types of development.

It includes consideration of landscape values as well as the susceptibility of the landscape to change.

With regard to landscape effects, a proposed development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and a particular development may achieve this.

Landscape Sensitivity ranges from Low to Very High as outlined in Table 6-1.

Table 6-1 - Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principal management objective for the area is protection of the existing character from change
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principal management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principal management objective may be to consolidate landscape character or facilitate appropriate, necessary change
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principal management objective is to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principal

management objective for the area is to facilitate change in the landscape through development, repair or restoration.

Magnitude of Landscape Change

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors').

Five categories are used to classify magnitude of landscape change.

For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment, from Very High sensitivity to Negligible. (These categories are defined in Table 6-2 below).

Table 6-2 - Categories of Landscape Change

Magnitude of Change	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape.
High	Change that is moderate to large in extent, resulting in alteration or compromise to key elements, features or characteristics, and/or introduction of large elements considered uncharacteristic in the context. Such development results in a moderate to large change to the character of the landscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily uncharacteristic in the context. Such development results in moderate change to the character of the landscape.
Low	Change that is limited in extent, resulting in minor alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape
Negligible	Change that is very limited in extent, resulting in no alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are characteristic in the context. Such development results in minimal change to the character of the landscape.

6.2.3.4 Methodology for Visual Assessment

In Section 6.5 of this report, the visual effects of the proposed development are assessed. Visual assessment considers the sensitivity of the viewers (i.e. groups of people) and the magnitude of the changes to the composition and character of views. The assessment is made for a number of viewpoints selected to represent

the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the visual receptor sensitivity against the magnitude of change to the view resulting from the proposed development.

Sensitivity of the Visual Receptor

Visual receptor sensitivity is a function of two main considerations:

- Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention or interest is focussed on the views or visual amenity they experience at that location.

Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience.

Visual receptors less susceptible to change include travellers on road, rail and other transport routes (unless on recognised scenic routes which would be more susceptible), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

- Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

For the purpose of assessment, five categories are used to classify visual receptor sensitivity. These categories range from Very High to Negligible and are described in Table 6-3.

Table 6-3 - Categories of Viewpoint Sensitivity

Sensitivity	Description
Very High	Viewers at iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise regarded as being of very high value or national value. This may also include residential viewers whose primary view is of very high value.
High	Viewers at viewpoints that are recognised in policy or otherwise designated as being of high value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and are valued by the local community. This would include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes.
Medium	Viewers at viewpoints representing people travelling at slow or moderate speed through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include

	panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.
Low	Viewers at viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, etc. The view may present an attractive backdrop to these activities but there is no evidence that the view is valued, or that it is regarded as an important element of these activities. Viewers travelling at high speeds (e.g. motorways) may also be considered of low susceptibility.
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities, such as shopping, where the view has no relevance or is of poor quality and not valued.

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of the proposed development into the view, relative to the other elements and features in the composition(i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also takes into account the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view. These range from Very High to Negligible and are defined in Table 6-4.

Table 6-4 - Categories of Visual Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs highly valued features or characteristics, or the introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.

Magnitude of Change	Description
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

In this case, a number of tools are used to assist in the assessment of visual effects. These include Photomontages, which are produced from selected viewpoints. Initial viewpoints for photomontages are selected during the desk study with the exact location confirmed in the field during the site visit. The completed photomontages are also used to assist in the assessment of visual effects.

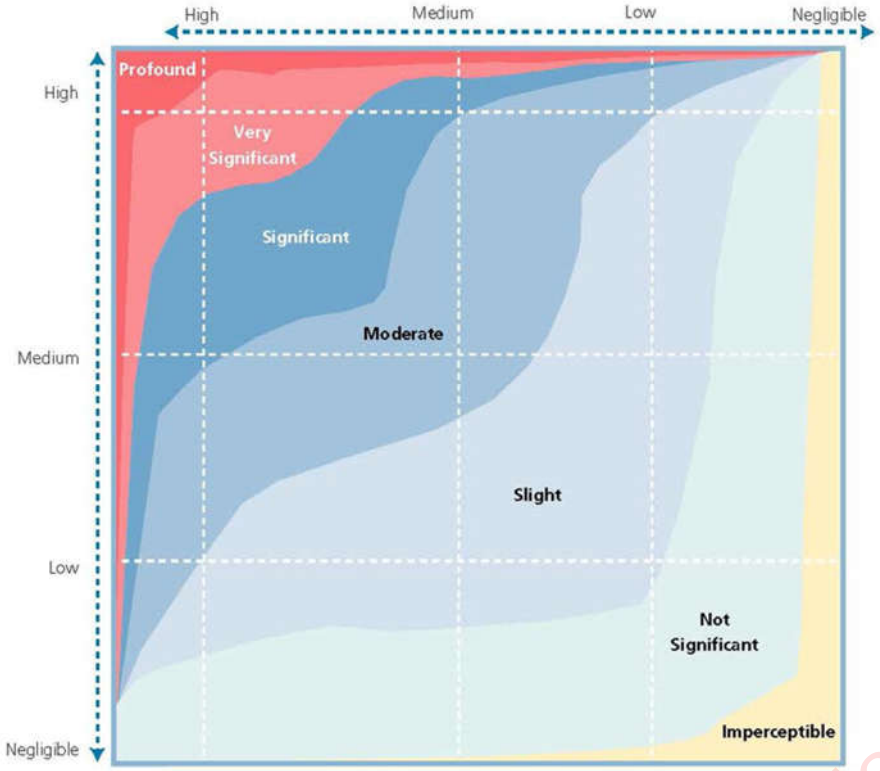
6.2.3.5 Significance of Effects

In order to classify the significance of landscape and visual effects, the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint. The definitions used by the EPA (2022) provide a useful scale to describe the significance of the effects.

There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

The relationship between the magnitude of change and sensitivity of the receptor with the varying classifications of Significance is illustrated on the below Table 6-5 as extracted from the EPA (2022) Guidelines (with labels amended and simplified based on GLVIA (2013 (guidance):

Table 6-5 - Significance of Effect (Source: EPA 2022)



Note: This graphic is a guideline only, and an element of professional judgment is also applied. The assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

The GLVIA 3rd Edition recognises (at para 2.23) that :

> "*professional judgement is a very important part of LVIA. While there is scope for quantitative measurement of some relatively objective matters, much of the assessment must rely on qualitative judgements*."

6.2.3.6 Quality and Timescale

In accordance with the EPA (2022), the predicted impacts are also classified as beneficial, neutral, or adverse.

This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a proposed development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative definitions are included in Table 6-6.

Table 6-6 – Quality of Effect (Source: CSR based on GLVIA 2013)

Definition of quality of affects	
Duration	Description
Adverse/negative	Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape (townscape) view to be diminished;

Neutral	Scheme complements (or does not detract from) the scale, landform and pattern of the landscape (townscape)/view and maintains landscape quality;
Beneficial/positive	Improves landscape (townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Impacts/effects are also categorised according to their longevity or timescale as in Table 6-7, below.

Table 6-7 – Duration of Effect (Source: EPA 2022)

Definition of duration of effects	
Duration	Description
Adverse/negative	Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape (townscape) view to be diminished;
Neutral	Scheme complements (or does not detract from) the scale, landform and pattern of the landscape (townscape)/view and maintains landscape quality;
Beneficial/positive	Improves landscape (townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

6.3 Receiving Environment

This section is divided into a review of landscape related Planning Policy as set out in the Louth County Council Development Plan 2021-2027 (LCCDP) and associated documents, and a description of the study area informed by desktop assessment and field visit.

6.3.1 Study Area

According to Section 5.2 of the Guidelines for Landscape and Visual Impact Assessment (3rd Edition 2013):

“The study area should include the site itself and the full extent of the wider landscape around it, which the proposed development may influence in a significant manner.” The study area extents for this LVIA derives from the nature of both the site and the proposed development, which is a proposed Balancing and Resource Recovery System located within an existing industrial estate on the urban-rural fringes of Dundalk Town.

While there is a low capacity for significant impacts to arise beyond 500m from the site, as the proposed development is largely limited visibility within the local area a 2km study area has been selected in this instance, with the study area of the underground piping contained to the road corridor. However, an emphasis will be placed on receptors within 500m of the site, as these are more/most likely to have the capacity to experience

significant visual effects. It should not be inferred that the Proposed Development is unlikely to be visible from any location beyond the study area, but, more importantly, that the Proposed Development is unlikely to influence such receptors in a significant manner.

6.3.2 Relevant Planning Policy

6.3.2.1 The Louth County Development Plan 2021-2027

The Louth County Development Plan 2021-2027 (hereafter referred to as the 'Plan'/CDP) contains a range of policies relevant to establishing the landscape and visual values and sensitivities for the site and site environs, as set out below.

The latest Louth CDP has superseded the previous local area plan for the town of Dundalk known as Dundalk and Environs Development Plan 2009-2015. The Dundalk Local Area Plan 2024-2030[22] will be the new local area plan, but it is currently at the early stages of public consultation.

Economy & Employment

Strategy for Future Employment Growth

EE 1: *To maximise the economic potential of Louth by building on its locational advantage along the Dublin-Belfast Economic Corridor and promoting and marketing the Regional Growth Centres of Drogheda and Dundalk for economic investment*

EE 43: *To continue to support the implementation of the Mullagharlin Framework Plan 2008 which will ensure that future development in the Framework Plan area will be of a design and layout of international quality that will allow Dundalk to continue to compete for international investment.*

Natural Heritage, Biodiversity and Green Infrastructure

Landscape Character Area:

The LCDP highlights a matrix of factors contributing to a 'Landscape Character Area' (LCA), as follows; Landscape Quality, Scenic Quality, Rarity, Conservation Interests, Wilderness, Recreational Opportunity, Cultural Association, Tranquillity and Stakeholder Representative. This classification is based on the Louth Landscape Character Assessment (LCC, 2002), which details the landscape assessment of the Landscape Character Area the study area falls within the Muihevna Plain and Dundalk Bay Coast LCAs as detailed later in this section. Refer to Figure 6.1.

Relevant Policies of the LCDP are as follows:

NBG 23 *To ensure the preservation of the uniqueness of a landscape character type by having regard to its character, value and objectives in accordance with national policy and guidelines and the Louth Landscape Character Assessment and by ensuring that new development meets high standards of siting and design and does not unduly damage or detract from the character of a landscape or natural environment.*

NBG 24 *To ensure development reflects and, where possible, reinforces the distinctiveness and sense of place of the landscape character types including the retention of important features or characteristics, taking into*

[22] https://consult.louthcoco.ie/en/system/files/materials/97/Issues%20Paper%20-%20%20Final.pdf

account the various elements, which contribute to their distinctiveness such as scenic quality, habitats, settlement pattern, historic heritage and land use.

***NBG 26** To explore the designation of Landscape Conservation Areas as appropriate, in conjunction with the relevant Government Department and stakeholders to protect specific important landscapes and particularly in respect of Carlingford Mountain SAC.*

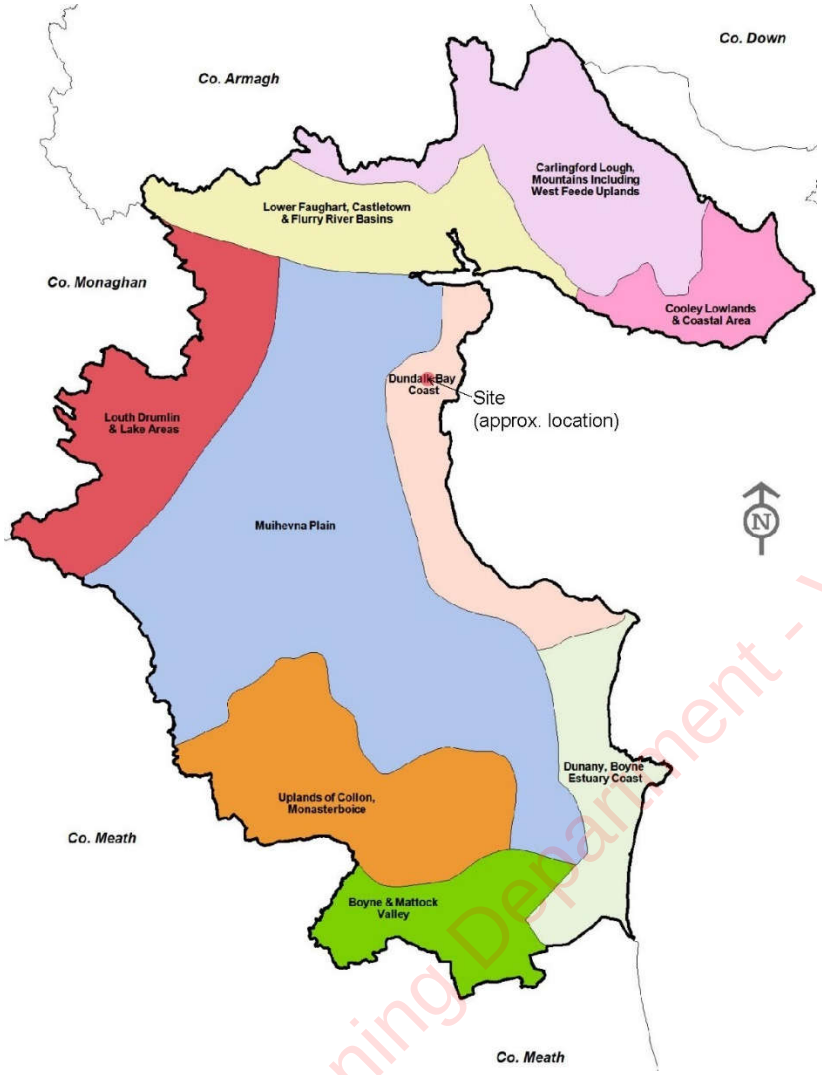


Figure 6.1 – County Louth Landscape Character Areas. Source: LCC CDP 2021-2027 Map 8.5 Landscape Character Area

Trees and Landscape Designations:

Various individual and groups of trees are noted as having special amenity value of which several can be found within the town limits of Dundalk. The nearest of these trees include no. 100 Haggardstown House/Bellfield Dublin Road, 101 Church Road, Haggardstaown and 102 Marl House, Church Road Haggardstown, all found within ca. 0.62km to 1.25km to the east of the proposed development. There are also some champion trees within Clermont Park, ca. 40-60m to the south of the proposed development. Refer to Figure 6.2.

Relevant Policies of the LCDP are as follows:

NBG 31 *Where in exceptional circumstances, trees and or hedgerows are required to be removed in order to facilitate development, this shall be done outside nesting season and there shall be a requirement that each tree felled is replaced at a ratio of 10:1 with native species and each hedgerow removed is to be replaced with a native species. In Drogheda and Dundalk, replacement trees will be required at a ratio of 5:1 where the removal of trees is required in order to facilitate development.*

NBG 33 *To assess the implications of proposed development on significant trees and hedgerows located on lands that are being considered for development, seeking their incorporation into design proposals where appropriate and in compliance with procedures detailed in Appendix 6.*

NBG 34 *To increase native tree coverage in the County to also act as carbon sinks by promoting the planting of suitable native trees and hedgerows along public roads, residential streets, parks and other areas of open space.*

Landscape Designations:

County Louth contains a number of unique landscapes which have been recognised through their designation as Areas of Outstanding Natural Beauty (AONBs) and Areas of High Scenic Quality (AHSQ) with these having county to regional/national importance. The AONBs are recognised for as having unspoilt landscape, special character and spectacular scenic quality while the AHSQ may contain working landscape but still retain a high scenic quality.

Those designations within the northern end of the county include Carlingford and Feede Mountains AONB and Feede Mountains and Cooley Area of High Scenic Quality (AHSQ). Both fall outside of the study area, being located approx. 7km to the northeast.

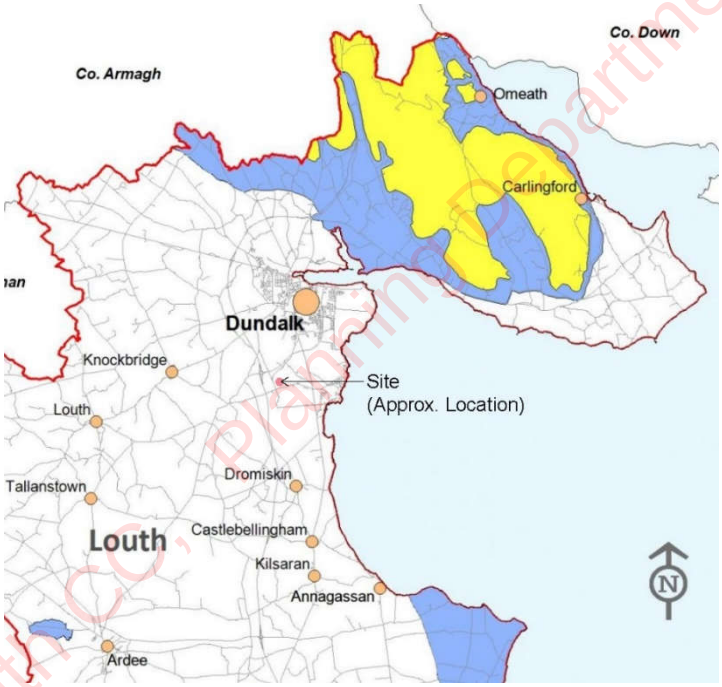


Figure 6.2 –Louth CDP Landscape Designations (extract). Source: LCC CDP 2021-2027 Map 8.15 Areas of Outstanding Natural Beauty and Areas of High Scenic Quality

Views and Prosects:

The LCDP lists the 'Views and Prospects' that are reflective of Louth's unique scenic quality. There are a cluster of county designated views from the elevated locations within the Carlingford and Feede Mountains AONB and Feede Mountains and Cooley Area of High Scenic Quality (AHSQ) (VP2-12) and Faughart Hill (VP13). Of which some of the elevated panoramic views which when facing in the direction of the town of Dundalk may include the Proposed Site within views of the town's southwestern end.

There are some Views and Prospects located within the town limits of Dundalk. The nearest of these to the proposed development including No. 38 Views of the town from the Ardee Road and No.47.- Views of the Cooley Mountains from the car park at St. Fursey's Church, Haggardstown. However, none of the town views containing the proposed development, with most views orientated towards the coastline or mountains. Refer to Figure 6.3 and 6.4.

NBG 38: Protect and sustain the established appearance and character of views and prospects listed in Tables 8.14 – 8.18 of this Plan that contribute to the distinctive quality of the landscape, from inappropriate development.

Scenic Views:

The LCDP also has designated views as experienced travelling along existing roads due to their amenity and tourism value, with many located within or looking towards the various landscape designations. The nearest scenic views are located ca. 2.1km southeast of the proposed development, with views across Dundalk Bay and not in the direction of the proposed development.

NBG 40: To prohibit inappropriate development which would interfere with or adversely affect the Scenic Routes.

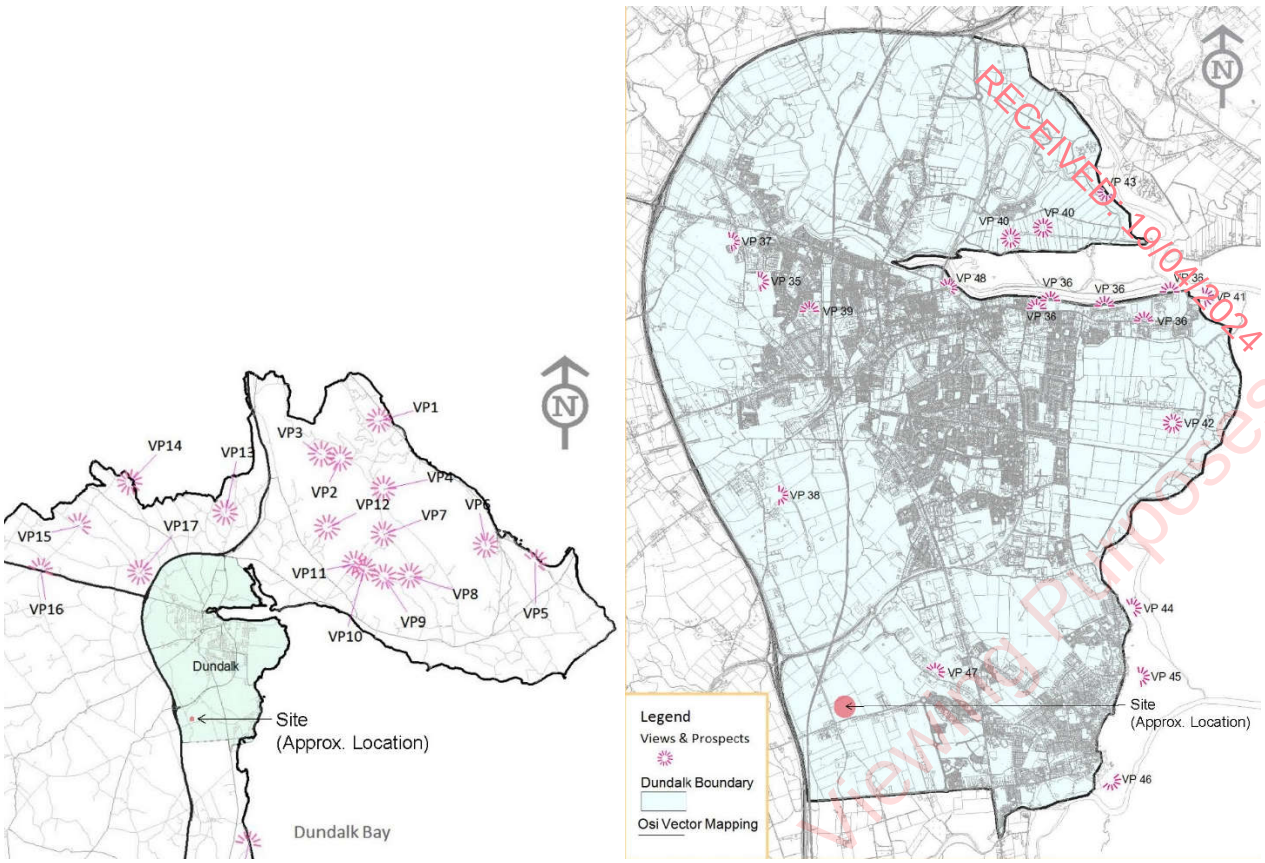


Figure 6.3 –Louth CDP Views and Prospects, County Louth (extract). Source: LCC CDP 2021-2027 Map 8.16 Views and Prospects, County Louth

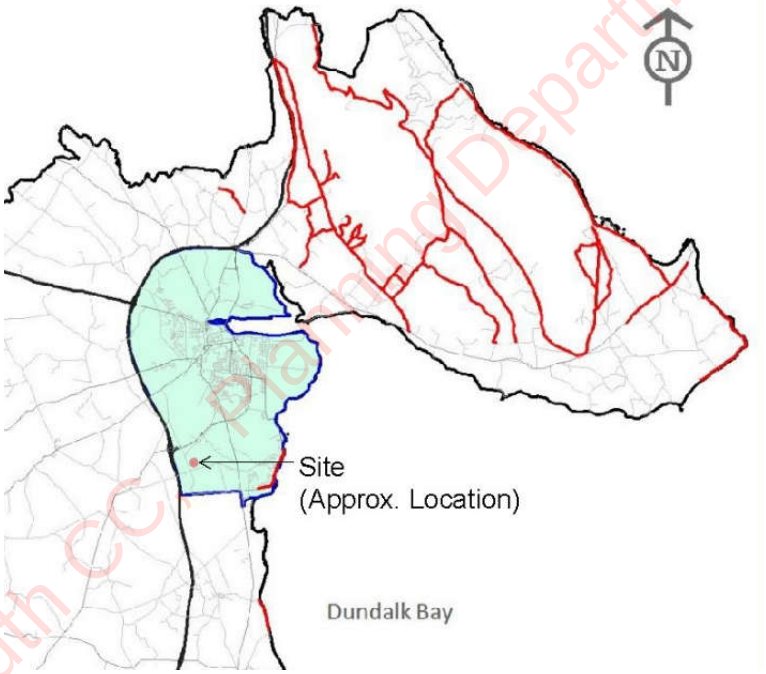


Figure 6-4 - Louth CDP Scenic Routes (extract) Source: LCC CDP 2021-2027 Map 8.20 Scenic Routes, County Louth and Dundalk

Green Infrastructure:

NBG 41 *To support the green infrastructure network of County Louth and ensure its implementation in the assessment of all development proposals to prevent adverse impact on the ecological connectivity of County Louth's Core Areas.*

NBG 48 *All future development proposals shall require within the overall design scheme the integration of environmental assets and existing biodiversity features including those identified in Table 9 of the Green Infrastructure Strategy Appendix 8, Volume 3, to enhance the quality, character and design of the proposal.*

NBG 49 *To require the integration of green infrastructure and inclusion of native planting schemes in all development proposals in landscaped areas, open spaces and areas of public space.*

NBG 51 *To require the integration of climate change mitigation measures in any future spatial plans and climate change adaptation measures in proposed developments.*

Built Heritage

Archaeology

All known recorded monuments (and any new archaeological sites, artefacts or other evidence subsequently discovered) are protected under Section 12 of the National Monuments (Amendment) Act, 1994. Relevant Policies of the LCDP in relation to archaeological heritage are as follows:

BHC 1 *To protect archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places (RMP), and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process.*

BHC 6 *To ensure that any development, both above and below ground, adjacent to or in the immediate vicinity of a recorded monument or an area of special archaeological interest (including formerly walled towns) shall not be detrimental to the character of the archaeological site or its setting and be sited and designed with care to protect the monument and its setting. Where upstanding remains exist, a visual impact assessment may be required.*

BHC 10 *To require, as part of the development management process, archaeological impact assessments, geophysical surveys, test excavations and monitoring, as appropriate, where development proposals involve ground clearance of more than half a hectare or for linear developments over one kilometre in length or for developments in proximity to areas with a density of known archaeological monuments and history of discovery, as identified by a licensed archaeologist.*

Historic Gardens and Designed Landscapes

The LCDP recognises the importance of historic gardens and designed landscapes and their role in providing the setting for protected structures.

BHC 38 *To ensure new development will not adversely affect the site, setting or views to and from historic gardens and designed landscapes of heritage significance.*

Infrastructure & Public Utilities

IU 19 *To require the use of Sustainable Drainage Systems to minimise and limit the extent of hard surfacing and paving and require the use of SuDS measures be incorporated in all new development (including extensions*

to existing developments). All development proposals shall be accompanied by a comprehensive SuDS assessment including run-off quantity, run off quality and impacts on habitat and water quality.

Chapter 11 - Environment, Natural Resources & the Coast

ENV 38 *To retain and protect significant stands of existing trees/ hedgerows/woodlands, and seek increased planting of native trees, where appropriate, in new developments*

ENV 39 *Protect and preserve existing hedgerows in new developments, particularly species rich roadside and townland boundary hedgerows, and where their removal is necessary during the course of road works or other works seek their replacement with new hedgerows of native species indigenous to the area.*

Zoning

E2 Business and Technology

Objective: To provide for office, research and development and high technology/high technology manufacturing type employment. These developments should be designed to the highest architectural and landscaping standards while promoting walking, cycling and public transport accessibility. Refer to Figure 6.5.

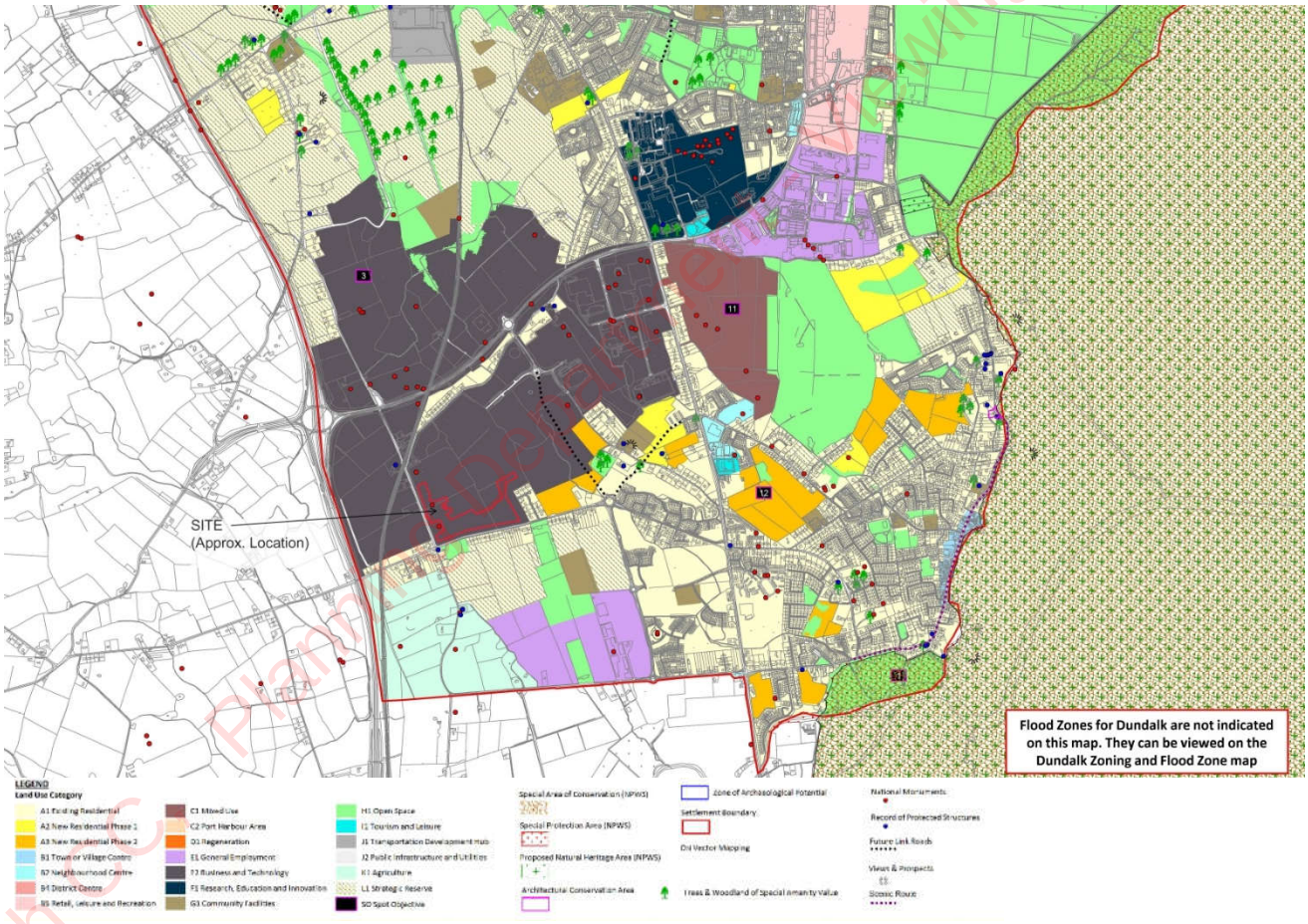


Figure 6.5 –Louth CDP Zoning Map (extract) Source: LCC CDP 2021-2027 Dundalk Composite Map

Mullagharlin Framework Plan 2008

The Mullagharlin Framework Plan 2008 is a framework which seeks to create a place with a unique identity that has the potential to attract high-end investors from Ireland and abroad. In this respect, one of the central objectives of the Framework Plan is to influence positive change that improves the investment product and raises the profile of Dundalk within the national and international arena. It is, therefore, an intention that the project is an inclusive one, which will ultimately provide the impetus for others, including the key stakeholders to initiate key actions to realise this vision.

The proposed development is located within Mullagharlin Landscape Character Area which the framework envisages as an area that due to its strategic location will be developed as:

A commercial, industrial, research and development employment zone. These types of uses will require a range of building forms varying from large building envelopes required by biopharmaceutical companies to smaller clusters of incubator units. It is proposed that all development will be embedded into a high quality landscape setting with connections to a network of green spaces and the overall transportation network including generic public transport within the campus and soft modes (walking and cycling). Within these areas physical markers such as artworks and water features are encouraged.

The framework sets out a number of site-specific objectives for this LCA which encourages a high-quality landscape design and public transport access to the area. Refer to Figure 6.6.

The site-specific policy requirement for the Mullagharlin West Character Area are as follows:

S11 The design shall seek to encourage innovative, creative and contemporary architectural design solutions through a high standard of design and site layout to ensure an attractive presentation is achieved. The built form shall be consistent with the spatial layout illustrated in the Framework Plan. The placement of large buildings in this area will be encouraged to favour the low-lying points of the landscape whilst tall slender buildings will be encouraged on the prominent/ high points of the landscape particularly in the vicinity of the southern link road.

S12 New buildings in this area shall be sympathetic to existing development, particularly established residential properties. The massing, volume and height of new development should be sensitive to the amenities of established properties within this area.

S13 High quality planting, screening and/or buffers will play an important role in softening the appearance of largescale structures. Mitigative planting shall contain semi-mature trees as part of reducing the visual impact of these structures on the surrounding area.

S14 Screening buffers shall be encouraged to ensure these car parks are not visible from the road and that hard surface areas are broken into cells. No on street parking and loading bays will be permitted on street within the vicinity of the gateway sites.

S15 The design of the sites within the Mullagharlin area will include high quality public or private open space that accentuates the landscape setting and prominent location. Development within this area shall respect the prominence of the gateway sites. Proposed landscaping schemes shall at least be equivalent to the standard set by DKIT Campus, Xerox and the IDA.

Figure 6.6 - Mullagharlin Framework Plan Character Area Map

6.3.2.2 Landscape Character

A landscape character assessment study was undertaken in 2002 for Louth County Council. The purpose of the LCA study is to analyse the character, value, and sensitivity of landscapes identified within a particular area which can be used to aid in decision making in relation to the management and planning of the landscape.

The LCA study has identified 9no. Landscape Character Areas across the county, of which the study area is located within 'Muirhevna Plain' Landscape Character Areas (LCA) and Dundalk Bay LCA. The proposed development falls within the Dundalk Bay LCA. The study's description of both LCAs is detailed below.
Muirhevna Plain LCA

Extent: This area is by far the largest landscape area in the county. It extends from the top of the Boyne Valley up to the and including Dundalk. It is identified for its flat undulating features drained by the meandering lazy rivers of the Fane, Glyde, White and Dee rivers. It contains the most fertile agricultural land in the county, which gives an overall impression of good farming husbandry. In the western half the landscape horizon is limited due to the smaller field patterns with their mature hedgerows and trees. The new motorway, when travelling north, offers uninterrupted views of the Cooley mountains for miles.

Landscape Characteristics: The LLCA describes the distinctive Landscape Characteristics of this LCA. The key characteristics of 'Muirhevna Plain' are; Refer to Table 6-8.

- Serves as a major traffic corridor between North and South.

- Extensive plain located between the Carlingford/Slieve Gullion mountain complex and the uplands of Collon and Monasterboice.
- Rich soils are conducive to extensive agricultural practices both in crop and animal production.
- Robust hedgerows give a sense of enclosure.
- The nature of the topography has had the effect that a number of small meandering rivers drain the flat landscape.
- The nature of the topography has had the effect that a number of small meandering rivers drain the flat landscape.
- Contains a number of fine broadleaf wooded areas around country houses.
- Area is rich in archaeological features.
- Renowned for its mythological past leading to the definition of the Táin Trail.
- Isolated housing is very evident especially in the eastern half.

Landform and Landcover: “Around Ardee there are undifferentiated groups of limestone, mudstone and sandstone from the Carboniferous/Dinantian Period. Whilst there are little are no commercial forests in the area, it abounds in small woodlands which are primarily broadleaf in character, particularly beech, with some oak and chestnut occasionally. Many of these trees are entwined with the ubiquitous climbing ivy. Ardee is particularly rich in tree cover. Other areas include Barmeath (N.H.A), Blackhall (N.H.A), Corderry, Darver (N.H.A.), Drumcar, Drumcashel, Lisrenny House, Rathbrist and Stephenstown. “

Human intervention:

- Evidence of hedgerow removal to facilitate more intensive farming.
- The Dublin - Derry N2 and Dundalk –Limerick N52, passes through Ardee at present, and a bypass is being proposed to relieve the traffic congestion in the town.
- Isolated rural housing is much more obvious in the eastern half of the area, due to the influence of the two large county towns and the more open landscape.
- E.S.B. power lines (220 kv) are quite obvious in the landscape.

Landscape Sensitivity:

- Underlying geology of glacial kames suggests that sand and gravel as possible mineral resource leading to proposals for quarrying in the area.
- In this open flat landscape the removal of traditional hedgerows would have a significant impact on the landscape. Where in some cases hedgerows have to be removed their replacement should be a similar hedgerow and not a post and wire fence, wooden fence, or brick wall.

- The rivers Glyde, Dee and Fane have the potential for change in terms of recreation and fishing which can be both positive and negative.
- Ardee bog (proposed N.H.A.) is currently under threat from land drainage.
- Rural housing and farm buildings being of a scale difficult to integrate into the landscape.

Table 6-8 – Muirhevna Plain Landscape Values & Classification

Key Values	Objective
Extensive area of good quality agricultural land with fine traditional hedgerows.	Conserve/enhance/restore
Small but very fine broadleaf woodlands throughout the area and within the town of Ardee.	Conserve/enhance
High density of archaeological features, particularly souterrains.	Conserve
Contains four proposed N.H.A.s	Conserve/create
Rathescar Lake worthy of N.H.A. status.	Conserve/create
Overall Classification	Regional

Dundalk Bay LCA

Key Characteristic of this LCA include:

- Land is relatively flat and not higher than 20m O.D.
- Seashore is mainly of marsh at the northern end, which gives way to sandy beaches in the
- south. Coastal erosion is evident.
- Well-defined hedge rows with larger fields. Some examples of old Country house estates with broadleaf planting.
- Main settlements are Blackrock, Dromiskin, Castlebellingham/Kilsaran and Annagassan.
- Motorway to the west has reduced the traffic along the old N1
- The area is rich in archaeological features.
- Dundalk Bay is a designated Special Protection Area (SPA).
- Isolated housing is very evident.

Landform and Landcover: Underlying geology consists of Dundalk and Castlebellingham is mixture of turbidite with a mixture of red shale, and red mica from the Ordovician /Silurian period, along with a few igneous

intrusions. At Salterstown there is a band of calcareous red mica greywackes with other greywackes and mudstone at Dunany. Above that there is the glacial drift of raised marine deposits of gravel extending along the coastline. Inland from that boulder clay which covers the greater part of South Louth can be found. The landscape is flat in the north and just above sea level with the exception of Dunany Point where there are cliff faces down to the shoreline.

Dundalk Bay is a Special Protection Area (SPA) designated for its special ornithological values. The bay is shallow with coastal erosion around Annagassan and Salterstown. Scenic routes provide views across Dundalk Bay towards the Cooley Mountains.

Human Intervention:

- The area is rich in archaeological items (approx. 80). The important sites are the Round Tower, Cross and Church at Dromiskin and the Motte at Greenmount. Salterstown has been designated as a settlement worthy of special architectural interest.
- Field patterns and hedgerows have remained the same for past few hundred years. Some loss of hedgerows. Stone wall occur in some area which indicates the shallowness of the overburden above the underlying geology.
- Settlements including Blackrock, Castelbelllingham/Kilsaran have experienced changes due to the motorway and greater residential areas.

Isolated housing is very prevalent and conspicuous in this flat landscape.

Landscape Sensitivity:

- Further removal of hedgerows and stone walls, whilst extending the panoramic views available in the area, would alter the landscape character.
- However further diversification in the horticulture sector is possible where there is easy access to Dublin markets. Accommodation for rural tourism can be expected to expand. The expansion of mariculture is possible between Salterstown and Dunany.
- Broadleaf and mixed forestry (30% broadleaf 70% conifer) would be sustainable in this L.C.A. and particularly in the Salterstown-Dunany area.
- There is no serious threat to the area for the introduction of further telecommunication masts given the existing coverage in the area.
- Windfarms in the present economic energy climate are not likely to emerge in the immediate future due to the low theoretical windspeeds in this area. However, offshore masts may be a possibility in the shallow reaches at Dundalk Bay. Refer to Table 6-9.

Table 6-9 – Dundalk Bay Coast Landscape Values & Classification

Key Values	Objective
Dundalk Bay (S.P.A.) Saltmarsh and mudflats with full range of plant communities. Very important for wintering and migrating wading birds.	Conserve

Some fine groups of broadleaf trees.	Conserve
Impressive coastal routes of high scenic quality.	Conserve/restore
Dunany Point area where there is a sense of tranquillity due to the low levels of the of the built environment, traffic and noise.	Conserve/restore
Opportunities for recreational pursuits with particular emphasis on the river edges and coastline.	Conserve/enhance/restore
Rich in archaeological features.	Conserve
Landlord village at Castlebellingham.	Conserve/enhance/restore
Existing hedgerows and stone walls.	Conserve
Overall Classification	Regional

6.3.2.3 Summary of Proposed Development's Compliance with Planning Policy

- The Proposed Development has been designed to appropriately sited next to the existing WuXi Biologics facility and will be similarly enclosed by earth berms to help minimise any potential impacts on local receptors.
- The Proposed Development and existing WuXi Biologics Facility are located within an area of land zoned as E2 Business and Technology which is to provide significant employment opportunities for the town as envisaged by the Mullagharlin Framework Plan 2008.
- The Proposed Development will be sited within an area of grassland with minimal impact on existing field hedgerows. As part of the landscape mitigation plans there will be opportunities to provide a mix of native species planting in the form of hedgerows and trees which will create net ecological gains and improvements to the local green infrastructure.
- No site-specific landscape designations within the site or in the immediate wider area and so no likely significant impact on landscape and visual amenity occurs. Similarly, the proposed development is relatively low in height and is likely not to affect any protected views or scenic routes within the town or wider county.
- The Proposed Development is in the County's Dundalk Bay LCA, but away from the LCA's more sensitive coastline and within an area of landscape already deemed as having the ability to accommodate development in the form of the operational WuXi Biologics Facility.

6.3.3 Description of the receiving environment

The existing site and its environs are described below in terms of:

- Site Location and Context
  - Site boundaries
- Access

- Topography and Drainage
- Land Cover
- Built and Cultural Heritage
- Landscape Character
- Landscape and Visual Amenity

Site Location and Context

The Proposed Development is located within the confines of the existing WuXi Biologics facility which is located within the IDA Dundalk Science and Technology Park, Mullagharlin, Dundalk on the southwestern edges of Dundalk. The proposed development lands are located within the townland of Haynestown.

The Proposed Development western boundary and southern boundary run close to the Mullagharlin Road and Marlbog Road, both local grade roads, with an existing fenced entrance to the Site directly off the Mullagharlin Road. While the Site is located close to 2no. main national transport routes which include the Dublin-Belfast railway line ca. 130m and the M1 motorway by ca. 480m both westwards of the Site. Across the surrounding areas are various residential, commercial, including the Xerox Plan, and agricultural uses which reflect the strategic importance interface of the part of Dundalk Town's urban-rural fringe. Refer to Figure 6.7.

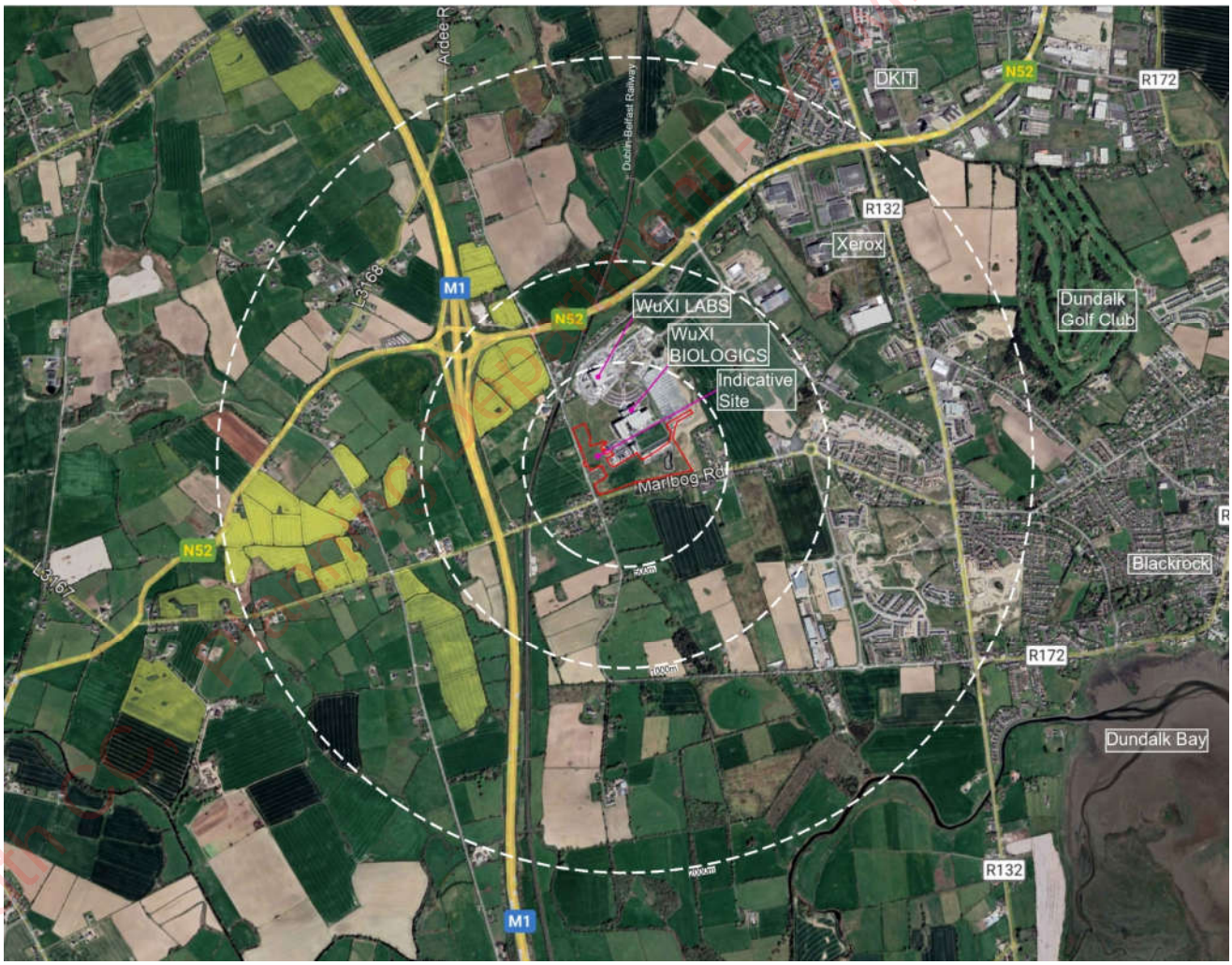


Figure 6.7 – Location of Proposed Development

Site boundaries

The proposed development is contained within the western and southern limits of the existing WuXi Biologics facility. The proposed development is predominantly enclosed by a mix of large grassed and tree covered berms and mix of fencing include post and wire, paladin and palisade along its western, southern and eastern boundaries. While its northern boundaries are contained by the adjoining existing plant's buildings, structures and roadways. More open ends of the proposed development include its far northwestern end which opens on the surrounding grassland and its far north-northeastern end which opens on a small area of hardstanding.

The proposed development western and southern boundaries are framed by a tall tree lined hedgerow which runs along the lengths of Mullagharlin Road and Marlbog Road but falls just outside of the site limits. The hedge is largely enclosed with the exception of some small openings into the Site, Gas Network Ireland compound and other electrical service units. This tall hedgerow helps to contain inward views of the Site and existing plant from a number of local roads, housing, farmland and section of railway line nearest to the boundary. Refer to Plates 6-1 and 6-2.

Plates 6-1 – Tree lined hedgerow adjoining the western boundary next to Mullagharlin Road

Plates 6-2 – Tree lined hedgerow adjoining the southern boundary next to Marlbog Road

Access

Access to the proposed development can be gained from off the existing internal tarmac roads of the WuXi Biologics facility leading around to the existing facility. Which itself is assessed from off Mullagharlin Road within the IDA Dundalk Science and Technology Park which leads to the public N52 national grade road. The far northeastern slit of land can be accessed from the overflow carpark. There is also a fenced off entrance on the western end off Mullagharlin Road. Refer to Plates 6-3 and 6-4.

Plate 6-3 Internal access roadway by the Site boundary

Plate 6-4 Main access leading to WuXi Biologics

Topography and Drainage

The existing proposed development lands are at an elevation varying between approx. 18.5 to 29m AOD. This includes a notable level change between approx. 18-23m AOD from the existing facility grounds and roadway up to the original farmland level which is marked by a steep embankment off the roadway. The original farmland varies between approx. 23m to 25m AOD with a slight rise westward towards the road. The lands to the south and southeast have several distinct berms made up of previous spoil extracted as part of the original WuXi biologics site works, with these elevated approx. 5m to 9m above the grounds reaching up to approx. 26m to 29m AOD.

The proposed development does not contain any natural streams or rivers. There is a large manmade SUDS attenuation pond to the eastern end of the Site which forms part of the wider managed SUDS systems through the WuXi Biologics land, which includes some landscaped suds water features to the front of the main building. Refer to Plates 6-5 and 6-6.

Plate 6-5 Site's relatively flat western area land

Plate 6-6 Notable drop in elevation from original and the Site existing facility and service road

Land Cover

Vegetation

Across the proposed development most of the land falls under grass cover which includes areas of undeveloped lands, the existing grassed berms by the boundaries, and a more formal suds areas adjoining the building. Some of the berms to the eastern end have been planted with a mix of young native trees including birch and alder species to provide additional screening from the adjoining Brookfield housing estate. There is a single dry SUDs Pond which contains a number of marginal planting, including bulrushes, found along its lower banks. The dense hedgerow found directly next to the proposed development's western and southern boundaries edges are prominently ash trees with also some occasional other native trees including birch, alder and underplanting of hawthorn, ivy, and briars through it.

Some of the site lacks vegetation where the land is covered in hard surfaces in the form of gravel, concrete and asphalt surfaces to support the existing wastewater treatment plant, access roads and paths. Refer to Plates 6-7 to and 6-10.

Plate 6-7 Grassland cover on the Site's Western end

Plate 6-8 The Site's slopes and embankments are predominantly under grassland cover

Plate 6-9 Grassland on eastern end of Site looking with partial views of the building and berms

Plate 6-10 The Site's SUDs treatment pond north

Built structures

The proposed development boundary skirts alongside part of the existing WuXi Biologics facility and road infrastructure. These structures consist of a mix of metal tanks, small supporting buildings and lengths of piping above ground sited within hard surface areas contained by security fencing. Immediately north of the site boundary line is the large tall existing WuXi Biologics building. Towards the northeastern end the boundary runs next to other supporting buildings. While the western boundary edge passes next to a Gas Network Ireland compound. Refer to Plate 6-11a and 6-11b.

Plate 6-11 (a) Part of the existing wastewater treatment plant

Plate 6-11(b) View northeast of the existing wastewater treatment and main building

Built and Cultural Heritage

The proposed development contains a number of historic features with some located within an exclusion zone of the proposed development works. Refer to Chapter 12 – Cultural Heritage. As part of the archaeological assessment for the original WuXi Biological facility some excavations took place at the souterrain and the immediate lands with some small artefact finds of previous habitation of late Neolithic era (discussed further in Chapter 12 – Cultural Heritage).

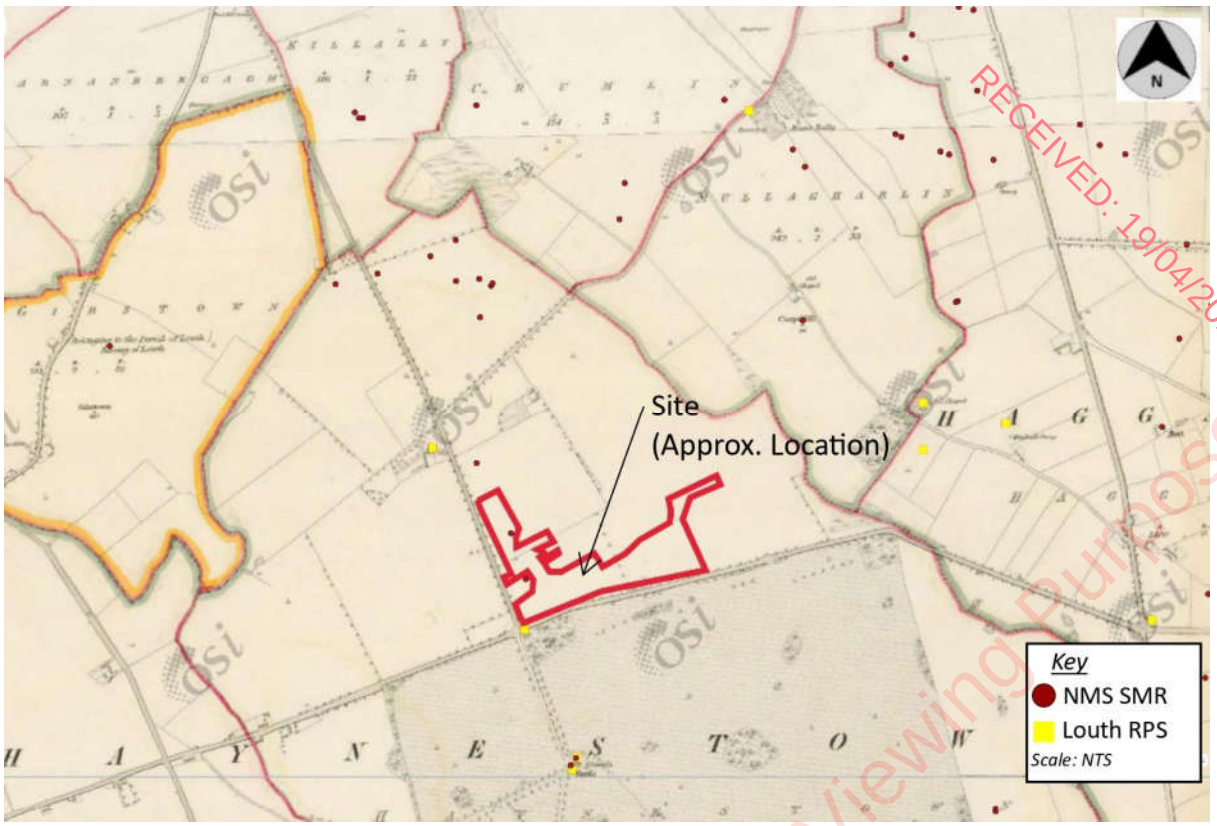


Figure 6.8 - Mid-19th century 6 inch Map with National Monuments Service (NMS) and Recorded Protected Structures (RPS). Source: Heritage Maps Heritage Council 2023

Landscape Character and Visual Amenity

The proposed development and immediate lands have some remnants of its former agricultural in the form of established field hedgerow and some undisturbed grass cover. Although its character has been largely altered in recent years with the construction and operation of the existing WuXi Biologic facility and associated activities through the grounds. Which is reflective of the planning policy changes for the Mullagharlin Framework lands from one of agricultural land use to business and technology employment area. The retained high field boundary together with the WuXi Biologics facilities existing berm and setting of buildings below ground levels creates a sense of visual enclosure of the site lands and existing plant structures. The tall buildings of the WuXi Biologics facility falls just outside of the Site and is a prominent local structure.

Wider Environs

Topography and Drainage

Across the wider local area the lands are of a similar low elevation ranging from approx. 5 to 40m AOD. The lowest lands are to the south and southeast in the direction of the coastline and the highest lands are to the west and northwest peaking as small hills.

Similarly, there are no streams or rivers to be found within the immediate area. The closest watercourse is the Carnabreagh Stream located ca. 700m west of the proposed development and the Haggardstown River is located ca. 750m east and is separated from the proposed development site by the L3161 Marlbog Road. This stream outfalls directly into Dundalk Bay. The Haynestown Stream is located ca. 1.1km south of the proposed

development site. and is separated from the proposed development site by the L3161 Marlbog Road. This stream is a tributary of the larger Fane River.

Land Cover

Vegetation

Vegetation cover across the urban area includes recent planting within the new business parks and housing estates including tree lined avenues/streets roadsides and mass planting of shrubs. While mature gardens can be found within the areas of established housing.

The vegetation cover across the wider rural area is of small and medium scale fields under productive pasture and tillage cover. Many of these fields are bound by mature hedgerows. Small copses of woodland can be found scattered through the lands with many the remnants of former estates. More linear lengths of woodland follow the motorway and railway line transport corridor.

Recent developments within the immediate area of the science and technology park means there are some large areas of recent disturbed grounds undergoing construction and a large gravel temporary carpark, of which a narrow section falls within the Site's far northwestern edges.

Built Structures

Within proximity to the site and WuXi Biologics facility is its neighbouring WuXi Vaccines Ireland plant of a similar height approx. 198m to the northwest of the site boundary line. Across the immediate area of the science and technology park are various low temporary buildings found within several construction compound areas.

The wider area is heavily influenced by its location on the edge of Dundalk town and proximity to Blackrock and the M1 motorway. This has led to the grow over the years of large of industry manufacturing and warehouse units within the new business parks and expansion of housing estates along the urban-rural fringes

Housing across the rural area is typically in the form of ribbon developments or smaller groups along and off of the various local roads, including those within proximity of the site. The density of housing is reflective of their location and ease of access to the town and motorway.

Cultural Heritage

There are a number of protected structures within the wider landscape which include a cottage, farmhouses and ecclesiastical sites. here are no Historic Gardens and Designed Landscapes (HDGL) within 2km of the proposed development. Further details can be found within the Chapter 12 - Cultural Heritage chapter of this EIAR.

Settlements, Landscape Character and Visual Amenity

The southern limits of the town of Dundalk nearest to the site are recognised through local planning policy as a key area for the town's economic development and employment growth due to its strategic location near to the motorway. This is reflective by the continued development of large industrial structures within the IDA business park with future changes to the existing farmland as the park expands across these zoned lands.

The surrounding area has also experienced a notable change from rural to urban area with the expanding housing estates of varying sizes.

Nonetheless the landscape has a high amenity value and is reflective of the Dundalk Bay Coast and adjoining Muirhevna Plain character area with an attractive mix of the industrial, functional, urban, and rural backdrop – agriculture.

Recent expansion of urban areas whilst locally transformational has not impacted on this wider balance and setting. Refer to Plates 6-12 and 6-13.

Plate 6-12 IDA lands nearest to the Site undergoing change

Plate 6-13 Nearby small Brookfield Housing estate bounded by the IDA lands

6.3.3.1Summary of Landscape Characteristics and Values

The values and characteristics of the site are listed below and can be categorised in two ways – values which should be conserved, and those that provide opportunity for enhancement. These values are summarised below:

The character of the area is not protected but any development should consider the setting of the area and where possible be sympathetic to it.

Conservation Values

The values to be conserved indicate those aspects of the receiving environment which are valued and sensitive and could be negatively impacted on by the Proposed Development.

- Mature trees/treelines across the Site's outer boundaries.
- The well-established surrounding residential areas.
- Some archaeological and historic elements of local importance within the site and local area

Enhancement Values

The values to be enhanced represents the site's capacity to accommodate change and therefore reflects landscape susceptibility. These include:

- Current lands around the existing WuXi Biologics facility largely under grass and under used.
- Current Development Plan zoning and strategy for maximising the potential of the existing IDA lands in which the proposed development is located, to reflect the objectives of the Mullagharlin Framework Plan and sustainable development of the existing WuXi Biologics facility.

6.4 Potential Effects on the Landscape

6.4.1 Landscape Sensitivity

The receiving environment consists of;

- The existing WuXi Biologics facility and wider IDA development lands within the Mullagharlin Framework Area; and,
- Surrounding suburban areas on the Dundalk/Blackrock urban-rural fringes, proximity to the national motorway and railway routes and rural areas in the wider area.

A review of the extent to which the development will affect the views experienced from adjacent landscapes are examined in the visual assessment section.

6.4.1.1 Landscape Sensitivity Assessment

Landscape Sensitivity: The Site, Immediate setting

These areas contain the existing WuXi Biologics and nearby WuXi Labs along with other company's manufacturing facilities and business/technology units within the extent of the Mullagharlin Framework lands. Although much of the lands between the existing industrial units within the framework lands have remained under working agricultural lands but these undeveloped zoned lands for employment are subject to future change through planning policies/developments. Near to these industrial lands along the network of local roads are small groups of residential areas which reflect the Site's location on the Dundalk town's urban-rural fringes. While the site is also found near to key road and rail transport networks.

Overall, the urban-rural landscape while established has some capacity for change and growth which is reflective of recent developments and planning policy for the area, thus is classified as Medium Sensitivity. This is defined as:

The sensitivity of these areas is regarded as **Medium** - *Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.*

Landscape Sensitivity: Wider areas

The wider area contains a mix of industrial/commercial, educational and large suburban residential areas which fall within the town's settlement limits. While there are some areas of existing working agricultural lands within the town's southern settlement limits that are zoned for future housing and employment areas that will be subject to future changes. Further to the south and west beyond the town limits, the lands are largely prominently active

farmland with areas of residential areas along the rural network. This rural landscape area is influenced by its proximity to the settlements of Dundalk and Blackrock and the motorway/railway networks.

The sensitivity of these areas is regarded as **Medium** - *Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.*

6.4.2 Construction Impacts and Effects on the Landscape

The construction stage will result in ongoing infrastructure, building and related works for ca. 15 months. Overall, the impacts described are generally short-term and visually adverse in nature.

6.4.2.1 Construction Effects on The Site and Immediate setting (medium sensitivity)

The construction stage will result in ongoing infrastructure, building and related works. This will entail:

- Site clearance across the footprint of the proposed development, including establishing a temporary compound area. Tree protection measures if any site works are near to adjoining trees on the boundary.
- The temporary movement and stock piling of earth and materials.
- The temporary movement of machinery, materials and personnel in and out of the site.
- All engineering, building and landscape works required with associated site infrastructure, fencing and plant.
- Grading and sowing of the permanent embankments and earth stockpiles with grass and wildflower mixes as indicated on the site layout plans.
- Reinstatement of the site compound area to grassland on completion of the siteworks.

The effects during construction would relate to a small geographical area. The development works are to be expected in such an urban environment and are not out of keeping with the expected character of the wider area and are in keeping with local policy for change.

The magnitude of change to this character area, during construction is expected to be **Low** to **Medium**. The importance of this effect would be **Slight** to **Moderate** and **Adverse** but **Temporary.**

6.4.2.2 Construction Effects on Wider Context (Medium sensitivity)

The effects during construction would be localized, being contained by the immediate local area. The change would introduce change in the form of additional building works occurring across the existing industrial lands. But these are not unexpected and are present in local policy and planning.

The magnitude of change to this character area, during construction is expected to be **Low to Negligible** which generates a **Slight to Not Significant, Temporary effect**.

6.4.3 Operational Impact and Effects on the Landscape

The site's Enhancement Values reflect policy that is supportive of further development across the lands contained within the Mullagharlin Framework Plan area including within existing operational sites to allow for further potential growth and to improve their current capabilities. The landscape analysis indicates a context where currently large areas of these development lands have remained undeveloped including large grass areas within the site. However, future changes provide opportunities to improve the existing landscape /townscape quality of these zoned lands through careful design so that any developments positively reflect the aims of the masterplan.

The site's Conservation Values relate to the context of the surrounding Mature trees/treelines just outside of the site's outer boundaries, neighbouring residential areas and some sites of local heritage significance. The impacts here would be primarily visual and relatively localised. These effects are discussed in the visual assessment.

The effects of this in terms of alteration of the landscape character are assessed below.

6.4.3.1 Operational Effects on Site and Immediate Area (Medium Sensitivity)

The effects on completion would relate to a small geographical area as the Proposed Development like the existing WuXi Biologics facility will be contained by the proposed and existing berms together with the high band of trees located immediately off of the Site boundaries.

The nature of the development will be a small expansion of the existing facility (P1122-01). With the various proposed elements and roadway having the same characteristics of elements found throughout the existing plant grounds.

As part of the proposed development soft landscaping mitigation and the newly formed berms will be shaped and sown with grasses to help merge them with the other existing berms contained within the Site's southern area. Similarly, the slopes of the embankments around the buildings and roadways will be sown up with grasses along with some slopes sown up with suitable wildflowers mixes which will also have local biodiversity benefits.

The change is in keeping with local policy for change through the further development of the currently underused lands within the designated Mullagharlin Framework lands.

The **magnitude of change** to this character area, would be **Low** - change that is moderate or limited in scale, resulting in minor alteration to key elements features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.

The **significance of this effect** would be **Slight and in the Short, Medium and Long Term**.

Qualitatively this change would be **Neutral.** The proposed development complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality.

6.4.3.2 Operational Effects on Wider Area (Medium Sensitivity)

The effects of the development at operation would be localised in the wider context. The proposed development would not change the characteristics and qualities of the wider growing suburban residential lands or rural landscapes contained within the Muihevna Plain and Dundalk Bay Coast LCAs.

The **magnitude of change** to this character area, would be **Negligible**. Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the landscape key elements features or characteristics of the landscape,

The **significance of this effect** would be **Not Significant to Imperceptible** and in the Short, Medium and Long Term.

Qualitatively this change would be **Neutral.** The proposed development complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality.

6.4.4 Landscape Effects Summary

The proposed development falls within an area of lands that has been designated as a zone of Business and Technology under planning policy where changes to these lands are excepted under the Mullagharlin Framework Plan. The scale and characteristics of Proposed Development's elements are similar to that of the existing facility. The design layout seeks to minimise disturbance to the existing landscape elements by it being contained within a part of the site that is an under used grassland area. The built elements will be further contained within the immediate landscape by siting them lower than the existing topography through excavation of the land. The resulting excavated spoil will be retained on site and used to create new berms which are to be located alongside existing berms found near the southern boundary. These earthworks will be sown with a mix of grasses along with some wildflower meadow areas with additional biodiversity benefits. The works will not affect the high boundary hedgerow of the Mullagharlin Framework lands falling just outside of the Site which helps contain the proposed development.

Overall, the Proposed Development once operational will have a **Slight significance, neutral quality, long term** upon the landscape characteristics of the local area and is less apparent within the wider area having a **Not Significant to imperceptible significance, neutral quality, long term.**

6.5 Potential Visual Effects

6.5.1 Sensitivity of Visual Receptors

6.5.1.1 Zone of Visual Influence and Potential Visual Receptors

Based on the assessment of the landscape characteristics, values and sensitivities a number of viewpoints located along the local road network were selected for the assessment of visual effects of the Proposed Development. The onsite site survey concluded that due to the Proposed Development's structures being sited on an area of land set below the existing ground level together with the screening effects of the surrounding topography and existing vegetation that the visual effects in views from many areas around the subject site and wider area will be none to negligible. On this basis the following 8no. representative viewpoints from along the immediate road network were selected for assessment and photomontages, as per locations listed in Table 6-10 and mapped in Figure 6.9 below.

Table 6-10 – Viewpoint Selection

No.	Receptors and Views	Rationale for selection	Approx. distance from site boundary

1	Opposite Site Entrance	Representative of views from local road network	8m west
2	Opposite entrance to house	Representative of views from local residential area	22m west
3	Opposite entrance to house (group of 2)	Representative of views from local residential area and nearby protected structure	76m northwest
4	Next to B&B (between Heritage B&Bs and adjoining house)	Representative of views from local residential area	375m northeast
5	Open space in Brookfield Housing Estate, Marlbog Road	Representative of views from local residential area	165m east northeast
6	Houses along Marlbog Road	Representative of views from local residential area	20m south
7	Haynestown Cross Roads	Representative of views from local residential area and protected structure	41m southwest
8	St Paul's Church/ Haynestown Castle	Representative of views from local historic protected structures	401m southwest

Figure 6.9 Viewpoint Figure

6.5.1.2 Photography and presentation of viewpoints

Each Viewpoint is illustrated by a photograph illustrating the existing view and the photomontage showing the proposed development. The Photomontages have been produced by Modelworks and can be found within Appendix 6 (Volume 3) of this application. Verified photographs and photomontages have been taken with a wide-angle focal length (FL) and prime lens to allow representation of the development within its context. In all visualisations, the extent of the 50mm FL view has been indicated for reference, which is broadly equivalent to the c.40-degree Horizontal Field of View (HfoV) and is representative of what the human eye perceives and reflects the requirements of the Landscape Institute Technical Guidance Note on Visual Representation 2019. The verified views from each viewpoint were captured in October 2023.

To correctly view the photomontage at the correct scale the extents of the 50mm lens or 40-degree angle of view should be extended to A3 in size and viewed at arm's length. This can be done by printing a hard copy or, more easily, digitally on screen, allowing reference back to the wider angle to understand the context.

6.5.2 Predicted Visual Impacts and Effects

Viewpoint Descriptions

Each viewpoint is described below in its existing condition and the effects of the proposed development. The descriptions, including of the change / effects, focus primarily on the extent of the 50mm image, but refer to the wider context, as appropriate, to inform analysis.

Temporary effects at Construction Phase are briefly described. Effects at Operational Phase are described in more detail.

6.5.2.1 Viewpoint 1: Opposite Site Entrance on Mullagharlin Road

Existing View

The view is from standing directly opposite a break in the site's outer high hedgerow along its western boundary on Mullagharlin Road, which allows partial views into the Site. Here a former field gate entrance has been further enclosed by metal security fence and another fence line set further back from it. Through the gaps in these fences are views of the various elements within the existing WuXi Biologics facility and western profile of the WuXi Biologic building. The more elevated former agricultural lands visible in the foreground help to screen from view some of the lower elements within the existing WuXi Biologics facility. While against the background is the outline of the Cooley Mountains.

The view is representative of road users – including walkers, cyclists and vehicle users.

The viewpoint sensitivity is **Medium** - *Viewers are travelling at slow or moderate speeds through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views….*

Visual Impacts and Effects

Construction Phase

The view will include that of upgrading works to this entrance to provide access to the construction compound and of internal views of the siteworks including the initial earthworks followed by the built and engineering works to the proposed development. As the new access point for the construction compound there will be site traffic coming/going at certain times during the operating hours for the construction phases.

The Magnitude of change would be **Low**, the significance of effect would be **Slight Adverse Temporary**.

Operational Phase

The view will include partial views of the new administration building with various processing plant equipment set behind and offside of it. Where the new built elements will be viewed as an extension of the existing WuXi Biologics facility further west nearer to the boundary. These proposed elements have been set lower down within the Site to help reduce their visual prominence, while the WuXi Biologics existing building and existing WuXi Biologics facility remain the taller structures within this view. The proposed new building will add a more solid form to the view and screen out views of the existing WuXi Biologics facility various existing vertical and horizontal metal supports previously visible through the former boundary fencing.

As with the existing view, the new built elements will be partial screened by the new fence line in front of them. Although the proposed fence line layout helps to declutter the existing number of fences visible in the current view down to one single fence line and it will be set slightly further back from the road. As well as improvements to the former entrance rough gravel surface to a permanent asphalt surface finish.

There will be some occasional views of the movement of service traffic on/off the improved Site entrance point.

Any potential road users will only experience the change to existing view briefly when travelling along the road as they pass by this short break in the continuous high hedgerow boundary.

The magnitude of change would be **Low**. Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.

The importance of the effect is **Moderate-Slight** and would remain so in the Short, Medium and Long Term.

Qualitatively the impact would be Neutral i.e., The proposed development complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality.

6.5.2.2 Viewpoint 2: Next to entrance of house on Mullagharlin Road

Existing View

The view is located by the roadside entrance of this property looking southeasterly down the road towards viewpoint 1. Where the low yellow crossroad sign visible in the background indicates the location of the Site's existing/proposed entrance point. The high field hedgerow on the opposite side of the road greatly helps to screen out views of the Site and elements of the existing WuXi Biologics facility. The building does become visible through a gap in the hedge for the electricity unit located ca. 20m further down the road from this point. Outward views from the property are also contained by its own hedge on its roadside boundary.

The view is representative of nearest residences.

The viewpoint sensitivity is **High** *. ….or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community.*

Visual Impacts and Effects

Construction Phase

The existing roadside hedgerow greatly screen views of the proposed development works from the road, while the property's own roadside hedgerow will provide additional screening of these works. There will be some partial but heavily filtered views of the site compound and movement of machinery within the Site's northern end when the roadside hedgerows are lacking in leaf cover in the winter months, although the residence's roadside hedge will retain its level of screening due to it being an evergreen.

While there will be some indirect effects as a result of passing site traffic to/from the site compound from off Mullagharlin Road, mostly the contractor's personnel vehicle occurring at the beginning and end of the working day while most of the heavier load traffic will come a different route via the proposed internal haulage route.

The Magnitude of change would be **Negligible to Low**, the significance of effect would be **Slight-Not Significant to Moderate-Slight Adverse Temporary**.

Operational Phase

Potential views of the proposed development from this point in the road will be heavily screened by the high hedgerow opposite together with the low setting of the proposed development will ensure the proposed development is not visible from this point. Similarly, the residence roadside garden hedge will likewise block views of the proposed development.

Indirect effects will include some occasional movement of service vehicle traffic to/from the site's western site however it will be of low numbers and not distinguishable from existing traffic levels.

Therefore, overall there is **No Change** to the existing view.

6.5.2.3 Viewpoint 3: Next to entrance of house (group of 2) on Mullagharlin Road

Existing View

The view is from further north on the same road as viewpoint 1 and 2 looking southeasterly down the road in the direction of the proposed development which is hidden from view by the dense high hedgerow. Looking down the road it is possible to spot the low yellow crossroad sign in the background, which is located by the Site's existing/proposed entrance point and also by viewpoint 1. Although, the main views from this group of 2 small properties are looking out directly across the road towards the east facing away from the Site.

The view is representative of nearby residences.

The viewpoint sensitivity is **High** *. ….or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community.*

Visual Impacts and Effects

Construction Phase

The existing high roadside hedgerow together with the fact these properties are facing away from the Site will help restrict any potential views of the site works. There will be some indirect effects as a result of passing site traffic to/from the site compound from off Mullagharlin Road, mostly the contractor's personnel vehicle occurring at the beginning and end of the working day while most of the heavier load traffic will come a different route via the proposed internal haulage route.

The Magnitude of change would be **Negligible to Low**, the significance of effect would be **Slight-Not Significant to Moderate-Slight Adverse Temporary**.

Operational Phase

Similarly, the high roadside hedgerow together with the low setting of the proposed development will ensure the proposed development is not visible from this point. Therefore, there is **No Change** to the existing view.

6.5.2.4 Viewpoint 4: Next to Heritage B&B on Mullagharlin Road

Existing View

The view from this group of properties looking south-eastwards across the road directly onto the high and dense field boundary hedgerow of the Mullagharlin Framework development lands. The hedgerow and nearby WuXi Vaccines Ireland Limited (P1146) facility helps to screen out potential views of the existing Site lands. Similarly, most of the existing elements of the WuXi Biologics facility are largely hidden from view by the same hedge. Although some views of its building upper portions along with the WuXi Vaccines Ireland Limited (P1146) buildings are possible through gaps in the hedgerow and will be greater in the winter months.

The view is representative of nearby residences.

The viewpoint sensitivity is **High** *. ….or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community.*

Visual Impacts and Effects

Construction Phase

Potential views of the site work within the extent of the Site will be fully screened by high hedgerow opposite and the nearby WuXi Vaccines Ireland Limited (P1146) buildings and structures. Therefore, there is **No Change** to the existing view.

Operational Phase

Similarly, the same level of screening provided by the existing hedgerow and WuXi Vaccines Ireland Limited (P1146) facility together with the low setting of the proposed development will ensure the proposed development is not visible from this point. Therefore, there is **No Change** to the existing view.

6.5.2.5 Viewpoint 5: Open space in Brookfield Housing Estate, Marlbog Road

Existing View

The view is from the open space within the small housing estate. Looking westwards in the direction of the existing WuXi Biologics facility and the Site lands. Potential views of the Site are fully screened by the existing hedgerow bordering the estate, houses and a berm planted up with trees within the WuXi Biologics facility lands. A small upper portion of the WuXi building is visible in the background peering above the various tree cover between the group of houses.

The view is representative of the nearest residences.

The viewpoint sensitivity is **High** *. ….or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community.*

Visual Impacts and Effects

Construction Phase

Potential views of the site work within the extent of the Site will be fully screened by the surrounding existing tree cover, berms and houses. Therefore, there is **No Change** to the existing view.

Operational Phase

Similarly, the screening provided by the existing tree cover, berms and houses ensure and together with the low setting of the proposed development will ensure the proposed development is not visible from this point. Therefore, there is **No Change** to the existing view.

6.5.2.6 Viewpoint 6: Houses along Marlbog Road

Existing View

The view is from the end of a group of houses along Marlbog Road, looking northwards the existing high tree lined field hedgerow which along with the berms behind it block out most views of the existing WuXi Biologic Facility and any views of the existing Site lands. The small entrance break in the hedgerow allows for some limited views into these lands with partial views of the taller elements of the existing wastewater treatment plant visible above the intervening berms. Potential views from the group of residents are further hindered by the mix of garden trees along their property's edges.

The view is representative of the nearest residences.

The viewpoint sensitivity is **High** *. ….or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community.*

Visual Impacts and Effects

Construction Phase

Potential views of the site works from this point will be fully screened by the intervening existing and proposed berms together with the dense roadside hedgerow. Through the gap there will be some limited temporary partial views of earthworks during the creation of the spoil heap.

The Magnitude of change would be **Negligible,** the significance of effect would be **Slight-Not Significant Adverse Temporary.**

Operational Phase

Similarly, the existing high hedgerows and trees together with the low setting of the proposed development and the proposed and existing berms near the roadside boundary will ensure the proposed development is not visible from this point. Therefore, there is **No Change** to the existing view.

6.5.2.7 Viewpoint 7: Haynestown Cross Roads

Existing View

The view is by the crossroad next to a small, protected structure cottage. Looking northeastwards across the road in the direction of the proposed development is a high dense hedgerow which blocks all potential internal views of the Site and the existing WuXi Biologics facility from this point. Further up the road by the far end of the view and next to the furthest and lowest of the four road signs visible lies the existing and Proposed Site's western entrance point off Mullagharlin Road. While potential views from the small cottage, a protected structure, is blocked by its boundary walls and hedgerow.

The view is representative of the nearest residences and heritage asset.

The viewpoint sensitivity is **High***….or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community.*

Visual Impacts and Effects

Construction Phase

The existing high hedgerows and trees will help to fully screen the proposed temporary works within the limited of the Site. There may be some occasional views of site traffic entering/leaving the site by the section of road at the far end of this view, with most traffic likely to be heading northwards towards the N52 road and away from this viewpoint.

The Magnitude of change would be **Negligible,** the significance of effect would be **Slight-Not Significant Adverse Temporary.**

Operational Phase

Similarly, the existing high hedgerows and trees together with the low setting of the proposed development will ensure it is not visible from this point. Therefore, there is **No Change** to the existing view.

6.5.2.8 Viewpoint 8: St Paul's Church/Haynestown Castle

Existing View

The view is from the elevated point in the local road next to these protected structures, looking north to northeast down the road and across the surrounding farmland. Much of the view consists of mature trees and field hedgerow and a modern rural house sited between this vegetation. This dense vegetation cover fully screens potential views of the proposed development from this point.

The view is representative of the setting of the heritage assets.

The viewpoint sensitivity is **High** *. ….or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are highly valued by the local community.*

Visual Impacts and Effects

Construction Phase

The existing high hedgerows and trees will help to fully screen the proposed temporary works within the limited of the proposed development. There may be some occasional barely perceptible views of site traffic entering/leaving the site by the section of road at the far end of this view.

The Magnitude of change would be **Negligible,** the significance of effect would be **Slight-Not Significant Adverse Temporary.**

Operational Phase

Similarly, the existing high hedgerows and trees together with the low setting of the proposed development will ensure it is not visible from this point. Therefore, there is **No Change** to the existing view.

6.5.3 Viewpoint Assessment Summary

The following table summarises the results of the assessment of the effects of the proposed development on the visual resource in the construction and operational phase. Refer to Table 6-11 and 6-12.

Table 6-11 – Summary of Visual Effects – Construction Phase

No.	Receptors and Views	Sensitivity	Degree of Change	Significance and Qualitatively
				Short Term
V1	Opposite Site Entrance on Mullagharlin Road	Medium	Low	Slight Adverse
V2	Next to entrance of house on Mullagharlin Road	High	Negligible to Low	Slight-Not Significant to Moderate-Slight Adverse

V3	Next to entrance of house (group of 2) on Mullagharlin Road	High	Negligible to Low	Slight-Not Significant to Moderate-Slight Adverse
V4	Next to Heritage B&B on Mullagharlin Road	High	No Change	No Change
V5	Open space in Brookfield Housing Estate, Marlbog Road	High	No Change	No Change
V6	Houses along Marlbog Road	High	Negligible	Slight-Not Significant Adverse
V7	Haynestown Cross Roads	High	Negligible	Slight-Not Significant Adverse
V8	St Paul's Church/ Haynestown Castle	High	Negligible	Slight-Not Significant Adverse

Table 6-12 – Summary of Visual Effects – Operational Phase

No.	Receptors and Views	Sensitivity	Degree of Change	Significance and Qualitatively		
				Short	Medium	Long
V1	Opposite Site Entrance on Mullagharlin Road	Medium	Low	Moderate-Slight Neutral		
V2	Next to entrance of house on Mullagharlin Road	High	No Change	No Change		
V3	Next to entrance of house (group of 2) on Mullagharlin Road	High	No Change	No Change		
V4	Next to Heritage B&B on Mullagharlin Road	High	No Change	No Change		
V5	Open space in Brookfield Housing Estate, Marlbog Road	High	No Change	No Change		
V6	Houses along Marlbog Road	High	No Change	No Change		
V7	Haynestown Cross Roads	High	No Change	No Change		

No.	Receptors and Views	Sensitivity	Degree of Change	Significance and Qualitatively		
				Short	Medium	Long
V8	St Paul's Church/ Haynestown Castle	High	No Change	No Change		

6.5.4 Visual Impact Summary

The predicted visual effects of the proposed development from the 8no. assessed viewpoints range from **No Change, Slight-Not Significant, Slight to Moderate significance and of neutral quality** depending on location.

Once operational the majority of receptors will experience **No Change** to their existing view. As the proposed development visibility is highly contained within the immediate area due to the design siting the various proposed elements below the existing ground level. Meaning the new structures don't extend more than ca. 2.5m above the existing Mullagharlin road level of 25.5m AOD. Further screening is provided by the existing and new berms along the southern and eastern ends of the Site together with the high dense tree lined hedgerow which runs next to the Site and frames the wider Mullagharlin Framework development lands boundaries.

Where visible, in the case of Viewpoint 1 only, the built out proposed development's elements will be clearly read as an extension of the existing WuXi Biologics facility. Here this view is only experienced briefly while passing by the revised entrance point onto the Mullagharlin road.

6.6 Do Nothing Scenario

Were the Proposed Development not to proceed it is expected that the existing lands within the site limits would remain under grassland cover and continue to be managed as part of the overall site's ongoing landscaping maintenance. Thus, not alternating the existing landscape and visual baseline.

6.7 Cumulative Effects

A review of Louth County Council planning portal was undertaken in March 2024 to help determine if there are any other relevant active planning submissions that because of their scale or type of development could potentially have notable cumulative landscape or visual effects with the proposed development.

The majority of applications in the area are for new singular rural housing or extensions to existing houses.

There are limited applications falling within the extent of the Mullagharlin Framework lands. The latest of which include a proposed Battery storage facility (LCC Planning Ref: 23419 - pending) on lands immediate northwest of the Xerox Toner buildings and directly west of this is approved variations to the existing Pentagon Technologies P7 (LCC Planning Ref: 2360372 – approved) which includes a new wastewater treatment plant. Which are both located ca. 1.3km and 1.1km respectively to the northwest of the proposed development. Closer to the proposed development and within the WuXi Biologics grounds is a pending application for a single turbine 125m to blade tip (LCC Planning ref: 2360356 - pending) which is located ca. 545m northwest of the nearest proposed development structures.

6.7.1 Cumulative landscape effects

The proposed development will slightly further add to this development type occurring within the Mullagharlin framework lands along the above recently approved Pentagon Technologies plant. However, such elements are a requirement to be able to safely process any waste materials from any individual industrial units. Both plants are suitable spaced away from each other with each to be located near to their respective existing buildings and contained within the local landscape. The proposed development is located well away from the above energy storage/production applications. The proposed development will not result in any additional loss of key landscape elements such as field boundaries with it and the others to be contained within areas of open worked grounds or agricultural improved grassland.

Given the intended uses of the Mullagharlin framework lands as guided through planning policy it is expected that a range of different development types will occur across these lands in the future as it evolves to become a major source of employment. This will include the need for further wastewater treatment plants and energy sources as new industry developments are established on these lands.

Thus, the proposed development will not have any notable cumulative landscape effects with the other above applications within the Mullagharlin framework lands, resulting in some **negligible, neutral and long-term cumulative landscape effects.**

6.7.2 Cumulative visual effects

The potential for the proposed development to be viewed alongside the other listed developments above is considered here.

As indicated in the viewpoint assessment the proposed development in general was found to have very limited visibility across the area. The only viewpoint with some visibility was that of viewpoint 1 by the Site's western entrance, which is experienced only by-passing road users. Similarly, potential cumulative views with the other developments are also limited. There will be some combined cumulative views of the proposed development and the proposed turbines which would be peering above the existing WuXi Biologics building. Of the two developments the proposed turbine would be more prevalent given its scale and moving blades. The existing WuXi buildings and the proposed development will block any potential views in the direction of the other approved wastewater and pending energy storage applications from this point.

There will be the potential to experience cumulative sequential views of the proposed development with the other approved wastewater plant but only when directly passing by both as one travel along Mullagharlin road and Chapel Road respectively. There will also be views of the proposed development with the proposed turbine, again the proposed development's structure only being visible as one passes by the entrance gap at viewpoint 1. While given its vertical form the turbine will be more visible across a wider range of roads in the area.

Thus, there be limited potential cumulative views effects as a result of the proposed development being viewed in combination or sequential with these other approved/pending developments, were they all to be approved, and thus result in **negligible, neural and long term** cumulative visual effects.

6.8 Mitigation Measures

The proposed development looks to minimise its direct and indirect impacts on the various landscape elements and features within the Site and neighbouring lands through the implementation of suitable mitigation through all phases of the development.

6.8.1 Construction Phase

The site works will be undertaken in accordance with a Construction Environmental Management Plan (CEMP), of which a number of minimum site management controls are provided in the CEMP as outlined in Chapter 2 of this EIAR.

Any clearance of any vegetation will be carried out in accordance with the CEMP and under supervision of the clerk of works ecologist. The existing hedgerows and trees adjoining the Site boundaries and the extent of their root protection areas (RPAs) within the site boundary will be protected by installation of temporary heras type fencing in accordance with BS5837:2012: Trees in Relation to Construction. Any necessary trimming back of trees or excavating/other site works close to these trees and their RPAs during the proposed site works will be supervised by an appointed arborist.

The proposed development works will include excavating large areas of ground with the resulting disturbed soil and rock being retained on site and reused elsewhere for the Site's screening berms and soft landscape areas. Where required any temporary storage of soil on site will be carried out in accordance with the CEMP.

Visual impacts will be mitigated through the appropriate site management measures and good work practices to ensure the Site is kept tidy and free of rubbish, dust is kept to a minimum, and that public access along the road network is kept free to minimise disruption to local residences and road users. Access will also be provided via the temporary internal haulage route within the site to minimise disturbance to the local road network.

Works will be carried at agreed hours with the council. Any lighting will be directional towards the works area so to minimise light spillage.

Site hoarding will be appropriately scaled, finished and maintained for the period of construction. Similarly, other structures including the site compound, scaffolding and security fencing will be temporary in nature and contained with the extent of the works area.

The temporary compound area will be cleared of all machinery, structures and materials with the grounds levelled, cultivated and reseeded so to reinstate back to grassland.

6.8.2 Operational Phase

The proposed planting measures include a wildflower area to the main embankment on the plant road and rough pasture grass mixes across the on the new berm and any other areas of disturbed grounds within the Site. A landscape contractor will maintain these landscaped areas to ensure the new vegetation cover across these earthworks quickly become established to help prevent any potential soil erosion or dust and improve their visual appearance and their integration into the immediate landscape. The boundary trees will be maintained by pruning back whenever required. All newly landscaped areas across the proposed development will be incorporated into the overall landscape maintenance scheme of the wider WuXi Biologics lands.

All access to the proposed development and activity will be undertaken within agreed working hours agreed with Louth County Council. The Site's lighting scheme has been designed so to prevent unnecessary light spillage and the use of sensor lighting to ensure lighting is permanently turned on. Other relevant design measures include keeping noise and vibration from operating plant equipment will be maintained at a low dB rating and effluent balancing and resource recovery plant has a dedicated odour treatment facility and low dust emission. All of which will ensure the operating plant doesn't cause any potential nuisance for local receptors and within the receiving landscape.

6.9 Residual Effects

The landscape impact during the construction phase will result in a disruption from construction activity e.g., machinery, site compounds across the proposed development site bringing about a disruption to the existing Site lands. The mitigation measures will seek to minimise the impacts e.g. through implementing the CEMP and protecting retained vegetation, reusing excavated soil and reinstating any disturbed lands, but the resulting residual effects as assessed above will have a significance of effect of **Slight to Moderate** and remain so **Temporary**, qualitatively the impact would be **Adverse.**

At the operational phase there will be a permanent change in character from the existing underused area of rough grassland to a small extension of the existing wastewater treatment plant. With the various proposed elements and roadway having the same characteristics of elements found throughout the existing plant grounds. The proposed changes are in keeping with local planning policy for development within the Mullagharlin Framework lands. As assessed above this will result in a significance of the effect of **Slight** and remain so in the **Short, Medium and Long Term**, qualitatively the impact would be **Neutral**.

The visual impact during the construction phase will occur due to the visibility of certain construction activity across the proposed development e.g., workers, machinery and lighting or from the surrounding road network. Although these impacts can be reduced by implementing the CEMP they can't be fully mitigated out. Much of the potential inwards views of the siteworks will be greatly restricted by the high treelined hedgerow which borders roadside ends of the Site and the wider Mullagharlin Framework lands.

As outlined above this activity will have a significance of effect as **Slight-Not Significant to Slight** and remain so **Temporary**, qualitatively the impact would be **Adverse.** While two receptors have **No Change**

Once complete the proposed development will at the operational phase result in a permanent change to views and visual amenity, with the addition of the proposed built structures resulting in a slightly further expansion of the existing balance system and pH correction system to the west. Although it was found that the actual potential visibility of the proposed development was found to be very limited due to mitigation measures and avoidance measures through the design process seek to reduce the potential visual impacts along with the neighbouring high tree lined field hedgerows. As assessed above the visual effects on these receptors range will have a significance of effect ranging from **No Change** from 7 of 8 viewpoints with the other viewpoint located opposite the Site entrance as having a **Moderate-Slight** Neutral quality and all Long Term.

6.10 Monitoring Requirements

All landscape works will be implemented in accordance with best practice and the landscape contract works to be supervised by a suitably qualified landscape architect.

The monitoring during the construction and operational phase will include review and management of the planting cover along the screening berms and surrounding grounds so that the planting becomes fully established, while ensuring the berm's screening effectiveness, stability and helping prevent runoff or patches of exposed bare soil. This will include establishing a regular grass cutting regime occurring during the growing season. While the wildflower area on the main embankment will be managed to ensure the success of the wildflowers so they're not displaced by grasses or other weeds.

All planting across the proposed development will be monitored by the appointed landscape contractor for an establishment period of 3 years or otherwise as agreed with Louth County Council. The works will include mowing, pruning, watering and weeding. Any loss of planting to occur during this establishment period will be

replaced with similar or approved alternative. Once established the planting will be maintained as part of the wider landscaping of the WuXi Biologics grounds.

6.11 Interaction with other Environmental Attributes

The potential for interactions with Biodiversity will be limited for the areas of the land to be improved with wildflower mix as part of the site layout plans and mitigation which will have some net biodiversity gains through the provision of pollinator friendly species. Much of the Site falls with species poor grassland, which will be altered to accommodate the works and subsequently reseeded. There are no established mature trees within the Site nor does the proposed development affects any just outside of the Site boundaries through suitable mitigation measures. Please refer to Chapter 5 Biodiversity.

The potential for interaction with Traffic & Transport will be indirect adverse effects upon the landscape character as a result of the movement of traffic during the construction phase and to a lesser extent during the operational phase. Similarly, there will be localised adverse to Neutral effects on the visual amenity as result of changes to existing traffic levels within the immediate surroundings, again being greatest during the construction phase while less prevalent during the operational phase. Please refer to Chapter 10 Traffic.

The potential interaction with Land and Soils will occur during the earthworks of the construction phase with movement of soils through the site and the temporary and permanent stockpiling of soils as a result of ground clearance and excavation altering the existing topographical levels and character of the Site. The purpose of this works is to lower the built structures within their immediate setting which along with the newly created grassed berms aims to help screen the Proposed Development from the nearest visual receptors as part of the mitigation measures. Please refer to Chapter 10 Land, Soils and Geology.

6.12 Difficulties encountered during preparation of this chapter

The assessment was undertaken from the surrounding public road which meant that it was not always possible to assert a receptor's exact views towards the proposed development e.g., if such views were limited to only their rear garden or upper floors of a property. Where this occurred, professional judgement was used, in keeping with best practice, to describe the likely visual effects from this receptor.

6.13 Risk of Major Accidents and/or Disasters

No risk of major accidents or disasters are likely to impact upon landscape or visual receptors, with the thorough implementation of a Construction Environmental Management Plan (CEMP) during the construction phase while during the operational phase the new proposed development will be managed as part of a controlled environment in line with the existing wastewater treatment plant's safety management system.

Where an incident to occur within the Site resulting in a potential gas or liquid escape it could potentially affect the growth of some of the surrounding vegetation cover which may subsequently need replacing. While the high roadside hedgerow is likely to restrict any views of an incident from the nearest visual receptors, bar possibly the upper portion of a gas plume, it could affect their residential amenity through any occurrence of noise or obnoxious smells. Although, the likelihood of such a risk affecting landscape and visual receptors would at worst case be likely to be slight, localised and occur over a brief period.

7. Air Quality and Climate

7.1 Introduction

This Chapter of the EIAR considers the potential air quality, odour and climate effects associated with the project at Dundalk. This Chapter of the EIAR was prepared by Imelda Shanahan and Nathaniel Blue of TMS Environment Ltd. Imelda has over 30 years professional experience in completing assessments of this type for various different types of development. Imelda has a BSc (Hons) in Chemistry from University College Dublin and a PhD in Physical Chemistry, she is a Chartered Chemist and a Fellow of the Institute of Chemistry of Ireland and a Fellow of the Royal Society of Chemistry. Nathaniel has a Masters in Environmental Sciences from Trinity College Dublin (2021), a BSc in Environmental Science from Seattle University (2020), and three years of post-qualification experience in environmental assessment.

7.2 Methodology

7.2.1 Study Area

The Wuxi Biologics facility is within the IDA Dundalk Science and Technology Park in Dundalk. The site is bounded to the north by residential dwellings along Mullagharlin road and the Haggardstown Garden Centre, to the west by residential dwellings and agricultural land along Mullagharlin road, to the south by residential dwellings and agricultural land along Marlbog Road and to the east by residential dwellings and agricultural land. The site lies ca. 480m east of the M1 and the land in the vicinity of the site is for residential, commercial and agricultural purposes. Xerox Business Park is located to the northeast of the site.

The proposed Effluent Balancing and Resource Recovery System is located in Dundalk Co. Louth ca. 3 km south from the centre of town and the nearest private residence is located 100m west of the site. The study area is illustrated in Figure 7.1. The study area includes all areas that could potentially be affected by the emissions from the proposed development. The study area was determined using professional judgement and from a consideration of the potential impacts on receptors located near the proposed development. Although potential impacts are not significant across the entire study area, the assessment considers all of these areas in order to demonstrate that sensitive receptors will not be adversely affected by the emissions to atmosphere from the proposed development.

Figure 7.1 - Study Area

7.2.2 Impact Assessment Methodology

General Approach

The impact assessment methodology involves identification and characterisation of the air quality impacts that may be associated with the project, characterisation of the baseline environment to benchmark the existing situation, quantitative prediction of air quality effects and assessment of the effects against recognised Air Quality Standards (AQS) and guidelines. From this assessment comes a definition of mitigation measures that are required to ensure that all aspects of the effects of the project, through the operational phase, are managed and controlled to protect human health, the environment and amenity.

The report meets the requirements of the relevant regulations and has been prepared in accordance with the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

The project will:

(i) have regard to the Guidelines on the information to be contained in Environmental Impact Statements, 2022, as appropriate; and,

(ii) have regard to the relevant topics contained in the EPA's Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) September 2003.

The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports were published in May 2022. These Guidelines take account of the revised EIA Directive (2014/52/EU) which are

considered in this assessment. Effects are described in the EPA Guidance in terms of quality, significance, magnitude, probability, duration and type. A description of the significance of effects is presented in Table 7-1 and Table 7-2 presents the description of the duration of effects as shown in the Guidelines.

In addition to considering the above guidance, the general approach adopted for the air quality impact assessment is summarised as follows.

- Describe the existing baseline air quality at the site and in the vicinity of receptors – addressed in Section 7.3;
- Describe the potential effects of the proposed development on air quality – addressed in Sections 7.4 - 7.7;
- Identify appropriate criteria against which to assess the significance of the effects associated with the proposed development – addressed in Section 7.2;
- Propose mitigation and avoidance measures where required;
- Identify and assess all cumulative effects with potential to effects upon the receiving environment.

Table 7-1 - Describing the Significance of Effects from EPA Guidelines

"Significance" is a concept that can have different meaning for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

Table 7-2- Describing the Duration of Effects from EPA Guidelines

'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	
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.

Construction Phase Assessment Methodology

The IAQM's (2014) Guidance on the Assessment of Dust from Demolition and Construction describes a five-step approach to the assessment which is summarised as follows:

- Screen the proposed development to determine if there is a requirement for a more detailed assessment;
- Assess the risk of dust impacts for each of the four activities (demolition, earthworks, construction and construction traffic) and take account of the scale and nature of the works, and the sensitivity of the area;
- Determine the site-specific mitigation for each potential activity;
- Examine the residual effects and determine whether these are significant; and,
- Prepare the dust assessment report.

This approach has been applied to the Proposed Development. A detailed assessment is required when there are human receptors within 350m of the boundary of the project site, and since the closest human receptors to the Proposed Development site boundaries are within this distance, a detailed assessment was required.

There are no European or Designated Sites within 50m of the site boundary, which is the threshold distance for ecological sensitivity to dust. Therefore, there are no significant Construction Phase air quality impacts predicted for ecological sites from the construction works, and this element is not assessed further.

The impacts on air quality from the Construction Phase will arise through the generation and subsequent deposition of dust and elevated local PM_{10} concentrations. The four construction activities have been assessed on the basis of the area sensitivity and the emission magnitude. The dust emission magnitude is based on the

scale of the anticipated works and should be classified as Small, Medium, or Large. Dust emissions are defined according to the scale and nature of the work for each activity, as described in Table 7-3 below.

The two types of sensitive receptors that may be impacted by dust from construction activities, as defined by IAQM (2014), are human and ecological. These are defined as *"a location that may be affected by dust emissions during demolition and construction. Human receptors include locations where people spend time and where property may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust*".

The guidance refers to human receptors as those properties that may be subject to adverse impacts of dust or PM_{10} over a time period relevant to the Air Quality Standard. Specific properties include dwellings, cultural heritage collections, food manufactures, etc. According to IAQM (2014) a single dwelling is classified as one receptor, whereas a school counts as 100. In addition, relevant designated (ecological) sites and their sensitivity to dust impacts have also been considered. Designated sites include nature sites that have special status as protected areas because of their natural importance.

Receptor sensitivity is defined by a number of factors including:

- specific sensitivities of those receptors;
- number of receptors;
- proximity to construction site;
- background PM_{10} concentrations; and,
- site-specific factors.

The sensitivity of key receptors to each construction-related activity is determined for each of the following dust impacts:

- dust soiling;
- human health impacts; and,
- impacts on ecological receptors.

The sensitivity of an area to the potential impacts of each activity is defined at various distances from the work site depending on the sensitivity and number of receptors. IAQM categorises these in several distance bands for different impacts at 20, 50, 100, 200 and 350m. Receptor sensitivity to dust soiling is assessed for only four IAQM distance bands, whereas sensitivity to human health impacts is assessed for all five. Table 7-4 defines the levels of sensitivity of areas at different distances for each of the impacts listed above.

The estimated magnitudes of each construction activity (small, medium, large or negligible) are combined with the area sensitivity, which is determined by the number and proximity of receptors to the construction boundary and the background PM_{10} concentration. High sensitivity receptors include properties such as residences, care homes, hospitals and schools, and medium sensitivity receptors include hotels, offices and supermarkets. There are high sensitivity receptors close to the proposed development, and therefore as a worst-case approach, the assessment is based on a high sensitivity rating for all receptors.

Since the potential emissions are predominantly in the 30µm to 75µm size range, PM_{10} impacts are screened out as insignificant for this assessment. The assessment therefore focuses on the larger particle sizes. This qualitative analysis provides the overall level of risk of impacts for dust soiling, human health and ecology. The level of risk of each impact is used to identify appropriate mitigation measures.

Table 7-3 - Quantitative Determination of the Magnitude of Dust Emissions for Demolition and Construction Activities (IAQM 2014)

Activity	Dust Emission Magnitude	
Demolition	Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
	Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
	Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.
Earthworks	Large	Total site area >10,000 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 >8 m in height, total material moved >100,000 tonnes;
	Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately, dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes; and
	Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	Large	Total building volume >100,000 m^3, on site concrete, batching, sandblasting;
	Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
	Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Track-out	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;

Activity	Dust Emission Magnitude	
	Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

Table 7-4 - Area Sensitivity to the Effects of Dust Soiling (IAQM 2014)

Receptor Sensitivity	Number of Receptors	Distance from the Source, m			
		<20	<50	<100	<350
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

Operational Phase Assessment Methodology

The potential odour impacts are assessed principally by means of a dispersion modelling study using computerised dispersion modelling to evaluate the impact of emissions to atmosphere during the Operational Phase on ambient air quality. The results of the assessment are compared with benchmarks, discussed in Section 7.7. The assessment of impact significance is based on a comparison of predicted impacts with Air Quality Standards (AQS) and guidelines, and consideration of the magnitude and duration of the potential impact.

The Institute of Air Quality Management (IAQM, 2014) Guidance on the Assessment of Odour for Planning has also been used for the assessment of the odour effects of the project. This Guidance is especially suitable for the assessment of the temporary effects which could arise during the Operational Phase. The methodology adopted for the odour impact assessment study follows the Guidance recommendations of a number of key stages in the odour impact assessment process as follows:

- The magnitude of the potential odour emissions from all sources are identified;
- Sensitive receptors are identified and classified according to their relative sensitivity;
- The magnitude of the odour impact on receptors are identified; and

The significance of the effect is assessed as either ‘Significant’ or ‘Not Significant’.

Methodology for Assessing Impacts due to Aspergillus

The fungal disease known as "invasive Aspergillosis” may be contracted as a result of disturbance of materials that release fungal spores into the atmosphere and is a potential concern that requires consideration. This is a disease which is detrimental to persons with suppressed immune systems, such as hospital patients. The "National Guidelines for the prevention of Nosocomial Invasive Aspergillosis during construction/renovation activities" deals specifically with construction works occurring within or adjacent to hospitals. The report states that the fungal spores responsible for invasive Aspergillosis can originate from a number of sources such as construction, demolition, renovation, disturbance of soil, removal of fibrous insulation material, removal of suspended ceiling tiles and from poorly maintained air ventilation systems. The potential sources of the fungal spores associated with invasive Aspergillosis, as detailed above, are related to the occurrence of these operations either within or in very close proximity to the hospital buildings.

Fungal spores (the Aspergillus moulds) are found everywhere but are of particular concern when large scale demolition, excavation and earth-moving activity takes place and especially in close proximity to areas where vulnerable individuals are located. The dispersion of spores (or indeed dust or any other substance) which are released at a particular location depends on a significant number of factors which include the rate and temperature of the release, the release height, the wind speed, rainfall, wind direction, topography, local meteorological conditions, the nature of the substances released, the potential for physical or chemical interactions and the concentrations of the substances released and other factors. The dispersion of fungal spores will depend on all of the above factors and this dispersion is evaluated by considering the factors noted above and the distances from the source at which the predicted impacts are to be assessed. In the first instance, the key factors are the concentration of the spores released and the distance to sensitive receptors. Dispersion of fungal spores released as a result of any activity is a function of time and distance and would be completely dispersed i.e. no measurable concentration at approximately 250m from the source of the release.

The National Guidelines report referred to above notes that the fundamental requirement in respect of eliminating Aspergillus infection from construction works is first to minimise the dust generated during construction and second to prevent dust infiltration into patient care.

Climate impact assessment methodology

The Climate Action and Low-Carbon Development (Amendment) Act 2021, which provides for new arrangements aimed at achieving transition to a low-carbon, climate-resilient and environmentally sustainable economy by 2050, requires that the applicant considers and reduces its carbon footprint in all aspects of a project. This assessment provides information on how the project considers this objective in the selection of the preferred approaches for the project.

The potential climate impact of the project is assessed by comparing the total emissions of Greenhouse Gases (GHG) with those that would occur for the Do Nothing scenario. The principal potential GHG emissions associated with the project are methane (CH_4), nitrous oxide (N_2O), and carbon dioxide (CO_2). For the purposes of this assessment the project is compared with a *Do Nothing scenario* and evaluated. Therefore, 2 scenarios have been assessed as follows:

- Scenario 1 – Do Nothing, in this scenario, the Effluent Balancing and Resource Recovery System is not built; and,
- Scenario 2 – Do Something, (the Proposed Development), in this scenario the new elements of the Effluent Balancing and Resource Recovery System are constructed as described in this EIAR.

The assessment estimates the total GHG emissions from direct and indirect activities associated with the Proposed Development. Overall emissions over the lifetime of the project are considered. The assessment is presented in terms of relative GHG emissions from the various sources and while there are some uncertainties, the assessment allows a reliable comparison of the Climate Impact of the project relative to the Do Nothing scenario.

The Climate Action Plan (CAP) of 2023 describes Ireland's response to the climate crisis. It is integral to the National Development Plan of 2021-2030. Climate solutions are integral to Ireland's continuing social and economic development. At the heart of this issue is system change. Every sector is responsible for driving for a low-carbon transition. The CAP 2023 was considered in the impact assessment for the project.

Methodology for Assessing Cumulative Impacts

The cumulative impacts of known permitted developments with the proposed development were considered using the same methodologies outlined under the previous three headings. The consideration of the potential incremental impact of the other known developments in combination with those of the subject development leads to a conclusion in respect of cumulative impacts.

7.2.3 Impact Assessment Criteria

The assessment of impact significance is based on a comparison of predicted effects with air quality standards and guidelines, and consideration of the magnitude and duration of the potential impact.

Air Quality Standards

Air Quality Standards in Ireland have been defined to ensure compliance with EC Directives; they are developed at different levels for different purposes. European legislation on air quality has been framed in terms of two categories, limit values and guide values. Limit values are concentrations that cannot be exceeded and are based on WHO guidelines for the protection of human health. Guide values are set as a long-term precautionary measure for the protection of human health and the environment. The World Health Organisation (WHO) guidelines differ from EU air quality standards in that they are primarily set to protect public health from the effects of air pollution, whereas Air Quality Standards are recommended by governments, and other factors such as socio-economic factors, may be considered in setting the standards.

The Clean Air for Europe (CAFE) Directive (Council Directive 2008/50/EC) is an amalgamation of the Air Quality Framework Directive and its subsequent daughter Directives and sets out limit and target values for named air quality parameters. The fourth daughter Directive (European Parliament 2004) also sets out limit values to be met for certain air quality parameters. The CAFE Directive was transposed into Irish legislation by the Ambient Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022). The 4th Daughter Directive was transposed by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022).

The air quality standards and guidelines referenced in this report are summarised in Table 7-5. The Clean Air for Europe (CAFE) Directive (Council Directive 2008/50/EC) was transposed into Irish legislation by the Ambient Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022). This Directive and the Irish Regulations set out the main standards against which the potential impact of the development on air quality are assessed.

In addition to the Air Quality Standards Regulations and the Directive Standards, it is also appropriate to consider the WHO Guidelines. These guidelines were developed by the WHO to provide appropriate air quality targets worldwide, based on the latest health information available. The air quality guidelines for particulate matter (PM) PM_{10}, $PM_{2.5}$, nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) are considered in this report (WHO,

2021). While the WHO Guidelines are not mandatory, they represent current informed opinion on the levels to which we should be aspiring in order to minimise adverse health effects of air pollution. The WHO guidelines referenced in this report are summarised in Table 7-6.

Odour Standards

The only specific Irish legislation dealing with odour from WwTPs is the European Communities (Waste Water Treatment) (Prevention of Odours and Noise) Regulations 2005 (S.I. No. 787 of 2005), which requires that WwTPs are designed, constructed, operated and maintained in order to avoid causing nuisance arising from odours or noise. The regulations do not define 'nuisance' in terms of a numerical standard, and there is no statutory odour limit or AQS for odour in Ireland.

The EPA's (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4), which includes guidance on appropriate odour standards against which odour emissions may be evaluated, is the most widely used Guidance in Ireland for assessments of this type. This Guidance recognises that the exposure of the population to odour is assessed based on the odour concentration as well as the length of time that the population may perceive the odour. By definition, one odour unit per cubic metre (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, and standards are defined relative to this benchmark.

The EPA has issued guidance specific to intensive agriculture which sets target values for odour for pig-production units of 1.5 to 6.0OU_E/m^3 as a 98th percentile of one hour averaging periods. Guidance from the United Kingdom (UK) recommends that odour standards should vary from 1.5 to 6.0OU_E/m^3 as a 98th percentile of one hour averaging periods at the site boundary based on the offensiveness of the odour and with adjustments for local factors such as population density. The benchmarks vary depending on the relative offensiveness of odours with a target benchmark of 1.5OU_E/m^3 for the most offensive odours, 3OU_E/m^3 for moderately offensive odours and 6OU_E/m^3 for less offensive odours. The most offensive odour category includes raw sewage and septic sludge, while the moderately offensive odours include such sources as aeration tanks and clarifiers.

Guidance from New Zealand is based on consideration of the sensitivity of the receiving environment rather than the offensiveness of the odour and specifies odour criteria of 1 to 10OU_E/m^3 for the 99.9 to 99.5 percentile if one-hour average ground level odour concentration, with target specifications of 1.0 to 2.0OU_E/m^3 for high sensitivity receiving environments. Similar guidance from Europe, especially the Netherlands, sets similar performance criteria.

The target specification is no odour nuisance beyond the project site boundary. Targets for odour nuisance vary as outlined above, but there is a general consensus from relevant guidance that the target performance specification for the 98th percentile of one-hour average concentration should be 1.0 to 3OU_E/m^3. The target is set at sensitive receptors, thereby ensuring that there is no odour nuisance to receptors beyond this point. For the current assessment, and considering the nature of the process that may lead to odour emissions, a target standard of 1.5 OU_E/m^3 as a 98th percentile of one hour average ground level concentration is considered appropriate and is recommended for the assessment.

Table 7-5 - Ambient Air Quality Standards Regulations 2022 (based on EU Clean Air for Europe [CAFE] Directive 2008/50/EC)

Pollutant	EU Regulation	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	None	200 µg/m^3 NO_2
		Annual limit for protection of human health	None	40 µg/m^3 NO_2
		Annual limit for protection of vegetation	None	30 µg/m^3 NO +NO_2
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	150 µg/m^3	350 µg/m^3
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 µg/m^3
		Annual & Winter limit for the protection of human health and ecosystems	None	20 µg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50%	50 µg/m^3
		Annual limit for protection of human health	20%	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health (Stage 1)	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m^3
		Annual limit for protection of human health (Stage 2)	None To be achieved by 2020	20 µg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m^3 (8.6 ppm)
Benzene	2008/50/EC	Annual limit for protection of human health	0% by 2010	5 µg/m^3

NOTE: The Ambient Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) transposed EU Directive 2008/50/EC (CAFE) into Irish law.

Table 7-6 - WHO Air Quality Standards

Pollutant	Averaging time	Interim target				2021 Guidelines
		1	2	3	4	
Particulate matter (as $PM_{2.5}$), $\mu g/m^3$	Annual limit for protection of human health	35	25	15	10	5
	24-hour limit for protection of human health Note [1]	75	50	37.5	25	15
Particulate matter (as PM_{10}), $\mu g/m^3$	Annual limit for protection of human health	70	50	30	20	15
	24-hour limit for protection of human health Note [1]	150	100	75	50	45
Ozone, $\mu g/m^3$	Peak season Notes [2]	100	70	NA	NA	60
	8-hour Note [1]	160	120	NA	NA	100
Nitrogen Dioxide, $\mu g/m^3$	Annual limit for protection of human health	40	30	20	NA	10
	24-hour limit for protection of human health Note [1]	120	50	NA	NA	25
Sulphur Dioxide, $\mu g/m^3$	24-hour limit for protection of human health Note [1]	125	50	NA	NA	40
Carbon Monoxide, mg/m^3	24-hour limit for protection of human health Note [1]	7	NA	NA	NA	4

Note [1] Expressed as the 99th percentile

Note [2] Average of daily maximum 8-hour mean O_3 concentration in the six consecutive months with the highest six-month running-average O_3 concentration.

Table 7-7 - Air Quality Impact Assessment Criteria

Pollutant	EU Regulation	Limit Type	Value
Odour	None	Hourly limit for prevention of nuisance – not to be exceeded more than 176 hours per year (98th percentile)	1.5 OUE/m3

7.3 Receiving Environment

7.3.1 Meteorological Conditions

The magnitude of potential impacts of the Proposed Development on air and climate will largely be influenced by the local meteorological conditions, in particular by wind speed and direction and by precipitation rates. An evaluation of the climatic conditions at the site is therefore useful for an assessment of the type required for this study.

Met Éireann operate a Synoptic Network of weather stations at Belmullet, Malin Head, Rosslare (closed since 2008), Johnstown Castle, Birr, Clones, Kilkenny and Mullingar while the Aviation Division of Met Éireann maintains observing stations at Shannon Airport, Knock Airport, Casement Aerodrome, Dublin Airport and Cork Airport. There is no continuous meteorological monitoring on the subject site but the general guidance on selection of meteorological data for air quality impact assessments is to choose representative data, recently acquired, which best represents conditions at the site. At least three years of recently acquired data is preferred. Comprehensive monitoring data is available for Dublin Airport (located 60km south of the proposed development) and for Mullingar (70km southwest of the proposed development) which would be indicative of the meteorological conditions that are experienced at the proposed development. Therefore, for the purpose of obtaining reliable information about the climatological conditions at the site of the proposed development, a full set of meteorological data for the period 2016 – 2020 recorded at Mullingar was analysed. This is considered an appropriate data set for the study because of the close proximity of the station to the site and the similarity in topography in the immediate area of both the two meteorological station sites and the site of the proposed development. The data for Dublin Airport was used as a sensitivity check to test the robustness of the Model.

Wind speed and direction in particular is important in determining how emissions associated with the activity are dispersed. The prevailing wind direction determines which areas are most significantly affected by the emissions from the activity and wind speed determines in part the effectiveness of the dispersion of the emissions. The windroses for Mullingar are presented in Figure 7.2 for each of the years 2016 – 2020. The dominant wind direction is from the southwest quadrant with wind blowing from this quadrant for more than 50% of the time. The average long-term wind speed over the period 1985 – 2010 is 5.5m/s. Windroses for Dublin Airport are given in Figure 7.3. The dominant wind direction for Dublin Airport is from the west. The average long-term wind speed over the period 1985 to 2010 is 5.3m/s.

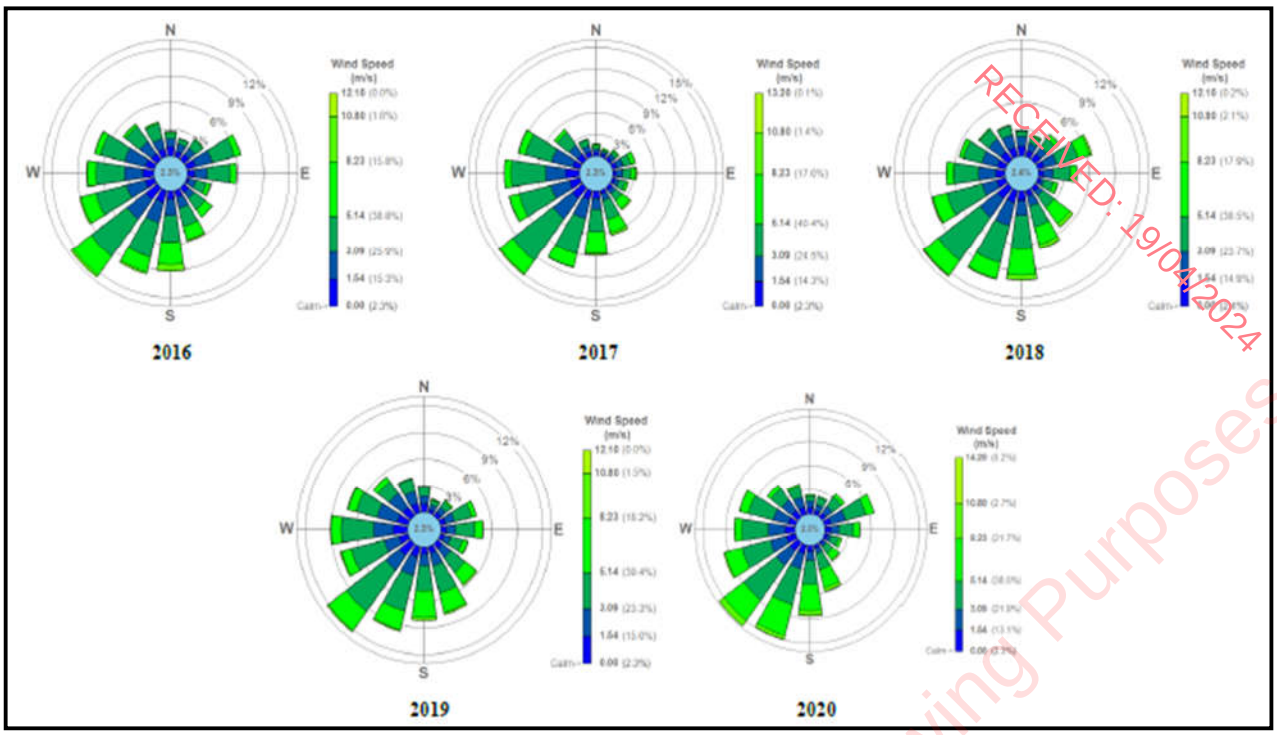


Figure 7.2 - Windrose for Mullingar (2016-2020)

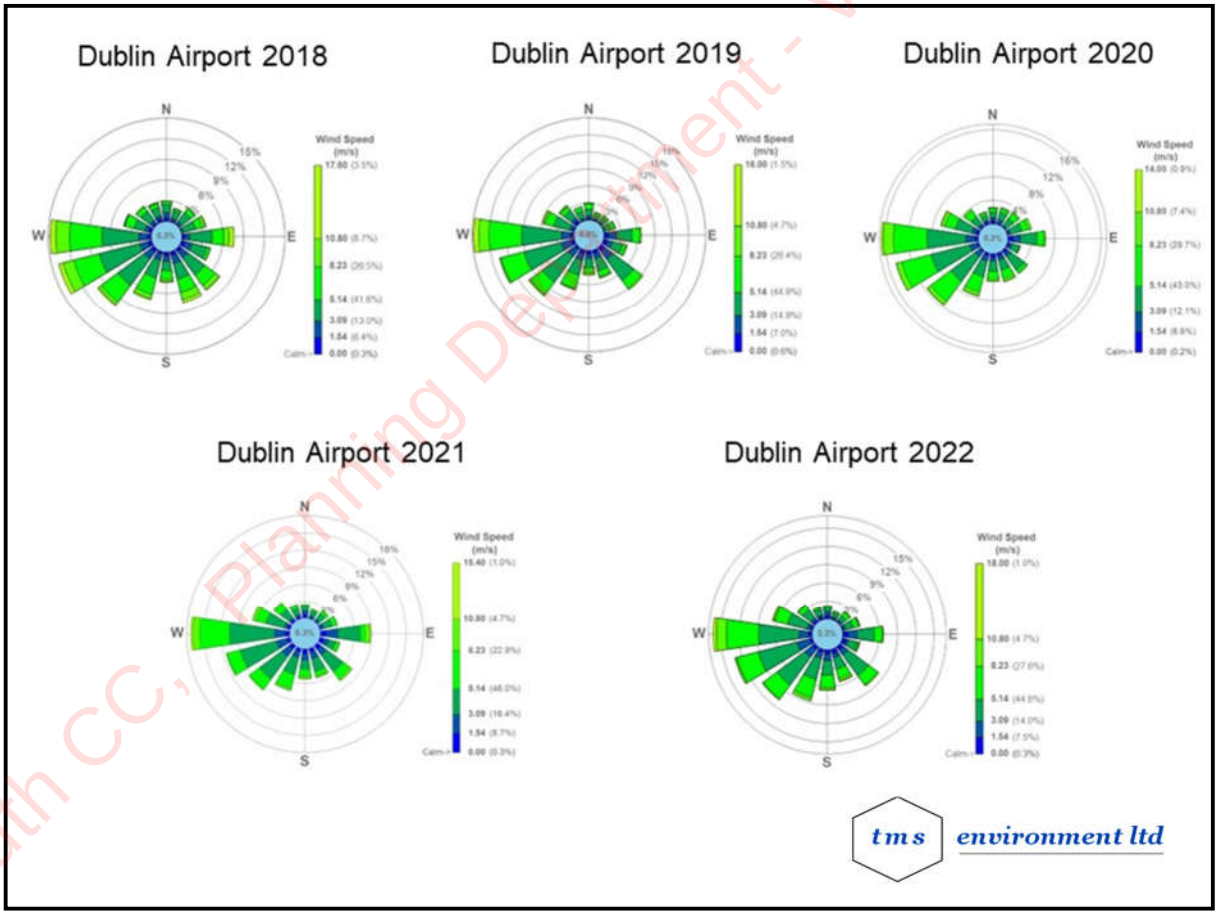


Figure 7.3 - Windrose for Dublin Airport (2018-2022)

7.3.2 Influences on Ambient Air Quality

The existing activities at and near the project site have the potential to exert an influence on ambient air quality by release of emissions to the atmosphere as follows:

- emissions of fine PM (PM_{10} and $PM_{2.5}$), SO_2, NO_x, CO from domestic, commercial and industrial heating;
- emissions of fine PM (PM_{10} and $PM_{2.5}$), SO_2, NO_x, CO and benzene from traffic on adjoining roads;
- emissions of dust and PM from agricultural activities; and,
- emissions of odour, nitrogen containing compounds, and hydrogen sulphide from the existing WwTP and outfall, and from licenced facilities in the area.

Overall, the contribution of traffic to air quality is considered to be the most significant influence on air quality in the immediate vicinity of the project site, but all other sources also exert significant influences on air quality.

The main substances which are of interest in terms of existing air quality are SO_2, NO_x, PM (including PM_{10} and $PM_{2.5}$) which could originate from combustion sources and traffic and odour from existing site activities. A description of existing levels of the various substances in ambient air is required to allow completion of the evaluation of air quality effects associated with the project and is presented in the following section.

7.3.3 Existing Ambient Air Quality

Air Quality Indicators

The main substances which are of interest in terms of existing air quality potentially affected by the Proposed Development are odorous substances and odour. Existing air quality indicator parameters are SO_2, NO_x (nitric oxide (NO) and NO_2, collectively referred to as NO_x), fine PM including PM_{10} and $PM_{2.5}$ which could originate from combustion sources, traffic and the existing commercial and industrial activities in the study areas. Carbon monoxide (CO) is also potentially of interest, and benzene (C_6H_6) may also be of interest from traffic sources mainly from R634 ca. 300m from the site. Odour emissions from the proposed development are also considered.

Particulate Matter

PM is made up of tiny particles in the atmosphere that can be solid (except for ice) or liquid (except for water) and is produced by a wide variety of natural and manmade sources. PM includes dust, dirt, soot, smoke and tiny particles of pollutants. PM of 10 micrometres (µm) in aerodynamic diameter or less is also referred to as PM_{10} or, more strictly, particles which pass through a size selective inlet with a 50% efficiency cut-off at 10 µm aerodynamic diameter. Similarly, $PM_{2.5}$ refers to PM of 2.5 µm or less in aerodynamic diameter. In the past, domestic coal burning was a major source of PM in Irish cities during winter months. Levels of particles have decreased significantly following the introduction of abatement strategies including Special Control Areas and other Regulations regarding the use, marketing, sale and distribution of certain fuels. PM is significant in relation to air quality is predominantly related to negative human health and respiratory effects.

Nitrogen Oxides

NO_x, which is the sum of NO and NO_2, are generated primarily by combustion processes. The main anthropogenic (man-made) sources are mobile combustion sources (road and air traffic) and stationary

combustion sources (including industrial combustion and domestic heating). The main source of NO_x near the project study area is traffic. The significance is health-related for NO_2 and ecological-related for NO_x. Nitrous oxide emissions may also be associated with the operation of the proposed development.

Sulfur Dioxide

SO_2 also originates from combustion but predominantly from heating sources and not traffic. The trend in ambient SO_2 concentrations is clearly downward and this pollutant is not a matter for concern in Ireland. The reduction in ambient SO_2 concentrations in recent years can be attributed to fuel switching from high-sulfur content fuels, such as coal and oil, to natural gas and to decreases in the sulfur content of oil.

Carbon Monoxide

CO is a colourless and odourless gas, formed when carbon in fuel is not burned completely. It is a component of motor-vehicle exhaust, which accounts for most of the CO emissions nationwide. Consequently, CO concentrations are generally higher in areas with heavy traffic congestion. CO is also a significant emission from air traffic.

Carbon Dioxide

CO_2 may be emitted from any combustion sources which include road and air traffic, and commercial and domestic heating.

Odour

The principal odorous gases potentially present in emissions from the proposed development include various organic substances, ammonia, hydrogen sulfide, and organic nitrogen compounds. Where available, data for existing levels of these substances in ambient air are discussed in the Long Term Air Quality Data and Odour Baseline sections. In addition, due to the nature of the process being undertaken, organic sulfur and organic nitrogen compounds could be present in the emissions.

Long Term Air Quality Data

A description of existing levels of the various substances in ambient air is required to evaluate air quality effects associated with the Proposed Development. The available data from the National Ambient Air Quality Network is a reliable data set for consideration in this study.

The Environmental Protection Agency (EPA) and local authorities maintain and operate a number of ambient air quality monitoring stations throughout Ireland in order to implement EU Directives and to assess the country's compliance with national air quality standards. Ireland's small population and generally good air quality means that a relatively small number of monitoring stations are sufficient across the country for the purposes of implementing the EU Air Directives. For ambient air quality management and monitoring in Ireland, four zones, A, B, C and D are defined in the Ambient Air Quality Standards (AQS) Regulations (S.I. No. 739 of 2022) and are defined as follows:

- Zone A: Dublin Conurbation.
- Zone B: Cork Conurbation.
- Zone C: 24 cities and large towns. Includes Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B &C.

The Proposed Development is considered to be located in Zone C and is considered a large town site for assessment purposes. Although the site is located approx. 3km from the town centre, it is considered that Zone C would more reliably indicate air quality in the area rather than Zone D. Air Quality Data from representative air monitoring stations in Zone C are therefore considered representative of air quality at the subject site. The EPA publishes Ambient Air Quality Reports every year which details the air quality in each of the four zones. The most recent report, published by the EPA in 2023, is the Air Quality in Ireland 2022, which contains monitoring data collected during 2022. Best practice requires that an average of at least three years of recent monitoring data is used for assessments of this type so data for 2020 to 2022 has been reviewed.

The EPA maintains monitoring stations in a number of large town locations including Kilkenny, Portlaoise, Dundalk, Navan, Waterford and Limerick to monitor Zone C background air quality. Other monitoring stations have operated at various times and some new stations have been added to the network, but recent and long-term data is available for the above stations.

Data from the EPA Air Quality Monitoring Annual reports for 2020, 2021 and 2022 was reviewed and a summary of the data for representative stations for the three most recent years is presented for each parameter of interest in Table 7-8.

The approach taken is to take the average of the three most recent years (2020 – 2022) for each of the designated Zone C stations detailed above and the averages of the values for the stations are reported in Table 7-8. Where available, data from Dundalk was used as the site is located in Dundalk. The Dundalk station does not monitor every parameter related to air quality. In these cases the average air quality of all available data sets in Zone C was used. This is the data set which is used in the assessment of the potential impact of the proposed development on air quality. A graphical presentation comparing the data with the relevant Ambient Air Quality Standards is presented in Figure 7.4.

It is noted from the data that existing ambient air quality is good for all health-related pollutants.

Table 7-8 - Summary baseline air quality data (2020 – 2022)

Data set	Parameter and averaging interval		Concentration µg/m3
Dundalk	Nitrogen dioxide NO2	Annual Mean, µg/m3	10.4
Dundalk	Nitrogen oxides, NOx	Annual Mean, µg/m3	17.8
Dundalk	Particulate Matter PM10	Annual Mean, µg/m3	12.3
Zone C Average	Particulate Matter PM2.5	Annual Mean, µg/m3	12.7
Dundalk	Sulphur dioxide, SO2	Annual Mean, µg/m3	2.7
Dundalk	Carbon Monoxide CO	Annual Mean 8-hour, mg/m3	0.4
Zone C Average	Benzene	Annual Mean, µg/m3	0.2

NOTE

Data summarised from the EPA Annual Ambient Air Quality Monitoring Reports 2020 to 2022.

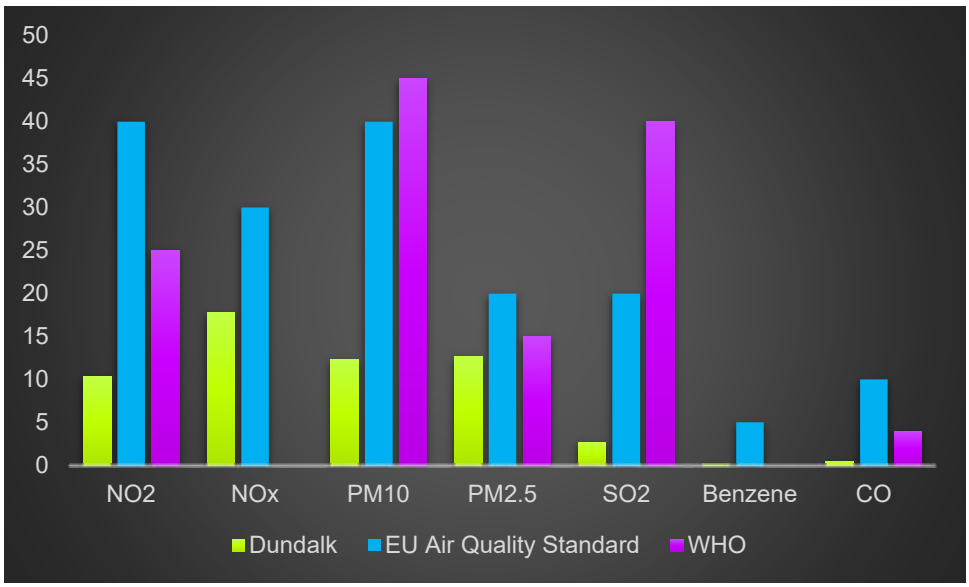


Figure 7.4 - Comparison of baseline air quality data with Air Quality Standards

7.4 Potential Effects on Air Quality during Construction Phase

7.4.1 Identification of potential Air Quality effects

The potential air quality impacts during Construction are summarised as follows:

- Dust emissions associated with demolition, excavation and construction activity;
- Emissions to atmosphere from construction vehicles; and,
- Aspergillus emissions associated with large scale excavations.

There is no potential for odour emissions during construction.

7.4.2 Dust Emissions Associated with Excavations

The most significant of the potential air quality impacts associated with the construction site is dust. Dust can be generated as a result of disturbance of materials, as a result of wind blowing across exposed surfaces and as a result of construction vehicle movements across exposed surfaces.

There are three potential impacts on air quality of the dust / particulate matter emissions. Dust deposition on surfaces is the main potential impact associated with the larger particles, nuisance effects such as reduced visibility could be associated with excessively high levels of suspended particulate matter and respiratory effects could occur as a result of excessive levels of fine particles such as PM_{10} and $PM_{2.5}$.

Dust emissions associated with the Construction Phase of the proposed development are expected to be predominantly in the 30 – 75µm particle size range so these particles, because of their size, will generally be deposited within 100m of the emission source. Only under exceptional meteorological conditions would the dusts be carried further downwind.

Suspended particulate matter (SPM) may also be released and this matter may remain suspended in the air. The main effect would be on visibility but this type of material could also be a respiratory nuisance if present at excessive levels. Emissions of dust in the form of fine particulate matter, PM_{10} and $PM_{2.5}$, may also occur, primarily as a result of materials handling and storage since the dominant particle size of the main construction materials is in the lower size ranges. There may also be some emissions of particles in these size ranges from the general site activities.

The risk of dust being emitted in sufficient quantities to cause a nuisance or health impacts is evaluated by considering the scale of the works programme. The IAQM's (2014) *Guidance on the Assessment of Dust from Demolition and Construction* gives advice on classifying the magnitude of the potential dust impacts, as discussed in Section 7.2.2. The magnitude of the dust emissions is estimated as shown in Table 7-9 for the proposed activity, using the advice and information derived from the Construction Plan for the proposed development.

Table 7-9 - Assessment of Magnitude of Dust Emissions for Construction

Activity	Magnitude of Dust Emission
Demolition	Low
Excavations	Medium
Construction	Low
Construction traffic	Low

There are no significant structures to be demolished with just two pillars requiring demolition. Some excavation work is required with by far the majority of excavated materials being topsoil, made ground and sandy clay.

The potential air quality impact arises from emissions of PM and may result in deposition of dust around the proposed site and track-out onto the roads nearby. The magnitude of the potential emissions associated with construction is assessed as medium using the above criteria.

The significance of the dust emissions and impacts is evaluated in terms of the sensitivity of the receptors in the area that could be affected by the emissions. The receptor sensitivity in the immediate vicinity of the proposed site is high because of the proximity of residential receptors. A summary of the assessment of sensitivity for each activity is presented in Table 7-10.

Table 7-10 - Assessment of Receptor Sensitivity for Construction Programme

Activity	Sensitivity of Receptors and Surrounding Areas		
	Dust Soiling	Human Health	Ecological
Demolition	Low	Low	Low
Excavations	High	High	Low
Construction	High	High	Low
Construction traffic	Low	Low	Low

Using the alternative assessment approach outlined in the EPA Guidelines as outlined in Section 7.2.2, the assessment shows that the most significant potential impacts are those associated with the site excavations and construction activities. There is predicted to be a short-term Slight adverse impact on the closest receptors during the Construction Phase. There will be no lasting impact and the short-term impact will be managed by means of an effective Construction Environmental Management Plan (CEMP) incorporating the mitigation measures outlined in Section 7.12. The CEMP will include a specific Dust Minimisation Plan which will ensure that dust impacts are prevented or minimised during the Construction Phase of the Proposed development.

Emissions of dust raised by vehicle movement on the roads near the site and on site are considered under the general construction phase emissions above. The expected construction traffic will not lead to significant generation of dust emissions and will not exert a measurable impact on air quality, it is concluded that an imperceptible impact would occur.

7.4.3 Impact of construction transport emissions on air quality

The expected construction traffic will not exert a measurable impact on air quality due to the relatively low vehicle movements and it is concluded that an imperceptible impact would occur. A water bowser will be used to dampen the haul road during periods of extended dry weather.

7.4.4 Aspergillus Emissions from Excavation and Earthmoving Activity

There is concern about a fungal disease, "invasive Aspergillosis" which may be contracted as result of disturbance of materials that release fungal spores into the atmosphere. Fungal spores (the Aspergillus moulds) are found everywhere but are of particular concern when large scale demolition, excavation and earth-moving activity takes place. The scale of works proposed for the subject development are modest and would not lead to release of significant amounts of spores. The potential impact is predicted to be imperceptible.

7.5 Potential Odour Effects during Construction Phase

There is no potential for odour impact during the construction phase of the project. The construction works will not have an impact on the existing infrastructure and no materials or methods associated with construction have potential to release odour.

7.6 Potential Odour Effects during Operational Phase

7.6.1 Characterisation of Potential odour impacts

The principal potential impact arises as a result of emissions to atmosphere is from the Odour Control System which consists of two activated carbon filters operating in parallel, with each unit filled with chemically impregnated activated carbon media. The potential Operational Phase impacts are assessed principally by means of a dispersion modelling study using computerised dispersion modelling. The assessment of impact significance is based on a comparison of predicted impacts with AQS and guidelines, and consideration of the magnitude and duration of the potential impact.

Odour emissions may potentially arise at all stages of the treatment process and therefore an assessment is conducted to evaluate the potential for such emissions and to evaluate the significance of the odour effects.

The treatment stages comprise of following:

- Preliminary Treatment from screening;

- Neutralisation system for pH correction;
- Off specification and balance tanks for storage and flow homogenisation;
- Lime dosing tank to remove phosphorus;
- Primary Treatment consisting of two lamella clarifiers and flocculation tanks located upstream of clarifiers;
- The primary treatment will produce sludge removing BOD, COD, TSS, and the lime from the wastewater;
- Post Primary Balance Tank for pH correction and to maintain an adequate C:N:P ratio;
- Secondary Treatment with filtering and screening beforehand;
- A membrane bioreactor system (MBR) with three biological tanks and membrane banks to remove the sludge from the treated water;
- Treated water storage tank;
- Sludge Blending and Buffer tanks to combine both primary and secondary sludge; and,
- Sludge Dewatering.

There are a number of possible sources of emissions to atmosphere during the Operational Phase from the various elements of the Proposed Development and the proposed modifications as summarised in Table 7-11. The potential significance of these emissions is also assessed and described in Table 7-11. Hydrogen sulfide (H_2S), organic sulfur and organic nitrogen substances, and odour emissions could be present in the emissions from the proposed process.

Table 7-11 - Significance of potential odour emissions

Element and Emission Sources	Potential Emissions	Potential Significance of emissions
Inlet works	Odour Hydrogen sulfide (H2S), organic substances	Significant. The inert works are covered thereby effectively containing the emissions for treatment in an Odour Control System. The odour control system treats emissions and ensures odours / emissions do not reach the site boundary.
Preliminary treatment	Odour Hydrogen sulfide (H2S), organic substances	Significant. The works are covered thereby effectively containing the emissions for treatment in an Odour Control System. The odour control system ensures that odours / emissions do not reach the site boundary.
Secondary treatment	Odour Hydrogen sulfide (H2S), organic substances	Significant. The works are covered thereby effectively containing the emissions for treatment in an Odour Control System. The odour control system ensures that odours / emissions do not reach the site boundary.

Element and Emission Sources	Potential Emissions	Potential Significance of emissions
Sludge Dewatering	Odour Hydrogen sulfide (H2S), organic substances	Significant. The works are covered thereby effectively containing the emissions for treatment in an Odour Control System. The odour control system ensures that odours / emissions do not reach the site boundary.
Sludge transport	Odour Hydrogen sulfide (H2S), organic substances	Significant. Sludge will be produced at a rate of ca. 5 tonnes per day. Sludge will be removed in sealed tankers by licenced hauliers and will be treated at a licenced waste facility. The sealed tankers will prevent release of odour emissions at any significant rate.
Final discharge	Odour	Insignificant. After treatment the odour of the final effluent is insignificant and is generally not detectable.

The potential characteristics of any odours associated with the proposed activity are considered in terms of the potential concentration of odorous substances that may be present in the emissions stream as well as the odour emission rate. The inlet odour concentration has been estimated from the characteristics of the wastewater and the nature of the activities undertaken at the facility.

A specialist company is providing an Odour Control System to treat all potentially odorous air associated with the proposed activity. The supplier of the odour control system has determined that there will be a combined volume of 2.74 m^3/sec of air treated in the odour control system which will discharge treated air at a height above ground level to be determined from the dispersion model at an exit velocity of 14m/sec from a 500mm cone. The maximum odour concentration in the emission stream will be 1000OU_E/m^3. These data were used as input data for the dispersion Model for the impact assessment as described in detail in Appendix 7.1.

7.6.2 Dispersion Modelling Impact Assessment

Dispersion Modelling Protocol

The EPA's AG4 guidance note (EPA 2020) gives guidance on the use of dispersion models which was followed in the execution of this study. A detailed modelling assessment was undertaken using the current version of the United States EPA's model AERMOD Prime model (Version 23132). The model computes average ground-level concentrations of pollutants emitted from either elevated or ground-level emission sources. Separate utilities associated with the dispersion modelling software allow for computation of ground-level concentrations of pollutants over defined statistical averaging periods, and additional features permit suitable consideration to be given to building downwash effects and the effects of elevated terrain near the proposed effluent balancing and resource recovery facility.

Model Input Data

Evaluation of the impact of the Proposed Development on air quality using dispersion modelling requires information on the following:

- Site layout and topography;
- Climatological data;

- Averaging intervals;
- Receptor locations; and,
- Emissions characteristics.

The data are summarised in the following sections of this Chapter.

(i) Site Layout and Topography

The layout and area of the proposed development site and the dimensions of the various plant buildings were obtained from scaled drawings. Topographical information was obtained from a site survey and from maps, orthographic photographs and digital Ordnance Survey data. Building downwash effects are possible as a result of the buildings on-site, so possible downwash effects were modelled using the modelling suite facilities.

The presence of terrain can lead to significantly higher ambient concentrations than would occur in the absence of terrain features, especially if there is a significant relative difference in elevation between the source and off-site receptors. International guidance and the Guidance Note AG4 suggest that, when modelling in a region of flat terrain, no digital mapping of terrain will be necessary. In relation to AERMOD, the guidance in AG4 is that digital mapping of terrain should be conducted where terrain features are greater than 10% of the effective stack height within 5km of the stack (for effective stack heights of 100m or less). From a review, it is concluded that digital terrain data are not required because there are no terrain features greater than 10% of the effective stack height within 5km of the site. However, terrain data were included as part of the sensitivity analysis for the proposed development which tested the sensitivity of the projections to varying input approaches and datasets.

(ii) Climatological Data

The magnitude of potential impacts of the proposed development on air quality and climate will largely be influenced by the local meteorological conditions, in particular by wind speed and direction and by precipitation rates. The meteorological data used as input to a dispersion model should be selected on the basis of spatial and climatological (temporal) representativeness as well as the ability of the selected parameters to characterise the transport and dispersion conditions in the area under investigation. The reliability of the data used as input data will depend on the proximity of the meteorological monitoring site to the area of interest, the complexity of the terrain and the amount of data available. In accordance with the EPA's AG4 guidance note, data were selected for the most appropriate station (Mullingar) and five years of recent data (2016 to 2020) were used for the assessment. In addition, to test the sensitivity of the predictions to varying input data, one year of recent data (2018) from Dublin Airport was also used for aspects of the assessment.

(iii) Averaging Intervals

The dispersion model was used to predict the incremental additions to ground level concentrations (GLCs) of all substances emitted from the facility over defined averaging periods. These averaging intervals were chosen to allow direct comparison of predicted GLCs with the relevant assessment criteria as outlined in Section 7.2.3. In particular, one-hour average GLCs were calculated at various distances from the site; percentiles of these average GLCs were also computed for comparison with the relevant AQS.

(iv) Receptor Locations

Two modelling approaches were adopted for the assessment. Up to 50 discrete receptors were modelled to predict the air quality impacts that could arise as a result of the emissions from the proposed development. Receptor Grids centred on the study area and set at 20m to 100m intervals at a distance of up to 2km from the

site were also modelled for the purpose of this assessment with up to 1,000 receptors modelled. A grid of 10m spacing within 500m of the stack was also used to test the sensitivity of the Model predictions to this variable.

Key sensitive human receptors were identified within the study area that are considered representative of the worst case locations where members of the public could potentially be affected by the emissions from the Proposed Development. These locations include residential properties. The locations of selected worst case sensitive receptors are shown in Figure 1 Appendix 7. Operational Phase impacts on these receptors were specifically assessed by including the receptors in the scope of the modelling protocol.

Operational Phase impacts of the Proposed Development on sensitive ecological receptors were also considered. There is no potential for emissions that could affect a Natura 2000 site / European Sites and there is therefore no requirement for further detailed assessment.

Background Ambient Air Quality

The predictions from a dispersion model are usually evaluated by comparison with AQS, with existing background concentrations of the various substances which are added to the predicted impact of the emissions. The exception is odour, for which background measurements are meaningless and cannot be added to predictions. So, the assessment relies on an absolute comparison of predicted odour levels with the relevant assessment criteria.

Impact Assessment Criteria

Impact assessment criteria are discussed in Section 7.2.3 and are summarised there and in Table 7-7.

Odour and odorous substances emissions

Information on dimensions and physical characteristics of the main emission sources was obtained by TMS Environment Ltd. from the Design Team for the Proposed development, and from similar installations. All of the emissions are treated as point emission sources. An ambient temperature of 288 Kelvin (K) has been assumed. The actual exit velocity from the Odour Control System was used as input data for the modelling study. Odour emission rates were derived using the approaches described in Section 7.6.1.

Modelling of other individual substances, such as H_2S was not included in the model because there are no Irish AQS against which compliance may be assessed for these substances. Modelling of odour emission rates rather than individual substances is considered a more reliable indicator of potential odour impact and atmospheric significance of the emissions – this is in accordance with standard procedures.

Emissions Modelling Scenarios

A number of modelling scenarios were considered to evaluate the impact of potential variations in the emission rates and to consider different potential operating scenarios for the proposed development. In particular potential maximum odour emissions were considered to occur 100% of the time although this is not expected in practice. This conservative approach tests the robustness of the model predictions.

7.6.3 Dispersion Model predictions

Model executions were completed to assess the incremental additions to GLCs of odour as a result of emissions from the proposed Odour Control System to allow comparison of the predictions with the relevant AQS and guidelines which are discussed in Section 7.2.3 and Table 7-7. The models were executed with the emission characteristics as presented above and the modelling predictions are presented in Table 7-12 together with the

AQS. In each case, the maximum predicted incremental contribution to GLCs is shown. Projections are presented for each of four stack heights assessed for the worst case meteorological dataset. The projections for all meteorological datasets are presented in Appendix 7.1.

It is clear from the data presented in Table 7-12 that the predicted ground level odour concentration as a result of the emissions will not exceed the assessment standard of $1.5OU_E/m^3$ for the 98-percentile predictions at any sensitive receptor for stack heights of 7.1m to 10m. As noted earlier, this is a very conservative assessment criterion and there is therefore confidence that the facility can easily operate within the required performance criteria without causing adverse impacts. Even under peak conditions, the performance standard is achieved. Although the assessment standard is not exceeded at any sensitive receptors for each stack height studied, the $1.5\ OU_E/m^3$ odour contour extends beyond the site boundary for some scenarios. A stack height of 7.1m is therefore recommended as the minimum stack height required to ensure that the target specification is achieved for all operating scenarios. The Model has determined that the stack height is appropriate.

The sensitivity of the predictions to the selection of meteorological dataset was also investigated by using meteorological data from Dublin Airport. These data show that there is very little difference between the predictions for the two sets of meteorological data, which demonstrates the reliability of the predictions and the lack of sensitivity of the predictions to the meteorological data selection.

Table 7-12 Maximum Predicted Ground Level Concentration of Odour

Air Quality Standard	Stack Height (m)	Predicted Ground Level Concentration (OU_E/m^3)	
		Mullingar 2018	Dublin Airport 2018
1-hour limit not to be exceeded more than 176 hours per year	7.1	0.37	0.37
	8	0.35	0.35
98th percentile	8.5	0.34	0.34

Note: Dublin Airport and Mullingar meteorological data

Sensitive human receptors were identified within the study area that are considered representative of the locations where members of the public could be exposed to emissions associated with the proposed development. Twenty three sensitive receptors located near to the Proposed Development were included in the assessment as detailed in Appendix 7.1. Predictions are presented in Appendix 7.1 for every modelling scenario and meteorological year assessed, and a summary of the principal findings is presented in Table 7-13. These data clearly demonstrate that emissions associated with the proposed facility will not cause a breach in any AQS or guideline and will not result in odour nuisance at any sensitive receptor in the area.

Table 7-13 - Maximum Predicted Ground Level Concentration of Odour any Sensitive Receptor

Air Quality Standard	Stack Height (m)	Predicted Ground Level Concentration (OU_E/m^3)				
		2016	2017	2018	2019	2020
1-hour limit not to be exceeded more than 176 hours per year	7.1	0.30	0.22	0.37	0.29	0.19

Isopleths showing the distribution of predicted GLCs are presented in Figure 7.5 showing odour predictions for 98-percentile of 1-hour ground level odour concentration for the proposed emission under maximum operating conditions and the proposed stack height of 7.1m. This shows that the odour concentration does not exceed the target threshold beyond the site boundary and at sensitive receptors in the area.

Figure 7.5 67- Isopleth showing maximum predicted odour concentration as the 98%ile of 1-hour GLC

7.7 Potential Effects on Air Quality during Operational Phase

Air quality impacts could arise as a result of emissions from transport associated with the proposed activity. Due to the very low predicted transport movements, there is an imperceptible effect on air quality and climate associated with the removal of the screenings, Fats, Oils and Greases (FOG's), grit, biosolids, sludge and non-sludge waste and from the site using trucks.

7.8 Potential Effects on Climate during Construction Phase

7.8.1 Introduction

This section of the EIAR provides a description of the impact of Greenhouse Gas (GHG) emissions from the project on climate during both the construction and operation phases of the Proposed Development. The following documents were reviewed in the consideration of the potential impacts of the Proposed Development on climate:

- Chapter 12 of the County Louth Development Plan 2021- 2027;
- Draft Louth County Council Climate Action Plan 2024 - 2029;
- Environmental Protection Agency – Irelands Provisional Greenhouse Gas Emissions 1990 – 2021; and,
- Institute of Environmental Management and Assessment (IEMA) Assessing GHG Emissions and Evaluating their Significance (IEMA, 2022).

The assessment of the impacts of the Proposed Development on climate considered impacts arising during construction and operation at the Site. Given the nature and size of the Proposed Development any impacts on climate are likely to be local. There is currently a lack of site specific / equipment specific GHG emissions data for the Proposed Development. However, an assessment was completed which focuses on the relative magnitude of GHG emissions for the Do Nothing and Do Something scenarios.

7.8.2 Policy Context

7.8.2.1 International Guidelines, Policy and Legislation

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) (UNFCCC 1992) and the Kyoto Protocol (UNFCCC 1997). The Paris Agreement (UNFCCC 2015), which entered into force in 2016, includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible. The work was further advanced at the 26th Conference of the Parties (COP) of the UNFCCC COP26 (UNFCCC 2021) summit in Glasgow in 2021. At COP26 Ireland committed to phasing out oil and gas production, as part of the Beyond Oil and Gas Alliance. The outcome of COP26 sets out work that is required to cut emissions this decade, and to keep global average temperature rise below 1.5°C.

In order to meet the commitments under the Paris Agreement, the European Union (EU) enacted 'Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013' (hereafter referred to as the 2018 Regulation) (European Union 2018). The 2018 Regulation aims to deliver, collectively by the EU, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters.

7.8.2.2 National Guidelines, Policy and Legislation

In 2015, the Climate Action and Low Carbon Development Act was enacted with a primary purpose 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' (3 (1) of No. 46 of 2015). The 2021 Climate Act subsequently removed any reference to a national mitigation plan and instead refers to both the 2019 Climate Action Plan (CAP) (DCCAE 2019), as published in 2019, and a series of National Long Term Climate Action Strategies. The Climate Action Plan (DCCAE 2019) was published in 2019 and outlined the status across key sectors including electricity, transport, built environment, industry and agriculture and outlines the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. An updated CAP was published in 2021 and contains updated objectives from the 2019 CAP.

The purpose of the 2021 Climate Act was 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'. Under the Act, each local authority is required to prepare a 'local authority climate action plan' lasting five years and specifying 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 GHGs by 31 December 2030 relative to 2018 annual emissions.

In relation to carbon budgets, the Climate Action and Low Carbon Development (Amendment) Act provides that the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in 2022 with Industry given a 35% reduction target and an emissions ceiling of 4,000Kt CO2eq.

The EU Commission has published technical guidance on climate-proofing of infrastructure projects for the period 2021 to 2027 (European Commission 2021). This guidance was published in order to improve climate considerations in infrastructure projects by integrating climate change mitigation and adaptation measures into the development of infrastructure projects. The guidance specifically notes that:

"Most projects will have an impact on GHG emissions, compared to the Baseline, through their construction, operation, and eventual decommissioning and through indirect activities that occur because of the project. This should be seen in the context of the project not as an isolated event but as a set of different and complementary interventions – in particular stemming from a plan. This might mean that a certain specific project does not have an individual net GHG reduction effect but is integral part of an overall plan that reduces emissions".

This is specifically relevant to the Proposed Project since there are elements of the Proposed Development which specifically aim to reduce GHG emissions. Proposed Development have been considered.

7.8.2.3Louth County Council Development Plan 2021 – 2027

The Louth County Development Plan contains several policies and objectives relating to climate change and which have been considered in this assessment.

Policy Objective CA1

To promote, support and direct effective climate action policies and objectives that seek to improve climate outcomes across the settlement areas and communities of County Louth helping to successfully contribute and deliver on the obligations of the State to transition to low carbon and climate resilient society through the encouragement and integration of appropriate mitigation and adaptation considerations and measures into all development.

Policy Objective CA2

Work to translate, support and implement strategic objectives of the National Planning Framework and the Eastern and Midland Regional Spatial and Economic Strategy to create an enabling local development framework that:

- Promotes and integrates important climate considerations in local development and planning decisions;
- Supports national climate policy and targets of the Climate Action Plan (as revised and updated) and the delivery of the national transition objective.

Policy Objective IU 56

To encourage the development of wind energy, in accordance with Government policy and guidance and the 'Wind Energy Development Guidelines' (2006) or any revisions thereof which may be issued during the lifetime of the Plan.

Policy Objective IU 65

To encourage and support the development of solar energy infrastructure for on-site energy use, including solar PV, solar thermal and seasonal storage technologies.

7.8.2.4 Draft Louth County Council Climate Action Plan 2024 – 2029

This document outlines Louth County Council's Climate Action Plan (CAP)prepared in accordance with the requirements of the Climate Action and Low Carbon Development Bill (2021) and the requirements of each Local Authority to make a Plan which shall specify the mitigation and the adaptation measures to be adopted by the local authority. The Draft Climate Action Plan has an objective to have Dundalk Blackrock as the decarbonisation zone (DZ) for County Louth. The DZ was chosen to demonstrate meaningful climate action in the town. The objective of the DZ zone is to reach the national target of 51% carbon reduction by 2030 and net zero by 2050.

7.8.3 Construction Phase Climate Impact Assessment

The principal GHG emissions associated with construction are CO2 from transport and machinery utilised in construction. For the 'do nothing' scenario, if the proposed development does not proceed then the emissions of GHGs in the area are projected to remain the same with some relatively minor increases as activity in the area develops. If the Proposed Development did not proceed, GHG emissions would still occur somewhere because there is a requirement to treat the effluent to an acceptable standard.

There is uncertainty about the precise quantities and types of materials to be used for construction and therefore a precise calculation of embodied carbon is not feasible at this time. It is projected based on data from similar projects that approximately 95% of the CO2 emissions from the construction phase would come from embodied carbon in construction materials, with approximately 0.5% coming from construction transport and the remainder from construction activity at the site. An approximate estimate of 0.85ktCO2eq emissions during construction has been derived based on consideration of available information, the relatively small scale of the Proposed Development and Ireland-specific emission factor data for similar projects. This estimate is considered imperceptible when considered over the lifecycle of the project.

Opportunities for minimisation of GHG emissions during construction will arise and will be required to ensure that the overall objectives of enhanced energy efficiency and minimisation of GHG emissions are achieved. Specifically, materials will be sourced from the closest feasible location thereby minimising transport related emissions and similarly excavated materials which cannot be reused on site will be relocated to the closest possible end destination.

7.9 Potential Effects on Climate during Operational Phase

The company operates under the terms of an Industrial Emissions Directive (IED) Licence (Reg Ref P1122-01). The main source of energy for the existing facility is electricity from the national grid. There are also 3 (No.) emergency diesel generators on site which are permitted to operate for more than 500 hours annually as a rolling average over a 3-years period. The emergency diesel generators are currently in the process of being converted to Hydrotreated Vegetable Oil (HVO). There are also 3 (No.) steam boilers on site, operated on Light Fuel Oil, with two of the three steam boilers permitted to operate at any one time. Operation of the steam boilers on light fuel oil (LFO) is limited in the IED Licence to a maximum of 500 hours per annum.

The site has been granted a GHG Emissions permit (GHG Permit No. IE-GHG199-10526-1) for an Annex 1 Activity – Combustion of fuels in installations with a total rated thermal input exceeding 20MW (except in installations for the incineration of hazardous or municipal waste). The Permit lists 9 emission sources with a combined capacity of 38.59MW from which emissions of carbon dioxide are permitted. The estimated annual emissions are 26267.9 tonnes CO2(e).

A solar photovoltaic system for renewable power generation will be mounted on the roof of the proposed administration building. The roof is covered with approximately 460m2 of solar panels producing 121 kWh/s PA per m2 and 98,859 kwh per year. This power is to be used onsite to run the site when the power is available thereby reducing dependence on fossil fuels and resulting in a reduction in greenhouse gas emissions. The project has been assessed to provide a CO2 emissions total avoided of 24,725kg/year which is approximately 0.094% of the permitted annual emissions of CO2.

The company has also applied to construct a wind turbine at the site which would lead to a further net reduction in GHG emissions. That separate project is being considered by the Local Authority. The Solar PV and wind turbine projects are consistent with the stated objectives in the Louth County Development Plan, and would both contribute to the Council Objective of a net caron reduction for the Dundalk DZ.

There are negligible levels of emissions of greenhouse gases such as carbon dioxide, nitrous oxide and methane associated with the Proposed Effluent Balancing and Resource Recovery System. Therefore, the project's emissions will not contribute measurably or significantly to climate change or have any discernible influence on the overall climate conditions. Since the emissions associated with the project are considered imperceptible, their effect on climate can also be regarded as imperceptible. As noted above, a separate element of the project is to install a solar PV system which will result in a net reduction in CO2 emissions for the overall site.

7.10 Do Nothing Scenario

There will be no change in air quality impacts if no change takes place. In the absence of the development proposal, the air quality is unlikely to change.

7.11 Cumulative Effects

The cumulative effects of the project in conjunction with current and future developments in the vicinity of the subject site are considered in this section.

The most relevant nearby sites are the WuXi Vaccines Ireland Ltd. (LCC 19861), Pentagon Technologies (Ireland) Limited (LCC 2360372), Oxigen Environmental ULC (LCC 21486), IDA Ireland (LCC 18187), and Pig Farm (ABP Ref: 305468) facilities.

The Wastewater Treatment Plant associated with Pentagon Technologies (Ireland) Limited (LCC 2360372) has the potential to emit odour into the environment, however as the WwTP is located 1 km northeast of this site, this is at a distance which will not lead to measurable cumulative impacts.

The waste recovery and recycling facility of Oxigen Environmental ULC (LCC 21486) has the potential to emit odour into the environment, however as the recycling facility is located ca. 4 km northeast of this site, this is at a distance which will not lead to measurable cumulative impacts.

The utility yards that process water and wastewater associated with IDA Ireland (LCC 18187) have the potential to emit odour into the environment, however as IDA Ireland is located 2 km northeast of this site, this is at a distance which will not lead to measurable cumulative impacts.

The pig farm (ABP Ref: 305468) has the potential to emit odour into the environment, however as the pig farm is located 2 km southwest of this site, this is at a distance which is will not lead to measurable cumulative impacts.

The construction of dwellings, a wind turbine, and electricity developments do not contribute to odour emissions, so these additional developments will not have any cumulative impact on odour associated with the proposed development.

The remainder of the projects are at a distance which is beyond the distance that could lead to measurable cumulative impacts. There will be no significant adverse air quality, climate, or odour impacts on the receiving environment as a result of the project or in conjunction with other local developments that are planned for the area.

7.12 Mitigation Measures

A Dust Management Plan will be formulated for the construction phase for as construction activities are likely to generate some dust emissions. The principal objective of the Plan is to ensure that dust emissions do not cause significant nuisance at receptors in the vicinity of the site. The most important features of the Dust Management Plan are summarised as follows:

- A designated Site Agent will be assigned overall responsibility for Dust Management;
- The design of the site and Construction programme considers dust impact management and chooses design approaches to minimise dust emissions;
- An effective training programme for site personnel will be implemented for the duration of the Construction Programme;
- A strategy for ensuring effective communication with the local community will be developed and implemented;
- A programme of dust minimisation and control measures will be implemented and regularly reviewed; and,
- A monitoring programme will be implemented.

The design of the construction programme and the location and layout of the construction compound and the storage of materials will be carefully planned to ensure that air quality impacts are minimised. The following is a summary of the main mitigation features for the proposed development and the specific mitigation measures

which will be employed in order to minimise emissions from the activity and the associated impacts of such emissions:

- Activities with potential for significant emissions will wherever possible be located at a position as far as possible removed from the nearest residential and commercial receptors;
- The areas on site which vehicles will be travelling on will generally be hard-surfaced or compressed ground thus significantly reducing the potential for dust emissions from the vehicles;
- The construction compound area will have hard standing areas to minimise dust generation from wind-blow.
- In order to minimise the potential for wind-generated emissions from material storage bays, these bays will be oriented away from the dominant wind direction to minimise the effects of wind on release of dust and particulate.
- The relatively coarse particle size (30 – 75µm) associated with the activity means that the particles will generally be deposited close to the emission source and will not travel significant distances away from the site.
- Fixed and mobile water sprays will be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather.
- A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management.
- A dust deposition monitoring programme will be implemented as outlined in section 7.14 at the site boundaries for the duration of the construction phase in order to verify the continued compliance with relevant standards and limits.

Table 7-14 Proposed Mitigation Measures

Character of potential impact	Mitigation measure
Construction Phase	
Dust deposition	A Dust Management Plan will be formulated for the construction phase of the project. A monitoring programme will be implemented Roadways will be hard-standing wherever possible to minimise dust emissions The construction compound area will have hard standing areas to minimise dust generation from wind-blow Fixed and mobile water sprays will be used to control dust emissions A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management Activities with potential for significant emissions will be located as far as possible from the nearest residential and commercial receptors where possible
Operational Phase	

Odour	Odour control system will treat emissions and ensure that odour effects are within the required performance level to ensure that no adverse impact arises.

7.13 Residual Effects

During the construction phase of the proposed development there will be some dust impacts experienced at the subject site. It is predicted that the mitigation measures proposed will ensure that the air quality impacts at the closest receptors are imperceptible. The predicted air quality impacts on the receiving environment during the construction phase are considered to be slight and short term imperceptible at local receptors.

7.14 Monitoring Requirements

The Existing Wuxi Biologics Facility currently operates under an Industrial Emissions License (IED) (P1122-01)along with a Greenhouse Gas Permit, both of which are continually monitored by the EPA. The Industrial Emissions Directive 2010/75/EU is aimed at reducing emissions from industrial production processes and has been in force in Ireland since 6 January 2011 and was implemented from 23 April 2013 onwards.

As a result, treated discharges from the proposed development are to comply with the standards as required under the existing Wuxi Biologics IED licence and associated Statutory and Regulatory limits including any agreements with other parties such as Uisce Éireann (UET).

Dust deposition monitoring shall be undertaken monthly during the construction phase from a representative number of monitoring locations around the site boundary as follows:

- The monitoring will be carried out using Bergerhoff dust deposition gauges;
- The off-site analysis of the Bergerhoff jars will be undertaken at a suitably accredited laboratory and deposition will be expressed as mg/m^2/day.
- The laboratory results will be compared against the Technical Instruction on Air Quality Control – TA Luft 2002 emission value for dust fall of 350 mg/m^2/day; and,
- Where the results of dust monitoring are found to exceed the limit, the cause or source of the excessive dust will be identified, and any feasible measures to reduce the impact shall be taken.

Monitoring of the effectiveness of the odour control system is recommended on commissioning and at annual intervals. Monitoring should include monitoring of odour and hydrogen sulfide levels in the inlet to and outlet from the odour control system.

7.15 Interaction with other Environmental Attributes

The impact of air quality on human beings living in the area of the proposed development has been addressed above for the construction and operational phase of the project. The impact assessment shows that the air quality effects that will be experienced by human beings in the vicinity of the project are all within the prescribed criteria. This interaction is described as neutral for the operational phase and is quantified as Not Significant.

This assessment has shown that the emissions generated from the development are very limited and do not have potential to generate a significant adverse impact on the local ecosystems including birdlife and wildlife. Air Quality in the area is good as shown in Section 7.3 and the Air Quality Standards will not be exceeded as a result of the project thereby ensuring that no significant adverse impact on ecosystems arises. This interaction is described as neutral and quantified as Not Significant.

7.16 Difficulties encountered during preparation of this chapter

There were no specific difficulties encountered when carrying out this assessment.

8. Noise and Vibration

8.1 Introduction

This section of the EIAR has been prepared by RSK Ireland to identify and assess the potential noise and vibration impacts associated with the proposed Effluent Balancing and Resource Recovery at WuXi Biologics. This chapter has been prepared by James Mangan and Kerith McClung of RSK Ireland Ltd.

James is Associate Director with RSK Ireland Ltd. and has been working in the field of Acoustics since 2001, he is a corporate member of the Institute of Acoustics (MIOA) and has completed the IOA Diploma in Acoustics and Noise Control from UWE (Bristol). He has extensive knowledge in aspects of environmental noise monitoring, analysis, impact assessment and reporting and has prepared environmental impact assessments reports for various major developments. James is the current Chairman of the Irish Branch of the Institute of Acoustics.

Kerith McClung is an Acoustic Consultant with RSK Ireland Ltd. and has a degree in Environmental Science from Ulster University. She is an associate member of the Institute of Acoustics (AMIOA) and has completed the IoA Diploma in Acoustics and Noise Control from the Trinity College Dublin. Kerith focuses on environmental noise surveys, associated data analysis and noise impact assessment.

This chapter includes a description of the receiving noise and vibration climate in the vicinity of the subject site, an assessment of the potential noise and vibration impact associated with the proposed development during both the short-term construction phase and the long-term operational phase on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

During the construction phase, the range of activities with potential to generate noise and vibration emissions to off-site sensitive receptors will include site preparation works and construction of the proposed development.

During the operational phase, the potential sources of noise are those associated with all proposed new plant items.

The significance of effects has been assessed in accordance with the EPA *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EIAR), 2022.

With regard to the quality of the effects, ratings may have positive, neutral or negative/adverse applications. The significance of an effects on the receiving environment is described in the range between imperceptible to

profound. The duration of effects as described in the EPA Guidelines are presented on a scale between momentary to permanent.

Noise and vibration emissions from the proposed development will vary in terms of quality, duration and magnitude. The following sections analyse the expected impacts from noise and vibration during both the construction and operational phases.

8.2 Methodology

A review of relevant standards and guidelines has been conducted to set noise and vibration criteria for the developments' construction and operational phases:

- Baseline noise monitoring has been undertaken to characterise the receiving noise environment;
- Predictive calculations have estimated the likely noise emissions during the construction phase at nearest sensitive locations (referred to as NSL's from hereon, outlined in ref. Figure 8.1);
- Predictive calculations have assessed potential impacts associated with the proposed developments' operation at NSL's surrounding the development; and,
- A schedule of mitigation measures has been proposed, where required, to reduce potential impacts relating to noise and vibration from the Proposed Development.

Relevant noise and vibration criteria for the developments' construction and operational phases, along with the methodology for conducting baseline noise surveys, are outlined below.

8.2.1 Construction Phase

8.2.1.1 Noise

The closest neighbouring NSL's to the Proposed Development are the residential dwellings primarily to the west and south of the proposed development. The distance between the construction site and nearby NSL's varies, the closest distance between the proposed development and neighbouring dwelling will be approximately 130m to the west.

Wuxi Biologics Ireland Ltd, is licensed by the Environmental Protection Agency (EPA) under Industrial Emissions Licence P1122-01, which provides criteria for the development in it is operational phase, with noise limits derived via the EPA "*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities"* (NG4). In relation to construction noise, NG4 states the following (pg6):

"Note that the guidance within this document relates to the assessment and measurement of noise in relation to Agency scheduled activities only. The guidance does not relate to construction and/or off-site transportation noise. For any construction related noise, this process is generally covered by the conditions of the planning permission and it does not relate to the licensable activity on site"

Therefore, as there are no statutory limits with respect to construction noise in Ireland, "BS 5228-1:2009+A1:2014 Code *of practice for noise and vibration control on construction and open sites. Noise*" has been used to assess construction noise and vibration. BS 5228:2009+A1:2014 is considered to represent the industry standard methodology for the assessment of construction noise and describes two methods for deriving noise significance thresholds for construction sites.

BS 5228:2009+A1:2014 (Appendix E.1) describes a method for identifying 'Potential significance based upon noise change'. Following this methodology, BS 5228:2009+A1:2014 designates a noise sensitive location (NSL) into a specific category based on pre-existing ambient noise levels and then sets a threshold noise value that, if exceeded, indicates a significant construction noise impact.

Table 8-1 presents the threshold values for significant noise impacts for weekday daytime and Saturday morning activity.

Table 8-1- BS5228 Construction Noise Thresholds for Significant Effects

Assessment category and threshold value period	Threshold value (dB)		
	Category A	Category B	Category C
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekend	55	60	65
Night-time (23:00-07:00)	45	50	55

A. Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

B. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

C. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

D. 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

Annex E.2 of BS 5228-1:2009+A1:2014 also provides the following comments in relation to 'Potential significance based on fixed noise limits':

BS 5228:2009+A1:2014 (Appendix E.2) also prescribes Potential significance based on fixed noise limits, which are sometimes adopted for projects of significant size, and are quoted below.

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter, as we hear it, in A-weighted decibels (dB(A))– see note below. Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*
>
> - 70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;
> - 75 decibels (dBA) in urban areas near main roads in heavy industrial areas.
>
> *These limits are for daytime working outside living rooms and offices. In noise-sensitive situations, for example, near hospitals and educational establishments – and when working outside the normal hours say between 19.00 and 22.00 hours – the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer (a reduction of 10 dB(A) may often be appropriate). Noisy work likely to cause annoyance locally should not be permitted between 22.00 hours and 07.00 hours."*

Taking account of the measured ambient noise levels and BS5228 significance thresholds, the recommended noise limits for construction activity are as follows:

- Monday to Friday 07.00 – 19.00 65 dB $L_{Aeq,12hrs}$
- Saturday 07.00 – 13.00 65 dB $L_{Aeq,6hrs}$

It is assumed that construction works will take place during normal working hours only. In exceptional circumstances, and subject to agreement with Louth County Council (LCC), extended hours of operation may be applied for, in such instances an assessment of potential noise impacts shall be carried out in advance of works taking place, and submitted to LCC, as part of the extended hours request.

8.2.1.2 Vibration

Following the same approach, "*BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration"* recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above.

The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. The recommended construction vibration criteria are presented in Table 8-2.

Table 8-2- Vibration Criteria During Construction Phase

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:		
Less than 15Hz	15 to 40Hz	40Hz and above

15 mm/s	20 mm/s	50 mm/s

8.2.2 Operational Phase

8.2.2.1 EPA Licence Noise Limits

Wuxi Biologics Ireland Ltd is licensed by the Environmental Protection Agency (EPA) under Industrial Emissions Licence P1122-01. This licence provides the following requirements relating to noise:

> ***"4.5 Noise***
>
> *Noise from the installation shall not give rise to sound pressure levels measured at the installation boundary and/or noise sensitive locations (NSLs) which exceed the limit value(s)".*

B.4 Noise Emissions

Daytime dB LAr,T (30-minutes)	**Evening-time dB LAr,T (30-minutes)**	**Night-time dB LAeq,T (15-minutes) Note 1**
55	50	45

Note 1: During night-time hours, there shall be no clearly audible tonal components or impulsive component in the noise emission from the activity at any noise-sensitive location

In relation to tonal and impulsive noise components, they are described in the EPA NG4 Guidelines as follows:

> *"Sounds which cover a range of only a few Hz which contains a clearly audible tone, i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'."*
>
> *"A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background".*

Such characteristics (i.e. tonal/impulsive) in site noise emissions are not permitted to be audible at NSL's during night-time hours. Should they exist during daytime/evening-time periods, appropriate penalties must be added to the $L_{Aeq,T}$ values to arrive at the $L_{Ar,T}$ values for comparison to the site noise emission limits. Methodologies for quantifying and rating tonal/impulsive characterises are outlines in the EPA NG4 Guidelines.

The EPA licence also requires annual compliance monitoring as outlined below:

> *"6.1.4 Noise*

The licensee shall carry out a noise survey of the site operations annually. The survey programme shall be undertaken in accordance with the methodology specified in the "Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)" as published by the Agency."

As per the EPA NG4 Guidance, cumulative noise from the facility (i.e. existing plant + proposed new plant items) are required to comply with the limits outlined in the site license.

8.2.2.2 Operational Phase Noise Criteria

The cumulative noise criteria to nearby NSL's are therefore as follows:

- Daytime (07:00 to 23:00hrs) 55 dB $L_{Ar,30min}$
- Evening (19:00 to 23:00hrs) 50 dB $L_{Ar,30min}$
- Night-time (23:00 to 07:00hrs) 45 dB $L_{Aeq,15min}$
- During night-time hours there should be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise-sensitive location.

8.2.2.3 Vibration

Due the type of plant selected and the distance between the proposed development and the nearest sensitive receptors, no significant sources of vibration are expected to arise during the operational phase of the development. Operational vibration has therefore been scoped out and has not been addressed further in this chapter.

8.3 Receiving Environment

An environmental noise survey has been conducted in accordance with ISO 1996-2:2017 *"Acoustics -- Description, measurement and assessment of environmental noise -- Part 2: Determination of sound pressure levels"* and the EPA NG4 Guidelines.

8.3.1 Monitoring Locations

Four locations were chosen to represent noise levels at nearby NSL's that are closest to the proposed development area of the site. Locations were chosen because of their proximity to nearby NSL's (i.e. nearby dwellings).

N1 To the east of the Proposed Development with the microphone positioned at ground floor level at a location representative of the proposed residential dwellings in Brookfield. This noise survey position comprised attended daytime and night-time monitoring.

N2a To the south of the Proposed Development with the microphone positioned at ground floor level at a location representative of the proposed residential dwellings on Marlbog Road (east of the crossroads). This noise survey position comprised attended daytime and night-time monitoring.

N2b To the south-west of the Proposed Development with the microphone positioned at ground floor level at a location representative of the proposed residential dwellings on Marlbog Road (west of the crossroads). This noise survey position comprised attended daytime and night-time monitoring.

N3 To the west of the Proposed Development with the microphone positioned at ground floor level at a location representative of the proposed residential dwellings on Marlbog Road (north of the crossroads). This noise survey position comprised of unattended monitoring over a week.

The selected measurement locations are shown in Figure 8.1, Plate 8.1 to 8.4. The location of nearby noise sensitive receptors is shown in Figure 8.1. Nearby noise sensitive receptors which have been included in the assessment are shown on Figure 8.1 and labelled R1 to R20.

Figure 8.1 - Baseline noise measurement position N1 – N3 and nearby noise sensitive receptors

Plate 8-1 Baseline Noise Measurements setup at N1

Plate 8-2 Baseline Noise Measurements setup at N2a

Plate 8-3 Baseline Noise Measurements setup at N2b

Plate 8-4 Baseline Noise Measurements setup at N3

8.3.2 Survey Periods

Noise measurements were conducted over the following periods:

- Location N1:
    - 9 August 2023 at 11:00 and 9 August 2023 at 15:00
    - 14 August 2023 at 23:00 and 15 August 2023 at 01:00
- Location N2a between
    - 9 August 2023 at 12:00 and 9 August 2023 at 15:00
    - 14 August 2023 at 23:00 and 15 August 2023 at 01:30
- Location N2b between
    - 9 August 2023 at 13:00 and 9 August 2023 at 15:30
    - 14 August 2023 at 23:30 and 15 August 2023 at 02:00
- Location N3 between
    - 9 August 2023 at 15:00 and 16 August 2023 at 15:00

The weather during the survey period was generally dry, calm and mild.

8.3.3 Instrumentation

The noise measurements were undertaken using the following equipment:

Table 8-3- Equipment used during noise surveys

Equipment	Type	Serial Number
Class 1 Sound Level Meter	Larson Davis LxT	4726
Class 1 Sound Level Meter	Rion NC-52	00710314
Acoustic Calibrator	Rion NC-75	34613228

Sample periods were 15-minute log periods. Calibration certificates are available on request.

8.3.4 Measurement Parameters

The noise survey results are presented in decibels (dB), using the following parameters:

$L_{Aeq,T}$ is the equivalent continuous sound level and is used to describe a fluctuating sound as a single value over the sample period (T).

$L_{AFmax,T}$ The maximum A-weighted sound pressure level occurring within a specified time period (T). Measured using the “Fast” time weighting.

$L_{AF10,T}$ Refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period (T). It is used to determine the intermittent high noise level features of locally generated noise and usually gives an indicator of the level of road traffic. Measured using the “Fast” time weighting.

$L_{AF90,T}$ Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval (T). It is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to describe a background level without contribution from intermittent sources. Measured using the “Fast” time weighting.

All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5.

8.3.5 Measurement Results

8.3.5.1 Location N1

Table 8-4 presents a summary of the attended daytime noise levels measured at Location N1.

Table 8-4- Summary of Measured Baseline Daytime Noise Levels at Location N1

Date	Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
9 August 2023	11:53	42	55	44	40
9 August 2023	13:38	40	66	41	37
9 August 2023	14:38	40	68	37	33
Average		41	63	41	36

Table 8-5 presents a summary of the attended night-time noise levels measured at Location N1.

Table 8-5- Summary of Measured Baseline Night-time Noise Levels at Location N1

Date	Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
14 August 2023	23:02	42	63	42	36
15 August 2023	00:02	44	65	46	38
15 August 2023	00:58	44	61	46	36
Average		44	63	45	37

During the day-time noise survey, the dominant noise sources were noted to be from road traffic and distant construction noise. Ambient daytime sound levels were measured in the range 40 to 42 dB $L_{Aeq,T}$. Daytime background sound levels were measured in the range 33 to 40 dB $L_{A90,T}$.

During the night-time, the dominant noise sources were noted to be from distant road traffic and distant plant machinery and distant construction noise ambient noise levels were measured in the range 42 to 44 dB $L_{Aeq,T}$. Night-time background sound levels were measured in the range 36 to 38 dB $L_{A90,T}$.

At this noise monitoring location, extraneous ambient noise sources not associated with WuXi Biologics activities (i.e. off-site road traffic) dominated the measured noise levels. Due to the continuous nature of the noise sources at the WuXi facility, it is appropriate to reference the measured $L_{A90,T}$ parameter which is deemed to be more likely to be representative of steady background sound emission levels such as those from plant noise on site.

Reference to the site survey notes, and the 2023 annual IEL noise monitoring report (AWN Consulting, 2023) (Tables 2 and 4) confirms that at Location N1, plant was barely audible (i.e. not immediately noticeable, unless actively listening), therefore the 2023 annual IEL noise monitoring report states that the specific WuXi plant noise level is up to, or more than, 5dB lower than measured $L_{A90,T}$.

8.3.5.2 Location N2a

Table 8-6 resents a summary of the attended daytime noise levels measured at Location N2a.

Table 8-6- Summary of Measured Baseline Daytime Noise Levels at Location N2a

Date	Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
9 August 2023	12:36	55	74	58	43
9 August 2023	13:58	56	72	60	42
9 August 2023	14:58*	-	-	-	-
Average		56	73	59	43

*Has been omitted from the average calculation as unusual traffic noise was noted during this sample. In the annual IED Licence Noise Survey 2023, background noise levels ranged from 36 to 44 dB $L_{AF,90}$.

Table 8-7 presents a summary of the attended night-time noise levels measured at Location N2a.

Table 8-7- Summary of Measured Baseline Night-time Noise Levels at Location N2a

Date	Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
14 August 2023	23:22	48	69	48	40

Date	Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
15 August 2023	00:21	48	68	49	39
15 August 2023	01:17	49	36	49	36
Average		48	69	49	39

During the day-time noise survey, the dominant noise sources were noted to be from road traffic and distant construction noise. Ambient daytime noise levels were measured in the range 55 to 76 dB $L_{Aeq,15min}$. Daytime background sound levels were measured in the range 42 to 62 dB $L_{A90,T}$.

During the night-time, the dominant noise sources were noted to be from distant road traffic and distant plant machinery and distant construction noise ambient noise levels were measured in the range 48 to 49 dB $L_{Aeq,15min}$. Night-time background sound levels were measured in the range 36 to 40 dB $L_{A90,T}$.

At this noise monitoring location, extraneous ambient noise sources not associated with WuXi Biologics activities (i.e. off-site road traffic) dominated the measured noise levels. Due to the continuous nature of the noise sources at the WuXi facility, it is appropriate to reference the measured $L_{A90,T}$ parameter which is deemed to be more likely to be representative of steady background sound emission levels such as those from plant noise on site.

Reference to the site survey notes, and the 2023 annual IEL noise monitoring report (Tables 2 and 4) confirms that at Location N2a, plant was barely audible (i.e. not immediately noticeable, unless actively listening), therefore the 2213 annual IEL noise monitoring report states that the specific WuXi plant noise level is up to, or more than, 5dB lower than measured $L_{A90,T}$.

8.3.5.3 Location N2b

Table 8-8 presents a summary of the attended daytime noise levels measured at Location N2b.

Table 8-8- Summary of Measured Baseline Daytime Noise Levels at Location N2b

Date	Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
9 August 2023	13:16	43	48	47	42
9 August 2023	14:18	40	40	40	40
9 August 2023	15:19	58	77	60	47
Average		53	55	49	43

Table 8-9 presents a summary of the attended night-time noise levels measured at Location N2b.

Table 8-9- Summary of Measured Baseline Daytime Noise Levels at Location N2b

Date	Time	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
14 August 2023	23:42	48	72	46	35
15 August 2023	00:40	46	68	47	35
15 August 2023	01:35	45	63	48	31
Average		47	68	47	34

During the day-time noise survey, the dominant noise sources were noted to be from road traffic and distant construction noise. Ambient daytime noise levels were measured in the range 43 to 58 dB $L_{Aeq,15min}$. Daytime background sound levels were measured in the range 40 to 47 dB $L_{A90,T}$.

During the night-time, the dominant noise sources were noted to be from distant road traffic and distant plant machinery and distant construction noise ambient noise levels were measured in the range 45 to 48 dB $L_{Aeq,T}$. Night-time background sound levels were measured in the range 31 to 34 dB $L_{A90,T}$.

At this noise monitoring location, extraneous ambient noise sources not associated with WuXi Biologics activities (i.e. off-site road traffic) dominated the measured noise levels. Due to the continuous nature of the noise sources at the WuXi facility, it is appropriate to reference the measured $L_{A90,T}$ parameter which is deemed to be more likely to be representative of steady background sound emission levels such as those from plant noise on site.

Reference to the 2023 annual IEL noise monitoring report (Tables 2 and 4) confirms that at Location N2, plant was barely audible (i.e. not immediately noticeable, unless actively listening), therefore the specific WuXi plant noise level is up to or more than 5dB lower than measured $L_{A90,T}$.

8.3.5.4 Location N3

Table 8-10 presents a summary of the average daytime (i.e. 07:00 to 19:00), evening (19:00 to 23:00) and night-time (i.e. 23:00 to 07:00hrs) noise levels measured at Location N3. The night-time period 02:00 to 05:00hrs has also been presented, as this period typically represents the period of the night typically less impacted by other competing noise sources that are not associated with WuXi site (i.e. road traffic noise).

Figure 8.2 to Figure 8.5 show a graphical representation of the measured daytime, evening and night-time baseline noise levels over the survey period.

Table 8-10- Summary of Measured Baseline Noise Levels at Location N3

Day/Date	Period	Measured Noise Levels (dB re. 2x10-5 Pa)			
		$L_{Aeq,T}$	$L_{Amax,T}$	$L_{A10,T}$	$L_{A90,T}$
9 August 2023	Day	57	72	59	44
	Evening	52	67	51	45
	Night	47	57	46	41
10 August 2023	Day	56	71	57	48
	Evening	53	69	52	46
	Night	51	61	50	44
11 August 2023	Day	57	70	59	52
	Evening	54	68	55	49
	Night	49	60	50	42
12 August 2023	Day	57	70	59	53
	Evening	55	67	56	50
	Night	48	60	50	43
13 August 2023	Day	56	68	57	52
	Evening	54	67	55	50
	Night	50	59	50	43
14 August 2023	Day	55	70	55	48
	Evening	53	67	54	48
	Night	51	61	52	45
15 August 2023	Day	55	70	56	49
	Evening	53	69	52	46

	Night	50	58	49	43
16 August 2023	Day	54	71	54	43
Average	**Day**	56	70	56	48
	Evening	53	68	53	48
	Night (23:00-07:00)	50	60	50	43
	Night (02:00-05:00)	46	56	48	41

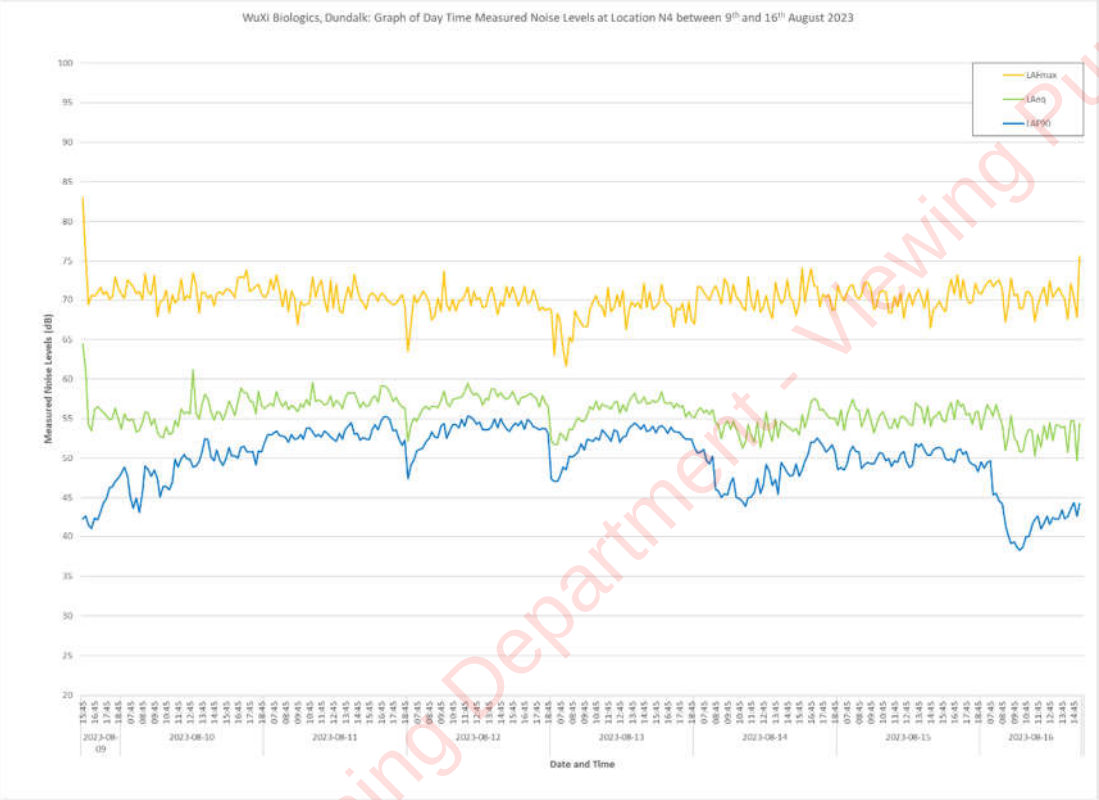


Figure 8.2 - Graph of Daytime (07:00-19:00) baseline noise measurements at N3

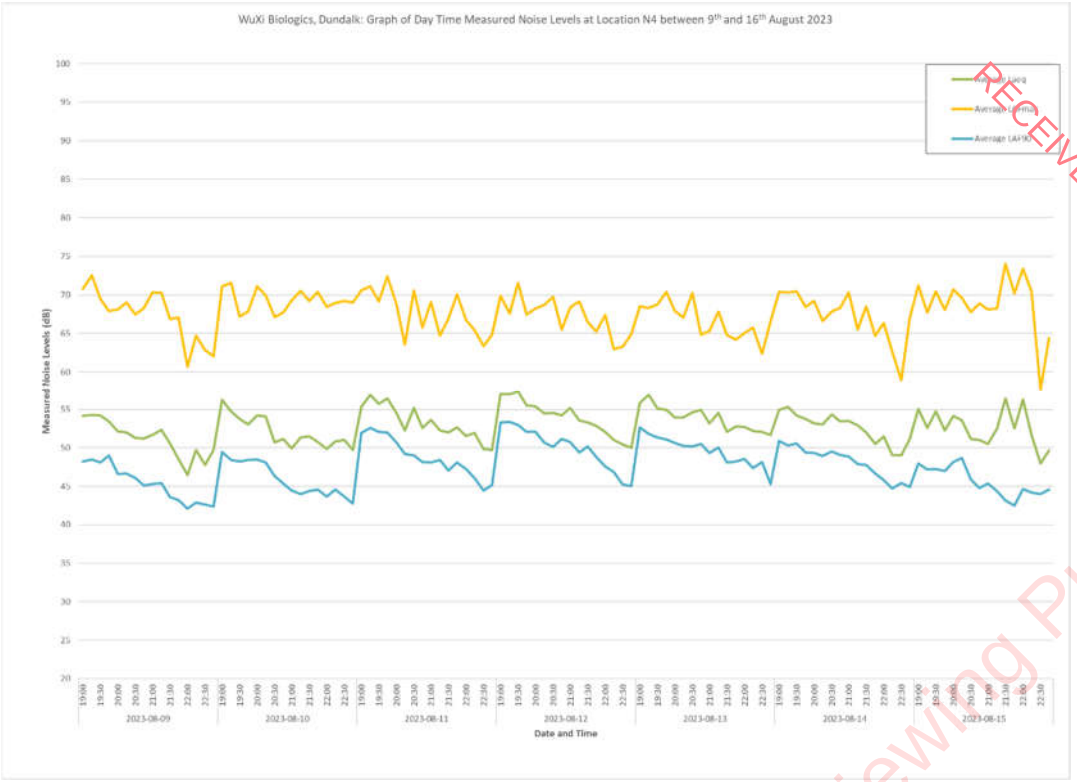


Figure 8.3 - Graph of Evening (19:00-23:00) baseline noise measurements at N3

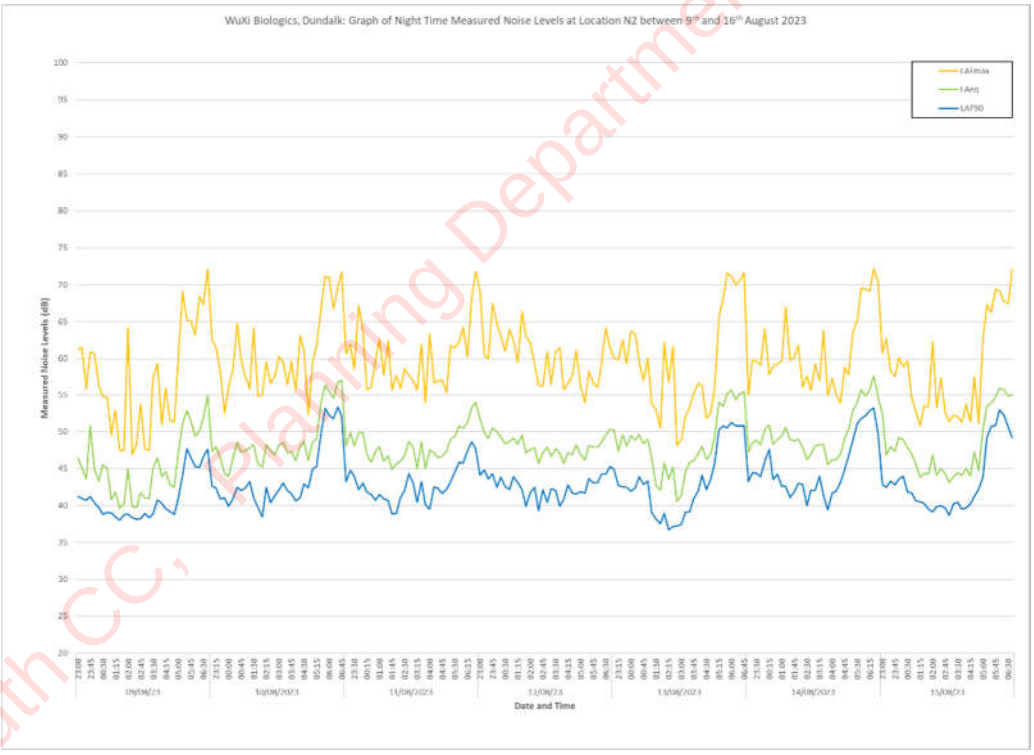


Figure 8.4 - Graph of Night-time (23:00 – 07:00) baseline noise measurements at N3

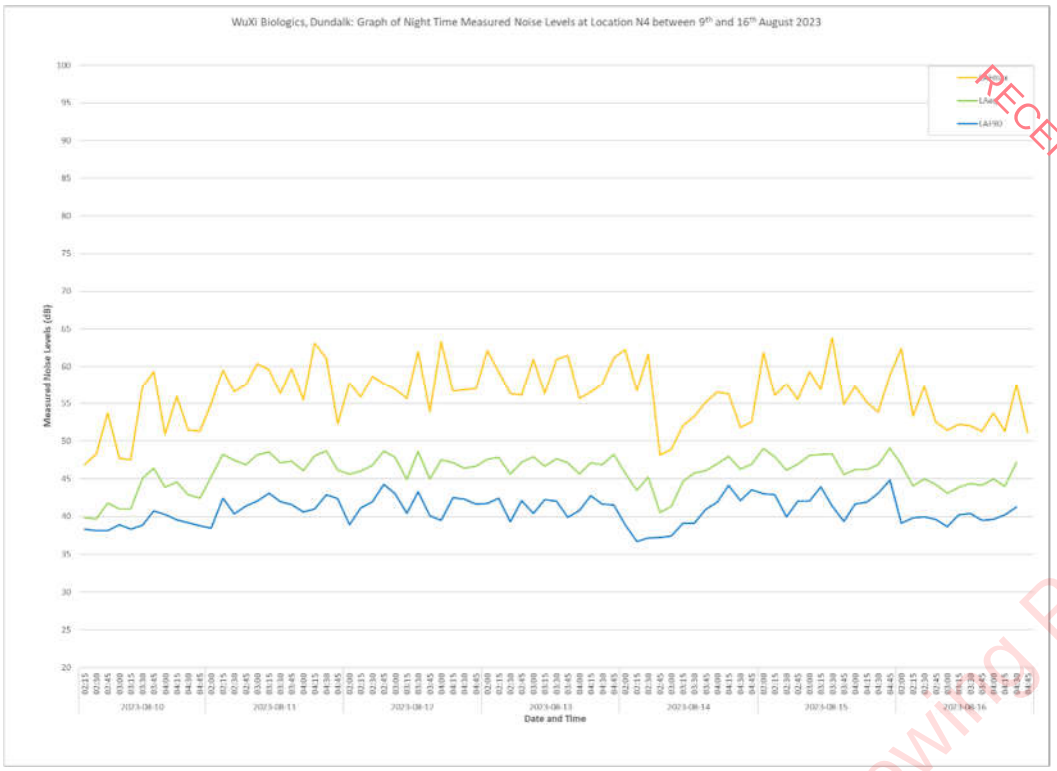


Figure 8.5 - Graph of Night-time (02:00 – 05:00) baseline noise measurements at N3

At this noise monitoring location, extraneous ambient noise sources not associated with WuXi Biologics activities (i.e. off-site road traffic along the Mullaharlin Road, which runs close to the monitoring location and nearby NSL) dominated the measured $L_{Aeq,T}$ noise levels. Due to the continuous nature of the noise sources at the WuXi facility, it is appropriate to reference the measured $L_{A90,T}$ parameter which is deemed to be more likely to be representative of steady background sound emission levels such as those from plant noise on site.

Reference to the site survey notes, and the 2023 annual IEL noise monitoring report (Tables 2 and 4) confirms that at Location N3, plant from the facility was barely audible (i.e. not immediately noticeable, unless actively listening), therefore the 2023 annual IEL noise monitoring report states that the specific WuXi plant noise level is up to, or more than, 5dB lower than measured $L_{A90,T}$.

8.3.6 Summary of Annual IED Licence Baseline Noise Monitoring

With consideration of the measured baseline noise levels as presented above, in addition to the annual compliance noise monitoring commissioned by WuXi for 2023[23], which concludes as follows…

> *"At all noise sensitive locations, extraneous ambient noise sources not associated with WuXi Biologics activities dominated the measured noise levels. Due to the continuous nature of the noise sources at the facility, it is appropriate to reference the measured L_{A90} parameter which is deemed to be representative of steady background noise levels as would be most influenced by specific noise levels*

[23] AWN Consulting Report Ref. 237501.0536NR01a "*WuXi Biologics Ireland Limited Annual IED Licence Noise Survey 2023*" dated 23 Sept 2023.

from the site. It was found that the specific noise level attributable to WuXi Biologics operations is within the specified emission limit values at all locations during the day, evening and night-time periods."

…it is concluded that the site is currently operating in compliance with the sites EPA Licence noise limits.

8.4 Potential Noise Effects during Construction Phase

8.4.1 Construction Noise

During the construction phase the main site activities will include ground and rock breaking works and construction of the infrastructure, along with the general construction noise associated with building construction and landscaping. Potential impacts during the construction phase will be short term.

Table 8-11 presents construction plant items that are considered to be typical for a site of this nature and the sound power levels.

Table 8-11- Construction Plant Items and Noise Emission Values

Phase	Item of Plant	Construction Sound Power Level (dB L_{wA})
Ground Breaking	Rock hammer	121
	Excavator	99
Construction of infrastructure	Dozer	107
	Rollers	108
	Dump trucks	107
	Cranes	99
Deliveries	Lorry	105

The nearest NSL's to the proposed construction works are the properties to the west of the site boundary. The closest works area is approximately 130m to the east from the nearest properties with the remainder of works taking place Noise calculations have been carried out, following the guidance outlined in BS 5228-1. The calculations also assume that the equipment will operate for 66% of a typical 12-hour working day and that a standard site hoarding, typically 2.4m height will be provided around the perimeter of the construction site for the duration of works. Table 8-12 summarises the construction noise predictions and shows contours in Figure 8.6 to Figure 8.8.

Table 8-12- Construction noise predictions at nearby noise sensitive receptors

Receiver (Ref Figure 8.1)	Construction Phase		
	Ground breaking (dB $L_{Aeq,1hr}$)	Construction of infrastructure (dB $L_{Aeq,1hr}$)	Deliveries (dB $L_{Aeq,1hr}$)
R1	63	52	47
R2	58	50	45
R3	60	52	48
R4	61	51	47
R5	59	50	44
R6	60	51	47
R7	60	50	47
R8	59	50	46
R9	58	49	45
R10	49	42	37
R11	49	43	37
R12	51	46	38
R13	55	48	39
R14	55	47	39
R15	55	47	38
R16	54	46	38
R17	53	45	37
R18	53	45	37
R19	49	41	35
R20	50	42	35

Figure 8.6 - Ground breaking noise prediction contours – 65dB(A)

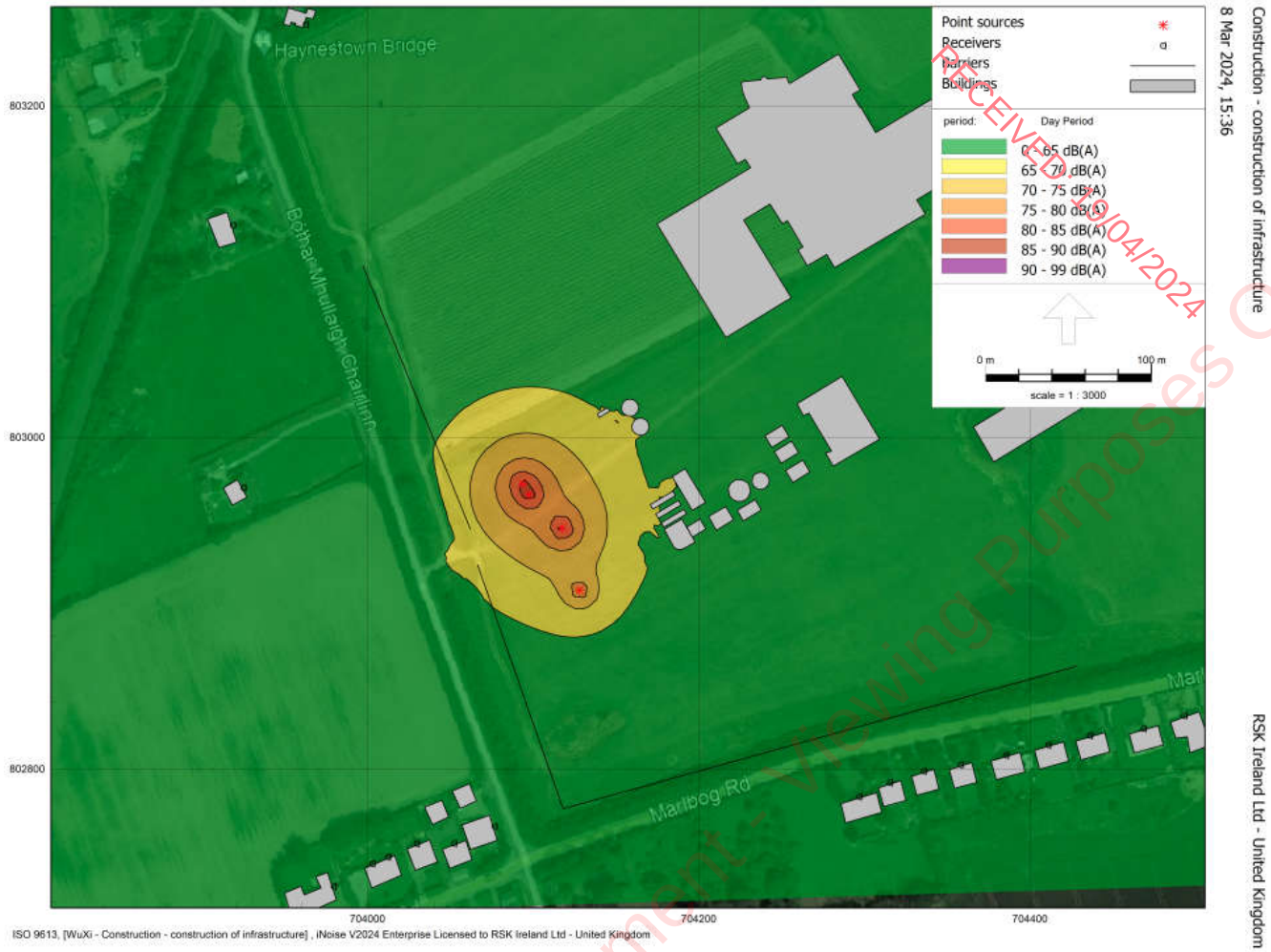


Figure 8.7 - Construction of Infrastructure prediction contours – 65dB(A)

Figure 8.8 - Deliveries noise prediction contours – 65dB(A)

With consideration of the site location, the likely construction phase activities, the distances from these works to nearby dwellings and the proposed construction noise criteria (i.e. 65 dB $L_{Aeq,T}$), it is predicted that there will not be any significant adverse noise impacts encountered. This assumes that works will take place approx. 130m to the east from the nearest receptor and construction works will take place during the daytime (07:00 to 19:00 on Monday to Friday and 07:00 and 13:00 on Saturdays).

General noise mitigation measures should be considered to further reduce any potential impacts. Typical mitigation measures that should be considered are presented in the Section 8.9 of this document.

8.4.2 Construction Vibration

With consideration of the distance from site boundaries to nearby sensitive receptors, and proposed general methods of construction, it is projected that vibration emissions to nearby receptors will be not significant. Vibration mitigation measures are, however, presented in the Section 8.9 of this document in order to ensure that construction vibration emissions are adequately controlled.

8.5 Potential Noise Effects during Operational Phase

In order to assess the potential operational phase sounds levels, a noise model of the site has been developed. *iNoise* is a proprietary prediction package for calculating noise levels from the facility to nearby receptors. Calculations are made in accordance with ISO9613-2:1996, taking into account a range of factors affecting the propagation of sound, including:

- the sound power level (dB L_{wA}) of the source;
- the % of time that the source operates during both day and night-time periods;
- the height of the sound source;
- the direction and angle that the source is pointing;
- the distance between the sound source and the receiver;
- the provision of obstacles such as buildings and/or barriers in the path between the source and receiver;
- the presence of sound reflecting/absorbing surfaces; and,
- climatic factors such as temperature, relative humidity and atmospheric pressure.

The proposed plant items, associated sound power level and proposed location of each item was supplied by the clients representatives. The sound power level for each item included in the model is detailed in Table 8-13.

Table 8-13- Proposed plant items

Type	Overall Sound Power Level (dB LWA)	Percentage on-time (%)	Number of items
Balance Tanks - Forward Feed Pumps	72	100	1
Screens - Progressive Stair Screen	87	100	1
Off-Spec Return Pumps	71	100	1
Balance Tanks - Jet Mixers	82	100	4
Lamellas & Mixers	82	100	1
Sludge Transfer Pumps	90	100	1
Dewatering Feed pumps	90	100	1
Odour Control Unit	100	100	2

Off-Spec Tanks - Jet Mixers	82	100	2
Blowers	75	100	3
Air Compressors	100	100	1
Membrane Skids	94	100	2
Cake Pumps	90	100	1
Dewatering Units (Screw presses)	80	100	2
Liquor Return Pumps	72	100	1
Lorries for deliveries	102	20	10 movements per day

The noise model was generated from a set of design drawings of the proposed site and with use of Google Earth background imagery of nearby buildings, with building heights, noise source heights and receiver locations derived from site sectional/elevation drawings.

The *iNoise* model then calculates noise levels to specific receiver locations (i.e. nearby NSL's) which, in-turn, allows for the assessment of noise impacts via comparison of predicted noise levels to the criteria previously outlined. The noise levels at the key receptors have been predicted assuming worst-case conditions where plant is operational constantly. The predicted noise levels at nearby receptors are presented in Table 8-14 and Figure 8.9 to Figure 8.11.

Table 8-14- Predicted noise levels at nearby receptors

Receptor Number	Proposed Effluent Balancing and Resource Recovery at WuXi Biologics Predicted Operational Phase Noise Level (dB $L_{Aeq,T}$)	
	Daytime (07:00 – 19:00hrs)	Evening (19:00 – 23:00hrs) & Night-time (23:00 – 07:00hrs)
R1	42	38
R2	42	38
R3	44	38
R4	42	41
R5	41	40
R6	43	41

Receptor Number	Proposed Effluent Balancing and Resource Recovery at WuXi Biologics Predicted Operational Phase Noise Level (dB $L_{Aeq,T}$)	
	Daytime (07:00 – 19:00hrs)	Evening (19:00 – 23:00hrs) & Night-time (23:00 – 07:00hrs)
R7	42	40
R8	42	40
R9	42	40
R10	35	34
R11	35	35
R12	36	35
R13	34	34
R14	37	37
R15	37	36
R16	33	33
R17	33	32
R18	33	32
R19	30	29
R20	30	29

These predicted values have been compared to the limits set out in Section 4 of the WuXi Biologics IED Licence. It is predicted that the proposed new plant items will comply with the daytime, evening-time and night-time limits.

The potential cumulative impact of existing + proposed plant noise levels are considered in the relevant sections of this EIAR Chapter.

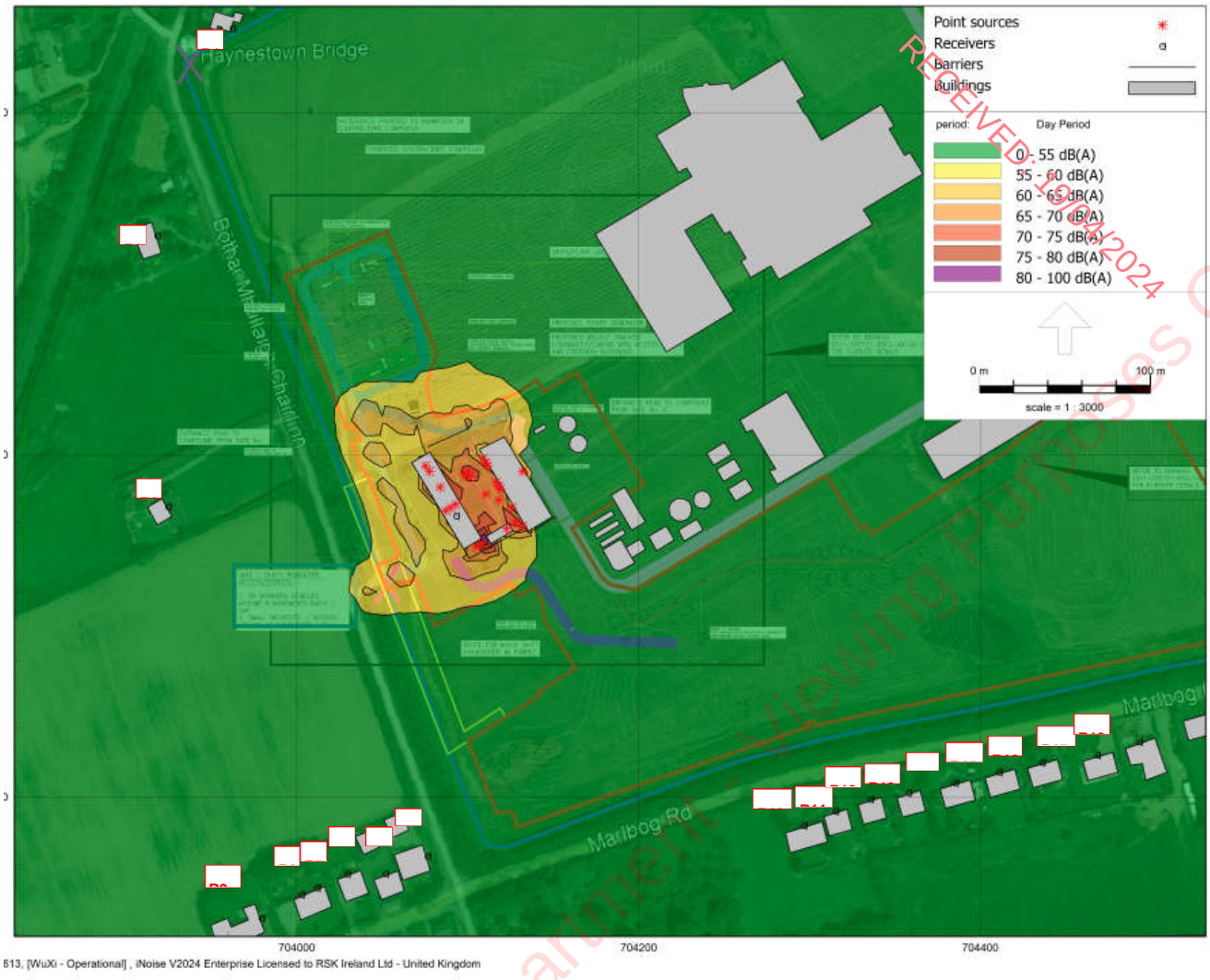


Figure 8.9 - Operational Daytime Noise Prediction Contours – 55dB (A)

Figure 8.10 - Operational Evening-time Noise Prediction Contours – 50dB (A)

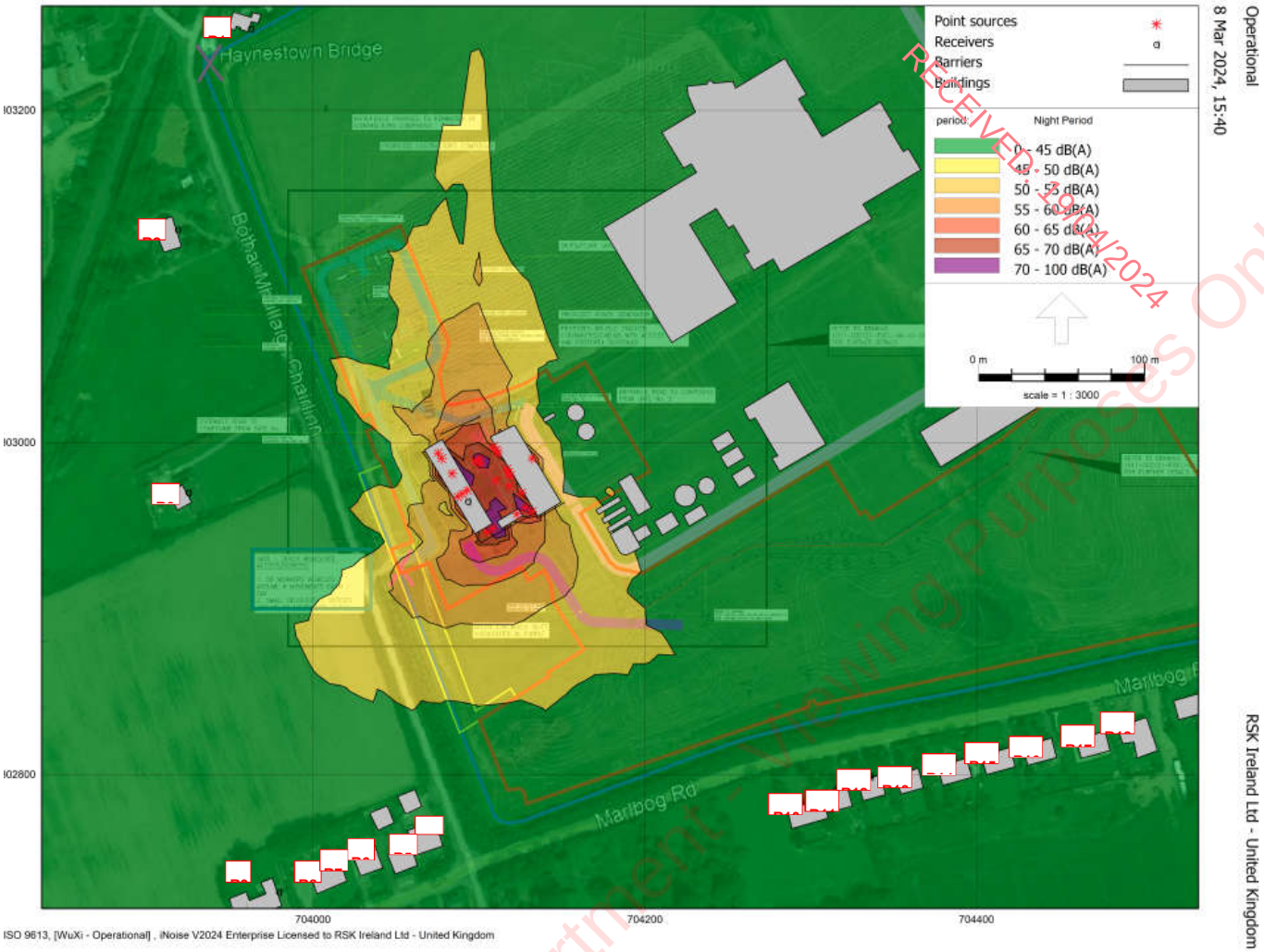


Figure 8.11 - Operational Night-time Noise Prediction Contours – 45dB (A)

8.6 Potential Vibration during Operational Phase

No significant sources of vibration are expected to arise during the operational phase of the development. Operational vibration has therefore been scoped out and not assessed further in this chapter.

8.7 Do Nothing Scenario

The existing noise climate will remain unchanged on site and at nearby noise sensitive locations, site will remain operational and in compliance with EPA licence noise limits.

8.8 Cumulative Effects

8.8.1 Construction

The phasing/commencement of any other permitted developments in the locality could potentially result in the scenario where a number of other construction sites are in operation at the same time as the proposed development. The location of these proposed development sites in relation to each other and to nearby noise sensitive locations, means that there is minimal risk of cumulative construction noise emissions resulting in an exceedance of the relevant criteria. The same conclusion is likely to be reached in the event that there are other nearby construction sites active at the same time as the sites discussed above.

A planning application has been submitted by WuXi Biologics Ireland Ltd erect a 3MW wind turbine, located at the East area of the existing biopharmaceuticals plan. The proposed wind turbine is located to the east of the proposed facility away from the location of proposed Effluent Balancing and Resource. Therefore it is unlikely to result in significant cumulative effects. It is recommended that construction is phrased at both sites to reduce the risk of cumulative significant effects.

8.8.2 Operational

In order to assess the potential cumulative impacts of the development, the predicted noise levels from the proposed plant items have been added to the current noise levels from the facility which was estimated using noise surveys carried out by RSK (detailed in Section 8.3.5). The background noise levels (L_{A90}) from the surveys completed in August 2023 have been used to estimate current noise levels from the facility (approach as per the 2023 annual IED licence compliance noise report). As shown in Table 8-15 cumulative calculated noise levels are predicted to comply with the WuXi Biologics IED Licence noise emission limits. The 2023 WuXi Biologics IED Licence Noise Survey has been included in Appendix 8.

Table 8-15- Predicted cumulative operation noise levels

Receptor Number	Estimated Existing Site Noise Emission Levels (dB $L_{A90,T}$)		Predicted Noise Levels from Proposed Development (dB $L_{Aeq,T}$)		Calculated Cumulative Noise Levels (dB $L_{Aeq,T}$)		Compiles with IEL Noise Limits?	
	Day	Evening & Night	Day	Evening & Night	Day	Evening & Night	Day	Evening & Night
R1	49	41	42	38	50	43	✓	✓
R2	49	41	42	38	50	43	✓	✓
R3	49	41	44	38	50	43	✓	✓
R4	43	34	42	41	46	42	✓	✓
R5	43	34	41	40	45	41	✓	✓
R6	43	34	43	41	46	42	✓	✓

Receptor Number	Estimated Existing Site Noise Emission Levels (dB $L_{A90,T}$)		Predicted Noise Levels from Proposed Development (dB $L_{Aeq,T}$)		Calculated Cumulative Noise Levels (dB $L_{Aeq,T}$)		Compiles with IEL Noise Limits?	
	Day	Evening & Night	Day	Evening & Night	Day	Evening & Night	Day	Evening & Night
R7	43	34	42	40	46	41	✓	✓
R8	43	34	42	40	46	41	✓	✓
R9	43	34	42	40	45	41	✓	✓
R10	43	39	35	34	44	40	✓	✓
R11	43	39	35	35	44	40	✓	✓
R12	43	39	36	35	44	41	✓	✓
R13	43	39	34	34	44	40	✓	✓
R14	43	39	37	37	44	41	✓	✓
R15	43	39	37	36	44	41	✓	✓
R16	43	39	33	33	43	40	✓	✓
R17	43	39	33	32	43	40	✓	✓
R18	43	39	33	32	43	40	✓	✓
R19	36	37	30	29	37	38	✓	✓
R20	36	37	30	29	37	38	✓	✓

8.9 Mitigation Measures

8.9.1 Construction

With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2'. Whilst construction noise and vibration impacts are calculated to be within the criteria set out in Section 8.2.1.1 in this document, the contractor will ensure that all necessary noise and vibration control measures will be used, in order to ensure impacts to nearby residential noise sensitive locations are not significant. The following mitigation measures are required during the construction of the proposed development:

- Limiting the hours of construction to the following:
    - Monday to Friday 07.00 – 19.00
    - Saturday 07.00 – 13.00

  In exceptional circumstances, and subject to agreement with LCC, extended hours of operation may be applied for. In such instances an assessment of potential noise impacts shall be carried out in advance of works taking place, and submitted to LCC, as part of the extended hours request.

- Continual monitoring of noise and vibration throughout construction at western site boundary closest to the receptors (i.e. Location N3), for the duration of the proposed development.

  The noise monitoring equipment shall meet the following minimum specification (or similar approved):
    - Logging of hourly noise (LAeq & LAFMax) and vibration (PPV) samples;
    - E-mail alert on threshold exceedance;
    - E-mail alert on low battery and low memory;
    - Remote access to measured data.
    - Data shall be reported on a monthly basis to Wuxi Biologics.

- A 2.4m high site hoarding should be erected around the construction area
- Maintaining site access roads to mitigate the potential for noise from lorries
- Selection of plant with low inherent potential for generation of noise and/ or vibration
- Situate any noisy plant as far away from sensitive properties as is reasonably practicable and the use of vibration isolated support structures where necessary
- Establishing channels of communication between WuXi, the contractor, Local Authority and residents
- Appointing a site representative responsible for matters relating to noise and vibration.

8.9.2 Operational

The cumulative predicted noise levels during the operational phase of the development are compliant with the limits set out in the licensed issued by the EPA under Industrial Emissions Licence P1122-01. However, the licence also states that during night-time hours there should be no clearly tonal component or impulsive component in the noise emission from the activity audible at any noise sensitive location.

Based on the preliminary plant information provided at this stage, the following plant items have been identified as having potential tonal components, at source, using the EPA NG4 objective tonal (1/3 Octave) identification method:

- Screens - Progressive Stair Screen

- Balance Tanks - Jet Mixers
- Lamellas & Mixers
- Sludge Transfer Pumps
- Dewatering Feed pumps
- Off-Spec Tanks - Jet Mixers
- Blowers,
- Membrane Skids
- Cake Pumps
- Dewatering Units (Screw presses).

These plant items may require additional review and potential additional noise mitigation measures, which will be designed and implemented (where required) at detailed design stage i.e. once final plant item selection have been made. Mitigation measures will be implemented, where required, in order to ensure that the IEL Licence requirements (i.e. for tonal noise emissions to not be clearly audible at NSL's) is achieved. Analysis of the 1/3 octave predicted noise levels based on the current plant selection, shows that no audible tones are anticipated at noise sensitive receptors. However, this analysis should be repeated once the plant items and suppliers have been finalised.

8.10 Residual Effects

8.10.1 Construction

During the construction phase of the proposed development there will be some negative effects on nearby noise sensitive locations due to noise/vibration emissions from construction activity. The implementation of suitable control measures will ensure that the effect is minimized. The residual effect from construction is as follows.

Table 8-16- Construction phase residual noise/vibration effects

Quality	Significance	Duration
Negative	Minor	Short-term

8.10.2 Operation

The anticipated residual effect from the operational phase of the development is summarised as follows.

Table 8-17- Construction phase residual noise/vibration effects

Quality	Significance	Duration
Neutral	Not significant	Permanent

8.11 Monitoring Requirements

The appointed contractor will be required to monitor levels of noise during critical construction periods at nearby sensitive locations and/or proposed development boundary.

WuXi Biologics will be required to continue to carry out annual noise compliance monitoring under the requirements of their EPA license in the developments operational phase.

8.12 Interaction with other Environmental Attributes

8.12.1 Population and Human Health

The impact assessment of noise and vibration has concluded that additional noise associated with the Proposed Development will not have any significant negative impacts. Mitigation and monitoring measures will be incorporated to further reduce the potential for noise generation from the Proposed Development.

8.12.1.1 Construction Noise & Human Health

In terms of the noise exposure of construction workers, the Safety, Health and Welfare at Work (General Application) Regulations 2007 (Statutory Instrument No. 299 of 2007) provides guidance in terms of allowable workplace noise exposure levels for employees. The Regulations specify two noise Action Levels at which the employer is legally obliged to reduce the risk of exposure to noise. The appointed contractor will be required to comply with the Regulations and provide appropriate noise exposure mitigation measures where necessary.

The noise exposure level to off-site receptors during the construction phase will be below the lower Action Level and therefore the risk of noise exposure resulting in hearing damage to off-site receptors is not significant.

In terms of construction noise emissions to nearby off-site receptors, provided that noise emissions are controlled to comply with the recommended significance thresholds, as outlined in previous sections, and considering the short-term nature of the works, the potential health effects associated with construction noise is negative, minor, short term.

8.12.1.2 Operational Noise and Human Health

The operational phase outward noise emissions will be controlled to comply with the recommended EPA and World Health Organisation (WHO) Guidelines, the potential health effects associated with operational phase of the proposed development noise emissions are neutral, not significant and permanent.

8.12.2 Biodiversity

The Noise and Vibration effects of the proposed development will cause some disturbance to the local fauna during the Construction Phase of the proposed development; however, the proposed mitigation measures will reduce this disturbance.

8.12.3 Traffic

There is the potential for traffic related noise to impact residents during the Construction and Operational Phase of the proposed development; however, due to the implementation of the proposed mitigation measures, there will be no significant impact.

8.13 Difficulties encountered during preparation of this chapter

There were no difficulties encountered in the preparation of this document.

8.14 Risk of Major Accidents and/or Disasters

Noise and vibration are not expected to have any impacts of the risk of major accidents and/or disasters.

9. Traffic

9.1 Introduction

This traffic chapter seeks to provide a description about the anticipated traffic impact of development of the Effluent Balancing and Resource Recovery System at the Dundalk Science and Technology Park in Haynestown.

9.2 Methodology

This traffic chapter has been prepared in accordance with European Union (Environmental Impact Assessment Directive (2011/92/EU as amended by 2014/52/EU) and European Union (Planning and Development) (Environmental Impact Assessment) Regulations and with due regard to the following EIAR guidance:

- Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' published in 2022;
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)' published in September 2003;
- EPA Guidelines on the information to be contained in Environmental Impact Statements, 2002,
- European Commission (EC) 'Environmental Impact Assessment of Projects Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU)', published in 2017; and,
- EC 'Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)', published in 2017.

9.3 Receiving Environment

The detailed description of the site location can be found in Chapter 2 of the report. In terms of the strategic links, the site is situated approximately 480 meters east of the M1 and south of National Road N52.

9.3.1 Site Access

9.3.1.1 At construction stage

Large construction vehicles, such as articulated lorries, will enter the proposed development through the existing WuXi Biologics Facility entrance and via the temporary haul road.

Smaller vehicles, including cars and vans carrying clean equipment and staff, will access the site via the existing agricultural gate on the Mullagharlin road, which will be repurposed to facilitate access for small vehicles as part of the proposed development.

The parking arrangements for the staff will be provided within the proposed construction compound. Parking alongside roads will strictly be prohibited.

9.3.1.2 During operational phase

As part of the proposed development the existing agricultural gate on the Mullaghareel road will be repurposed to facilitate the access to the plant for small vehicles during operation phase.

9.4 Potential Effects - Construction Phase

9.4.1 Methodology

To assess the potential effects of the trips associated with the proposed development, the following steps were utilised:

- Determining the working hours;
- Identification of the potential major links to be used for material delivery;
- Determining the baseline traffic for the major links to be used;
- Existing Capacity Analysis;
- Prediction of trip generation; and,
- Determination of the impact of the trips.

9.4.2 Working Hours

The following working hours are proposed for the construction phase:

- Monday to Friday – 7 am to 7 pm;
- Saturday – 8 am to 2 pm;
- No work on Sunday and Public Holidays; and,
- For material deliveries, peak hours will be avoided during weekdays. Therefore, deliveries will be restricted to only occur between 10 am and 4 pm.

Based on the above assumptions, the potential arrival and departure times for the staff are summarised below:

- During weekdays, all the staff will be arriving between 6 to 7am, and depart between 7 to 8 pm; and,
- During Saturdays, all the staff will be arriving between 7 to 8 pm, and depart between 2 to 3 pm.

9.4.3 Identification of Major Links for material delivery

In terms of location, the proposed development enjoys a strategic advantage being situated close to the M1 motorway and N52 national road. Consequently, all vehicles involved in construction activities can bypass local and regional roads, choosing instead to utilise these two strategic links.

9.4.4 Baseline Traffic

The baseline traffic for the analysis was obtained from the TII Traffic Monitoring Unit (TMU) counters, which are accessible on https://trafficdata.tii.ie/publicmultinodemap.asp. Data for the year 2023 was utilised for the analysis. Figure 9.1 illustrates the locations of the Traffic Monitoring Units (TMU) from which data was extracted for analysis.

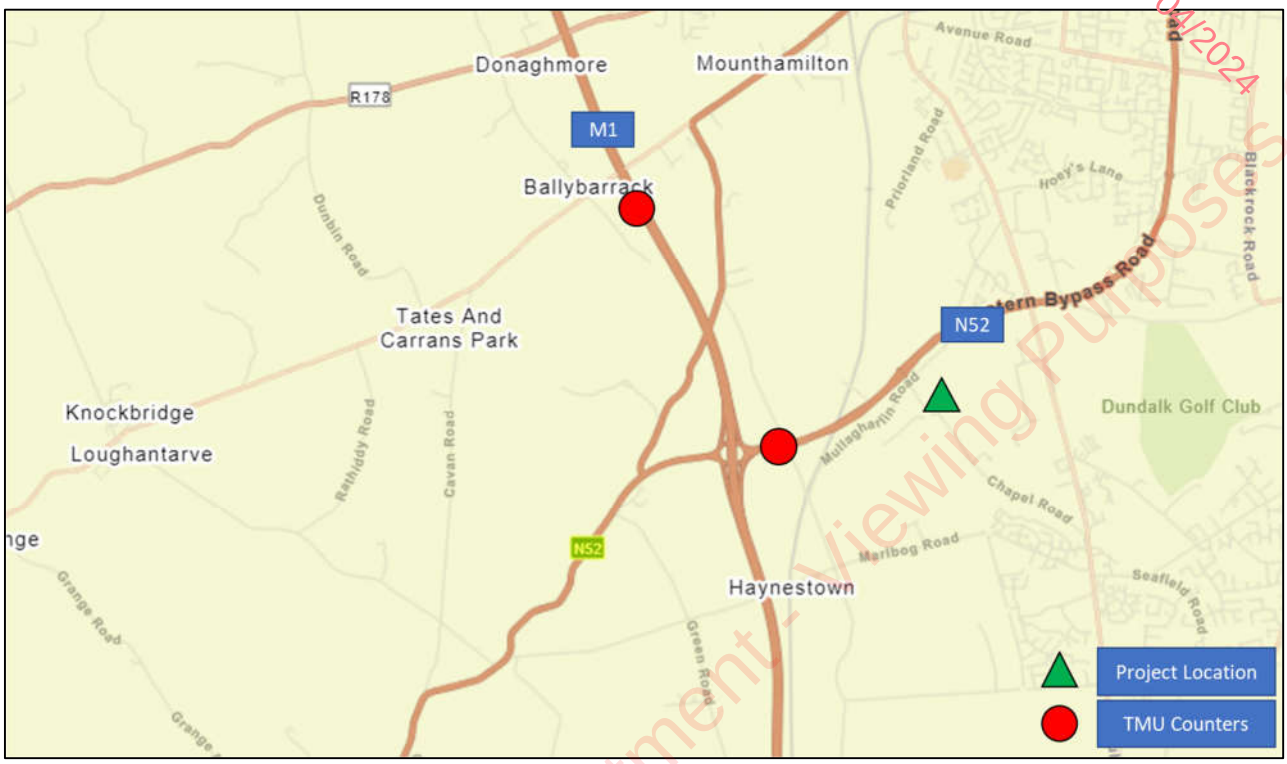


Figure 9.1 - Location of TMU Counters for the analysis

9.4.5 Existing Capacity Analysis

The existing capacity analysis of these links were analysed in accordance with the guidelines provided in the Design Manual for Roads and Bridges, specifically Volume 5, Section 1, Part 3, titled 'Traffic Capacity of Urban Roads' (published in May 1999).

According to this document, the category of these links and their corresponding 2-way capacity are summarised below:

- M1 (Urban Motorway (UM)) - 8,000 vehicles per hour; and,
- N52 (Urban All Purpose 2 (UAP2)) - 6400 vehicles per hour.

Based on the staff arrival and departure times, as well as material delivery times mentioned in the section above, analysis of existing capacity was conducted for the following hours on weekdays:

- Staff arrival time: 6 to 7 am;

- Material delivery: A single hour with peak background traffic between 10 am to 4 pm was considered for assessment; and,
- Staff departure time: 7 to 8 pm.

No assessment was undertaken for weekends, as weekend traffic is generally lower compared to weekdays.

For the analysis, the existing two-way peak hourly flow values for all links during the specified hours were determined using average daily flow data from the TII Traffic Monitoring Units (TMU) counters, as summarised in the table below.

Table 9-1 - Existing capacity analysis of the nearby major links

Links	Location of TMU counter	Type of the link	Capacity of the link (/hr)	Hour of the day	Max hourly flow	Flow / Capacity
M1	M1-1 M01 Dundalk Bypass Jn16 to Jn17	UM	8,000	6 to 7am	1145	14.31%
				3 to 4 pm	1969	24.61%
				7 to 8 pm	1136	14.20%
N52	N52 Between Dundalk and M1, Dundalk (South link), Co. Louth	UAP2	6400	6 to 7am	465	7.26%
				3 to 4 pm	1233	19.26%
				7 to 8 pm	660	10.31%

From the table above, it is evident that the links mentioned have sufficient residual capacity in their current state for the time periods assessed.

9.4.6 Trip Generation

The following section summarises the estimation of number of daily construction trips likely to be generated because of the construction activities and determine the potential impacts on the major links mentioned in Table 9-1 above.

9.4.6.1 Staff traffic

- At the peak of construction, it is anticipated that 50 construction workers will be required at the proposed development.
- It is assumed all the workers will use private vehicles.
- Therefore, based on above, 50 number of arrival trips and 50 number of departure trips were considered.

9.4.6.2 Material Deliveries

The construction activities (i.e., excavation and construction) will take place over ca. 15 months, during which the majority of HGV movements will occur.

The overall construction process is divided into following phases:

- Enabling and excavation – 3 to 4 months;
- Construction – 8 to 9 months (mainly concreting); and,
- Finishing and handover - 2 to 3 months.

Since excavation and actual construction work will not happen simultaneously, trips associated with both were calculated separately, and the maximum of both were considered for assessment. For finishing and handover work, the anticipated number of trips are generally fewer than for concrete and excavation work. Therefore, no finishing/handover trips were considered for the analysis.

Enabling and Excavation

The number of trips due to enabling and excavation work was determined as follows:

- The anticipated enabling and excavation volume of material are as follow:
    - Excavated Material, excluding rocks – 34,407 m3;
    - Excavated Material, rocks – 5,545 m3; and,
    - Fill Material – 3,750 m3.
- The assumed specific gravity of all the materials above are as follow:
    - Excavated Material, excluding rocks – 1.3 ;
    - Excavated Material, rocks – 2.0; and,
    - Fill Material – 1.3.
- Based on the above density and volume, the weight of excavation/fill material was determined as below.
    - Excavated Material, excluding rocks – 44,729 tonnes;
    - Excavated Material, rocks – 11,090 tonnes; and,
    - Fill Material – 4,875 tonnes.

As mentioned in the earlier section, the enabling and excavation period will be spread over 4 months. Assuming 5 working days in each week, and 4 weeks in a month, the total weight of the material required to be moved each day was determined as follows:

- Excavated Material, excluding rocks – 559 tonnes;

- Excavated Material, rocks – 139 tonnes; and,
- Fill Material – 61 tonnes.

Additionally, as mentioned earlier, all construction-related activities will be restricted between 10 am and 4 pm. Assuming uniform delivery over each hour, the weight of material required to be moved per hour are as follows:

- Excavated Material, excluding rocks – 93 tonnes;
- Excavated Material, rocks – 23 tonnes; and,
- Fill Material – 10 tonnes.

Assuming a Rigid HGV carries up to 20 tonnes in terms of payload, the total number of trips per hour are as follows:

- Excavated Material, excluding rocks – 5 vehicles;
- Excavated Material, rocks – 2 vehicles; and,
- Fill Material – 1 vehicle.

- Hence, a total of 8 vehicles per hour can be considered for enabling/excavation work.

Concrete Work

The number of trips due to concrete work was determined as follows:

- The anticipated volume of concrete for the entire work was assumed to be the same as the excavation volume, which is 34,407 m3;
- Assuming a concrete mixture can hold 6 m3 of concrete, it will account for 5,734 trips; and,
- As mentioned earlier, the concreting work will take over a span of around 9 months. Assuming the same assumption as taken for the excavation work (4 weeks in a month, 5 working days, and 6 hours for material delivery), the number of anticipated trips will be 6 per hour.

Therefore, based on the above analysis, a maximum of 8 vehicles per hour were determined for material delivery trips. It was further assumed that all these trips will return in the same hour, resulting in a maximum of 16 two-way trips per hour.

9.4.6.3 Total number of Trips

Based on the above assumption, a summary of the trips is presented in the table below.

Table 9-2 - Number of Construction Trips

Activity	Time Period	Trips
Staff	6 to 7 am	50 (Arrival trips)
	5 to 6 pm	50 (Departure Trips)
Material delivery	10 am to 4 pm	Each hour, 8 arrival trips and 8 departure trips

9.4.6.4 Construction Traffic Impact

Impact of Staff trips

Regarding the impact of the staff trips, the analysis was undertaken only for the M1 and N52 strategic links. A worst-case scenario was assumed in which all staff would use only these two links to commute to the site. The analysis is summarised below.

Table 9-3 - Construction Traffic Impact

Links	Capacity of the link (veh/hr)	Hour of the day	Existing Flow	Additional trips	Cumulative Flow	Cumulative Flow / Capacity
M1	8000	6 to 7am	1145	50	1195	15%
		7 to 8 pm	1136	50	1186	15%
N52	6400	6 to 7am	465	50	515	8%
		7 to 8 pm	660	50	710	9%

Based on the table above, it can be observed that the cumulative flow will account for 8 to 15% of the maximum capacity of the major links.

Some staff trips may opt for the regional road R132 or Mullagharlin road. However, it is anticipated that all staff will reach the site before morning peak hours and depart from site after evening rush hour. Therefore, these trips are not expected to have an adverse impact on the operation of these links.

Hence, based on the above analysis, the impact of the staff trips can be considered as "not significant".

Impact of Material Delivery Trips

Regarding material delivery trips, as mentioned earlier, all this traffic will be directed away from local communities and will utilise the M1 and N52 routes for transporting materials to the site. The analysis is summarised below. As mentioned earlier, for material delivery a single hour with peak background traffic between 10 am to 4pm was considered for the assessment.

Table 9-4 - Construction Traffic Impact

Links	Capacity of the link (veh/hr)	Hour of the day	Existing Flow	Additional trips	Cumulative Flow	Cumulative Flow / Capacity
M1	8000	3 to 4 pm	1969	14	1983	25%
N52	6400	3 to 4 pm	1233	14	1247	20%

Based on the table above, it can be observed that the cumulative flow will account for 20% to 25% of the maximum capacity of the major links. Hence, based on the above analysis, the impact of the material delivery trips can be considered "not significant".

9.5 Potential Traffic Effects - Operational Phase

A maximum of 5 new staff can be anticipated during the operational phase of the proposed development. Assuming an additional 3-5 deliveries, a maximum of 10 trips per day can be anticipated. Even if all these trips occur within a single hour, it would still be fewer than the estimated construction trips.

Therefore, impact of proposed development during operational phase can be considered as “not significant”.

9.6 Cumulative Effects

No significant trip-generating developments were found near the proposed development. Therefore, in terms of traffic and transport, no cumulative effects are anticipated.

9.7 Mitigation Measures

The following measures will be adopted around the perimeter of the project for security and protection purposes:

- All site access will be well lit, clean, robust level hard-standings, well signed and controlled by experienced gatemen. Doors and gates will be closed at all times when not providing access.
- The traffic management team will be clean and well presented at all times.

The contractor’s detailed Construction Traffic Management Plan will address the following key issues:

- Maintaining free traffic flow along the local road networks.
- Ensuring all footpaths and road surfaces are always free from debris.
- Ensuring the efficient free flow of operatives entering and exiting the proposed development site.
- Managing the distribution flow of materials within the site and debris removal to maintain the required levels of productivity whilst achieving the high-quality standards expected.
- Plant and operative segregation during all stages of the proposed development.

- Robust traffic management principles and practices will need to be enforced to ensure construction traffic does not create congestion and cause inconvenience to the adjacent tenants and the public.
- Protection to the public for the duration of the project construction phase on all elevations.

All deliveries will be through regional roads, M1 and N52. The contractor will develop a detailed Logistics Plan to identify the delivery schedule requirements for every delivery. It is anticipated that the contractor will operate a “Just in Time” delivery philosophy to minimise materials stored on site and reduce congestion in and around the works compound.

9.8 Residual Effects

No residual effects are anticipated for the proposed development.

9.9 Monitoring Requirements

No monitoring requirements are necessary for the proposed development.

9.10 Interaction with other Environmental Attributes

Possible interactions with other environmental attributes, such as air emissions and noise related to heavy vehicle movement and construction activities, are anticipated for the proposed development.

9.11 Difficulties encountered during preparation of this chapter

No difficulties were encountered during preparation of this chapter.

9.12 Risk of Major Accidents and /or Disasters

No risk of major accidents and/or disaster is anticipated for the proposed development.

10. Land, Soil and Geology

10.1 Introduction

This chapter describes the type of land, soils and geology likely to be encountered beneath the proposed development. It also addresses the potential effects of the Proposed Development on land, soils, and geology together with the mitigation measures that will be employed to eliminate or reduce any potential effects. The proposed Effluent Balancing Resource Recovery System located within the WuXi Biologics facility (i.e., the red line boundary) is hereafter referred to as 'the Proposed Development' or 'the site'. The site is located within the WuXi biologics Biopharma Campus in the south of Dundalk in the townland of Haynestown. A detailed description of the proposed development is presented in Chapter 2 - Project Description.

10.2 Methodology

The following scope of works was undertaken by AtkinsRéalis in order to complete the land, soils and geology assessment presented in this chapter:

- Desk-based study including review of available historical and relevant ground investigation information; and,
- Site Walkover Survey carried out on 23rd February 2024 by an experienced Geo-environmental Consultant.

This assessment has been completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'* (IGI, 2013). The IGI guidance document is an updated version of the 2002 guidelines, '*Geology in Environmental Impact Statements, A Guide'* (IGI, 2002), which was revised to take account of legislative changes, and the operational experience developed by geoscientists in the production of relevant environmental assessments. This assessment has also been prepared in accordance with the relevant Environmental Protection Agency (EPA) guidance, '*Guidelines on the information to be contained in Environmental Impact Assessment Reports'* published in May 2022.

The desk-based study involved reviewing information from the following sources:

- GSI Datasets Public Viewer and Groundwater web-mapping (consulted 07/03/2024);
- Ordnance Survey web-mapping to assess the surface topography and landforms (consulted 28/11/2023);
- EPA Public Viewer and web-mapping (consulted 07/03/2024);
- Google Maps Aerial photography (consulted 07/03/2024);
- Bing Maps Aerial photography (consulted 07/03/2024); and,
- Site Investigation Reports (Murphy Group, 2023; Ground Investigations Ireland Ltd., 2019).

A site investigation for the Proposed Development was carried out by the Murphy Group from the 15th of November 2023. The following information has been reviewed:

- Trial Pit Records (8no.); and,
- Silt Trench records (13no.)

Further details are presented in the Site Investigation Pack entitled 'Wuxi Biologics WwPTP Site Investigation Report' prepared by Murphy Group (2023), presented in Appendix 10.1.

A historic ground investigation for the Dundalk Bio-Pharmaceutical Facility was carried out by Ground Investigations Ireland between November and December 2018 with further work consisting of additional trial pits and rotary core boreholes conducted in January 2019. The following information has been reviewed:

- Trial Pit Records (30no.);
- Soakaway Records (6no.);
- Dynamic Probe Records (40no.);
- Plate Testing Records (40no.);
- Cable Percussion Borehole Logs (20no.);
- Rotary Core Borehole Logs (5no.);
- Laboratory Testing; and,
- Groundwater Monitoring.

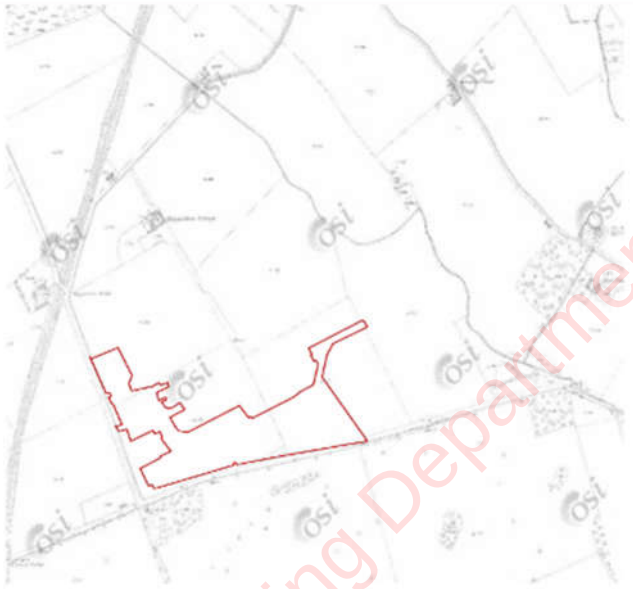
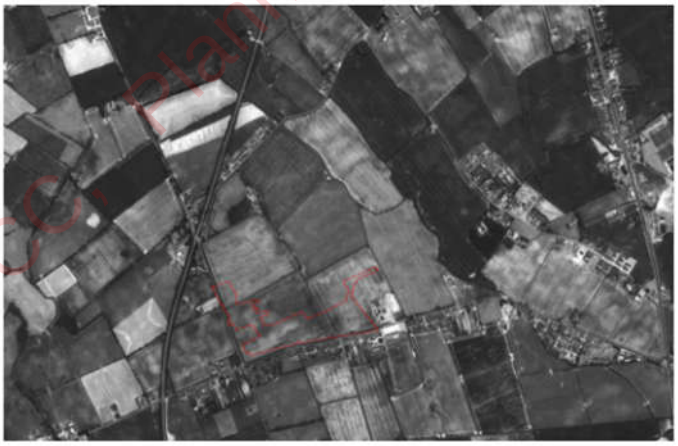
Further details are presented in 'Dundalk Bio-Pharmaceutical Facility Ground Investigation Report' prepared by Ground Investigations Ireland (2019), presented in Appendix 10.2

10.3 Receiving Environment

10.3.1 Site Development

A review of historic maps (including available 6-inch historic maps, 25-inch historic maps, and aerial photographs (1995 to 2018) from the Ordnance Survey of Ireland) (OSI, 2024) and current aerial photography (Bing Maps, 2024) confirms that the site has generally remained a greenfield site over the years with no significant changes to the site until 2021 when the Wuxi Biologics site was constructed. A summary of land use both in relation to the Site and surrounding lands is presented in Table 10.1

Table 10-1 – Historic Land Use Development - Summary

	**MapGenie 6 Inch BW 1829-1841 (OSI, 2024).** The Site is dominated by greenfield use.
	**Historic Map 25 Inch 1897-1913 (OSI, 2024).** There is no significant change in the surrounding area.
	**Aerial Map 1995 (OSI, 2024).** The 1995 aerial map shows a housing development has been constructed adjacent to the southeast corner and south of the proposed Site.

Aerial Map 1996-2000 (OSI, 2024).

No significant changes are noted between the 1995 and the 2000 aerial photography.

Aerial Map 2001-2005 (OSI, 2024).

There is no significant change to the proposed site between 2000 and 2005.

Aerial Map 2006-2012 (OSI, 2024).

There is no significant change to the proposed site between 2005 and 2012.

Aerial Map 2013-2018 (OSI, 2024)

There is no significant change to the proposed site between 2012 and 2018.

Aerial Map 2023 (Bing maps, 2024)

The 2023 aerial map shows the extent of the WuXi Biologics site.

10.3.2 Current Site Setting (and Topography)

The Site is located in the townland of Haynestown, in Dundalk, County Louth. The Site is bounded to the north and west by Mullagharlin Road, the south by Marlbog Road and the east by agricultural land and Brookfield housing development.

The Site is currently a greenfield site and is underlain by till derived from Lower Palaeozoic sandstones and shales. The lands on which the development is proposed is zoned by Louth County Council development plan 2021-2027 (LCC 2021) as 'E2' Business and Technology with the zoning objective being *'to provide for office, research and development and high technology / high technology manufacturing type employment*.' The proposed development has been designed in accordance with the zoning requirements. Land use zoning objectives are consistent with the national and regional policy which seek the development of serviced sites within settlements designated for development. According to ground investigation records, the general topography of the Site is ca. 24m above ordnance datum (mOD), and is ca. 6-7m higher than the rest of the current Wuxi operational facility / campus.

10.3.3 Ground Investigation

Ground Investigations Ireland Ltd. carried out a ground investigation for the Dundalk Bio-Pharmaceutical Facility between November & December 2018 (see Figure 10.1). The works consisted of:

- 30no. trial pits to a maximum depth of 3.5mBGL;
- 6no. soakaways;
- 40no. dynamic probes to determine soil strength characterises;
- 20no. cable percussion boreholes to a maximum depth of 4.3mBGL;
- 5no. rotary core boreholes to a maximum depth of 9.7mBGL;
- Laboratory testing (including 7no. soil samples scheduled for a representative suite of environmental analysis including indicator parameters, metals, hydrocarbons and PAHs); and,
- Groundwater monitoring.

Further details are presented in the Ground Investigation information pack entitled 'Dundalk Bio-Pharmaceutical Facility Ground Investigation Report' prepared by Ground Investigations Ireland (2019), presented in Appendix 10.2.

Murphy Group carried out a further site investigation at the Site from the 15th of November 2023. These works consisted of:

- Trial Pit Records (8no.); and,
- Silt Trench records (13no.).

Bedrock was encountered at 5no. of the 8no. trial pits at depths ranging from 1.8m-3.8mBGL (21.65mOD-19.54mOD). Medium-large boulders were encountered at the remaining 3no. trial pits which limited the depth of investigation. 13no. slit trenches were advanced to confirm the location & depth of gas and ESB services. Exploratory locations completed during the site investigation are presented in Figure 10.1. Refer also to Draft information presented in Appendix 10.

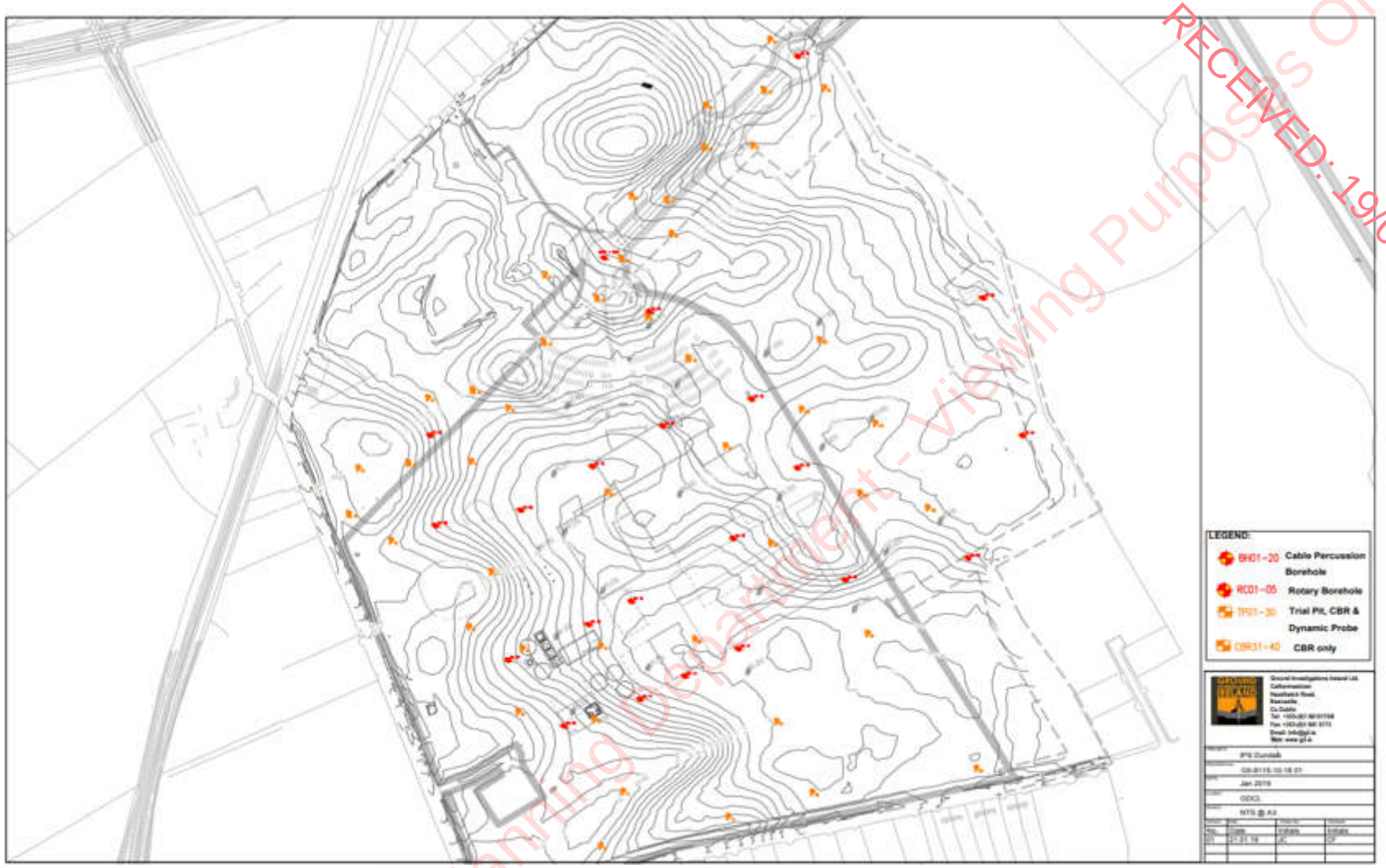


Figure 10.1 - Ground Investigation Locations (Ground Investigations Ireland, 2019)

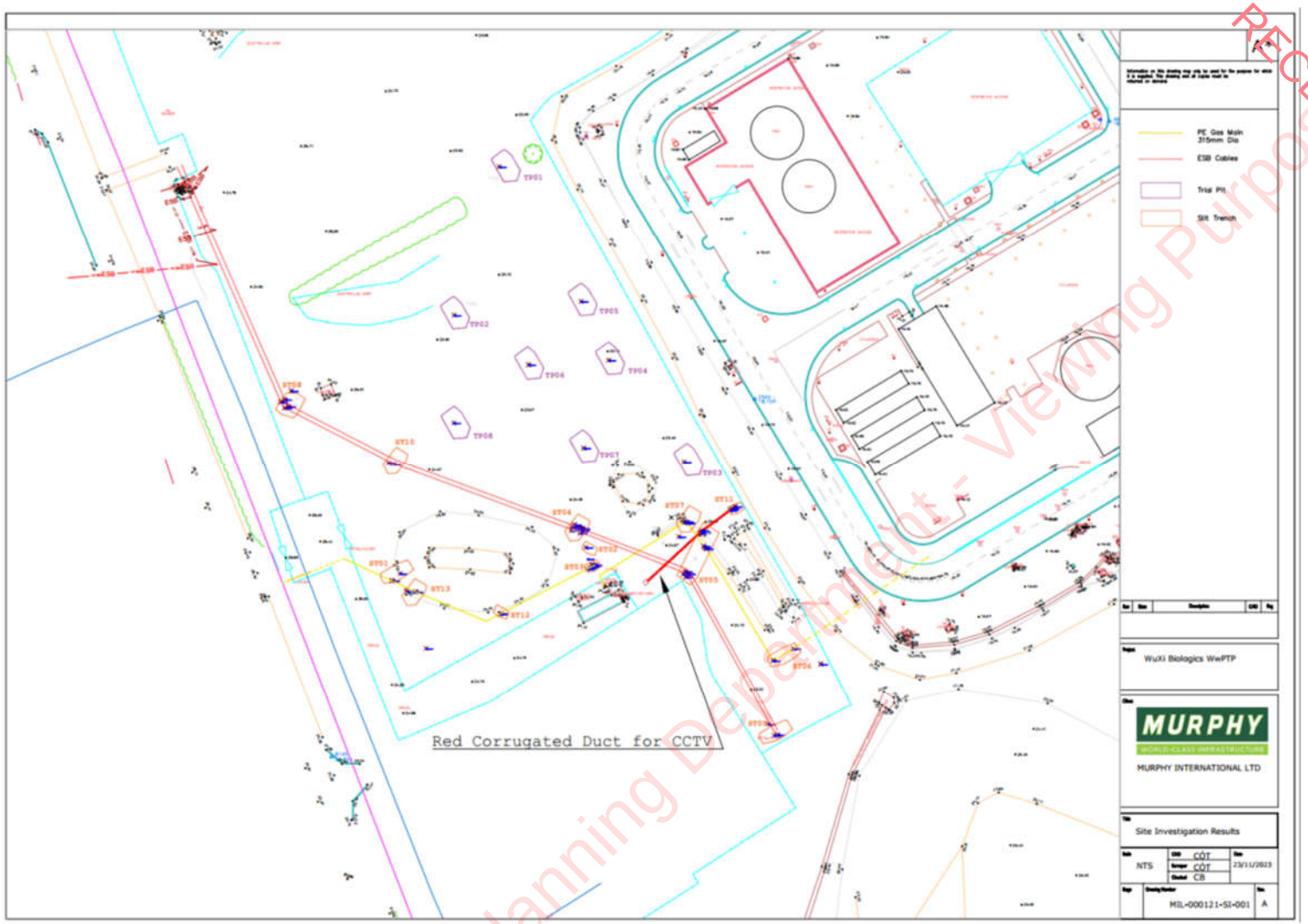


Figure 10.2 - Ground Investigation Locations (Murphy Group, 2023)

10.3.4 Soils

Based on the Teagasc soils database available on the GSI public data viewer, the dominant soil type underlying the Site and surrounding area is till derived chiefly from Lower Palaeozoic Rock. Refer to Figure 10.3.

Figure 10.3 - Teagasc Soil Maps (GSI, 2024)

According to the GSI public data viewer (GSI, 2024), the primary superficial / quaternary sediments underlying the Site comprise till derived from Lower Palaeozoic sandstones and shales. It is also noted that a small area of bedrock outcrop or subcrop is present at the western most edge of the site (GSI, 2024). Refer to Figure 10.4.

Regional soil descriptions were verified by the 2023 site investigation. Site specific soils records, as observed during the site investigation (Murphy Group, 2023) are summarised as follows:

- Brown clay soil with small to medium clay pieces were found at most locations across the Site and ranged from ca. 0m to 1.4mbgl;
- Angular shale was found across the site and ranged from 0.9 to 2.9mbgl; and,
- A blue/grey bedrock shale was encountered at 1.8mbgl in TP03 and TP04, at 3.8mbgl in TP06, between 3 to 4mbgl in TP07 and, at 2.3mbgl in TP08.

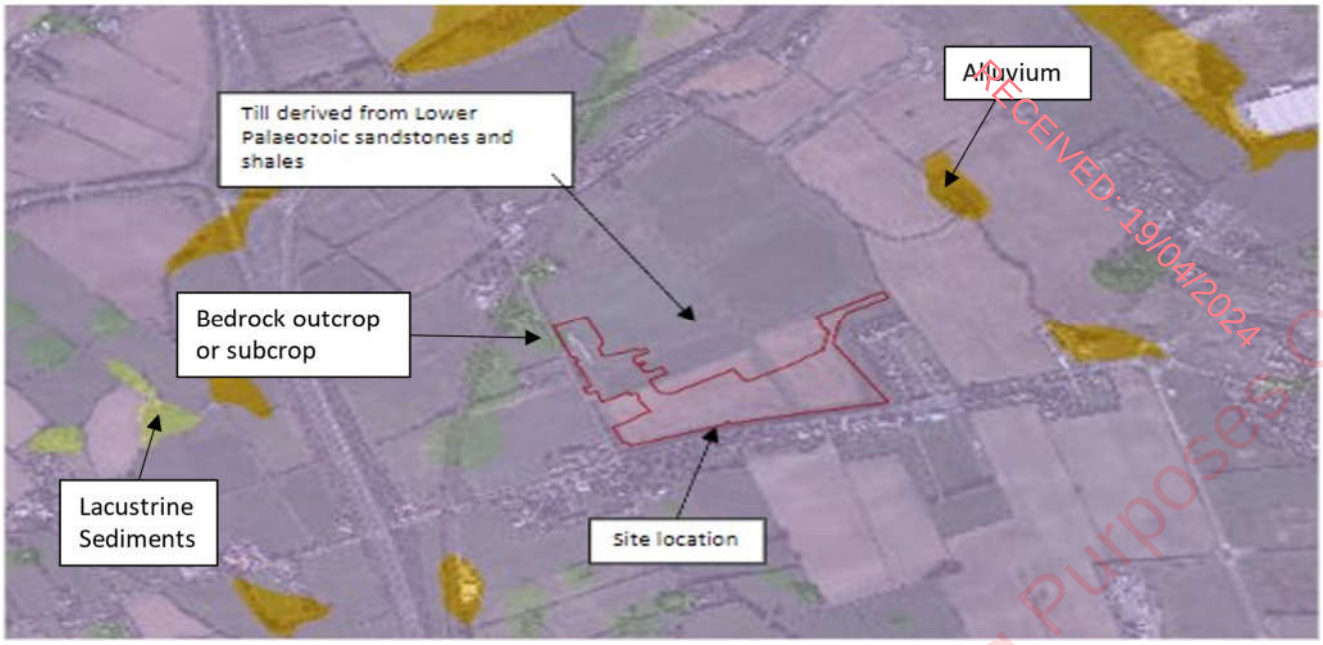


Figure 10.4 – Superficial / Quaternary Deposits (GSI, 2024)

10.3.4.1 Soil Quality / Contaminated Land

The proposed development is located within the Wuxi Biologics Ireland Limited current IED licenced boundary (site code: P1122-01).

On a regional scale there are 2no. EPA waste licenced facilities outside of the proposed development as follows:

- Oxigen Environmental (Coes Road) (site code: W0144-01), located ca.4km northeast of the proposed site; and,
- Dundalk landfill & civic waste facility – Dundalk Town Council (site code: W034-02), located ca.5km north of the proposed site.

On a regional scale there are 6no. IEL, IPC & IPPC licenced facilities outside of the proposed development as follows:

- WuXi Vaccines Ireland Limited (site code: P1146-01), located ca. 140m north of the proposed site;
- Xerox (Europe) Limited (site code: P0508-02), located ca. 1.3km northeast of the proposed site;
- Macardle Moore & Co. Limited, t/a Dundalk Packaging (site code: P0441-01), located ca. 3.3km north of the proposed site;
- Diageo Ireland Limited t/a The Great Northern Brewery (site code: P0440-01), located ca. 3.9km north of the proposed site;
- Great Northern Distillery Limited (site code: P0996-01), located ca. 3.7km north of the proposed site; and,

- O'Hanlon and Sons Contractors Limited (site code: P1007-01), located, ca. 4.6km north of the proposed site.

- On a regional scale there are 3no. Section 4 Discharges licenced facilities outside of the proposed development:
  - Aquafresh Fish (site code: LA Ref. 79), located 5.4km northwest of the proposed site;
  - Readypenny Inn (site code: LA Ref. 31), located ca. 5km southwest of the proposed site; and,
  - Darver Castle (site code: LA Ref. 40), located ca. 5.1km southwest of the proposed site.

Refer to Figure 10.5.

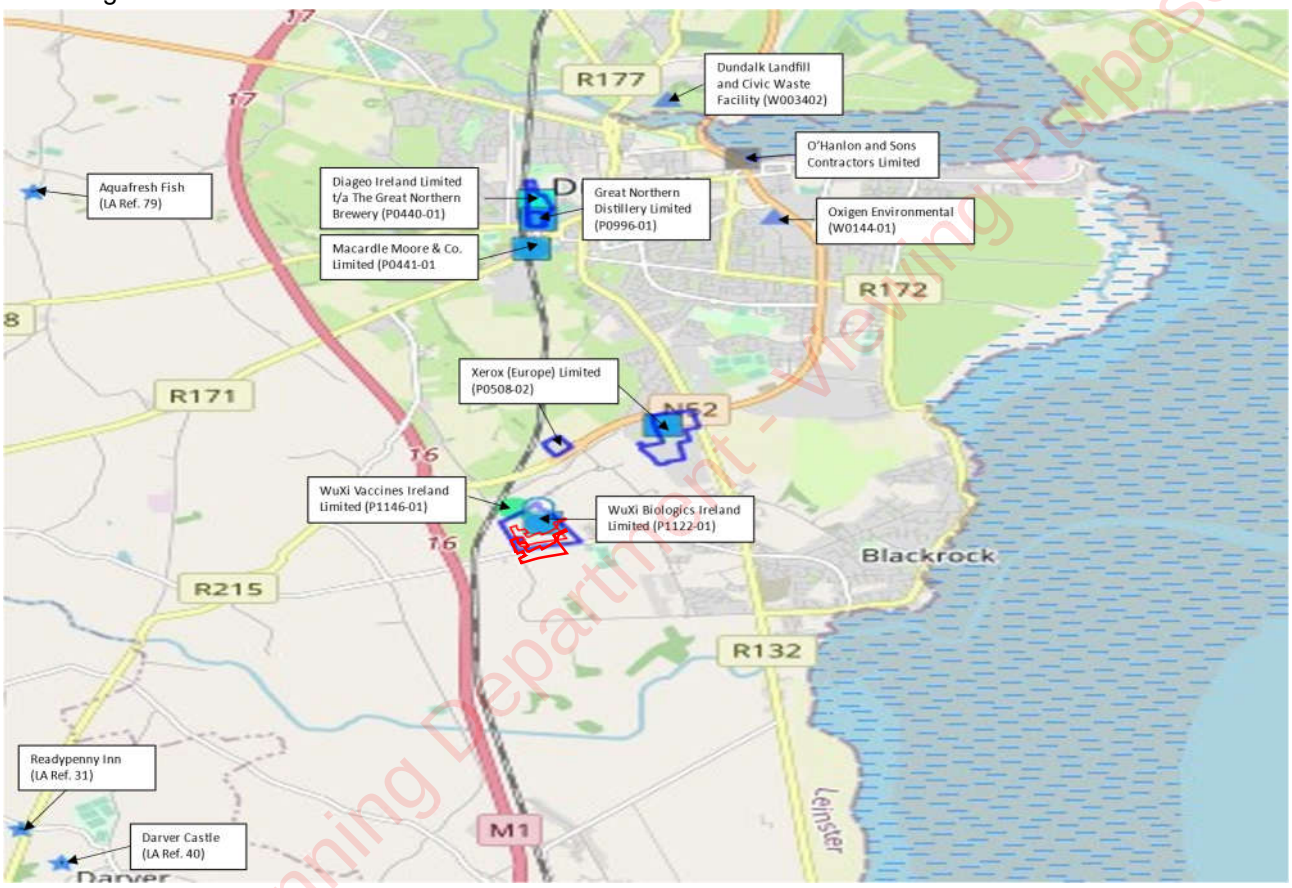


Figure 10.5 – EPA licenced facilities and discharges in the regional vicinity of the Site (EPA, 2024)

Selected representative environmental soil samples were collected during a previous ground investigation (Ground Investigations Ireland, 2019) across WuXi owned lands, and analysed for a comprehensive suite of analytical parameters by Exova Jones Environmental (including asbestos containing material, heavy metals, key indicator parameters, petroleum hydrocarbons, and polyaromatic hydrocarbons (PAHs)).

Based on the available soils analytical data and draft trial pit records presented in Appendix 10.1 and Appendix 10.2, there is no evidence of soils contamination within the current WuXi land ownership boundary, or within the red-line boundary of the proposed development.

10.3.5 Bedrock Geology

The GSI bedrock geology 100k map identifies the underlying bedrock at the Site as the Clontail Formation (see Figure 10.6). The Clontail Formation is described as calcareous red-mica shale. The GSI Bedrock mapping database (GSI, 2023) shows there are areas of bedrock on the western portion of the Site, and this has been verified by site specific ground investigation records (as detailed further below).

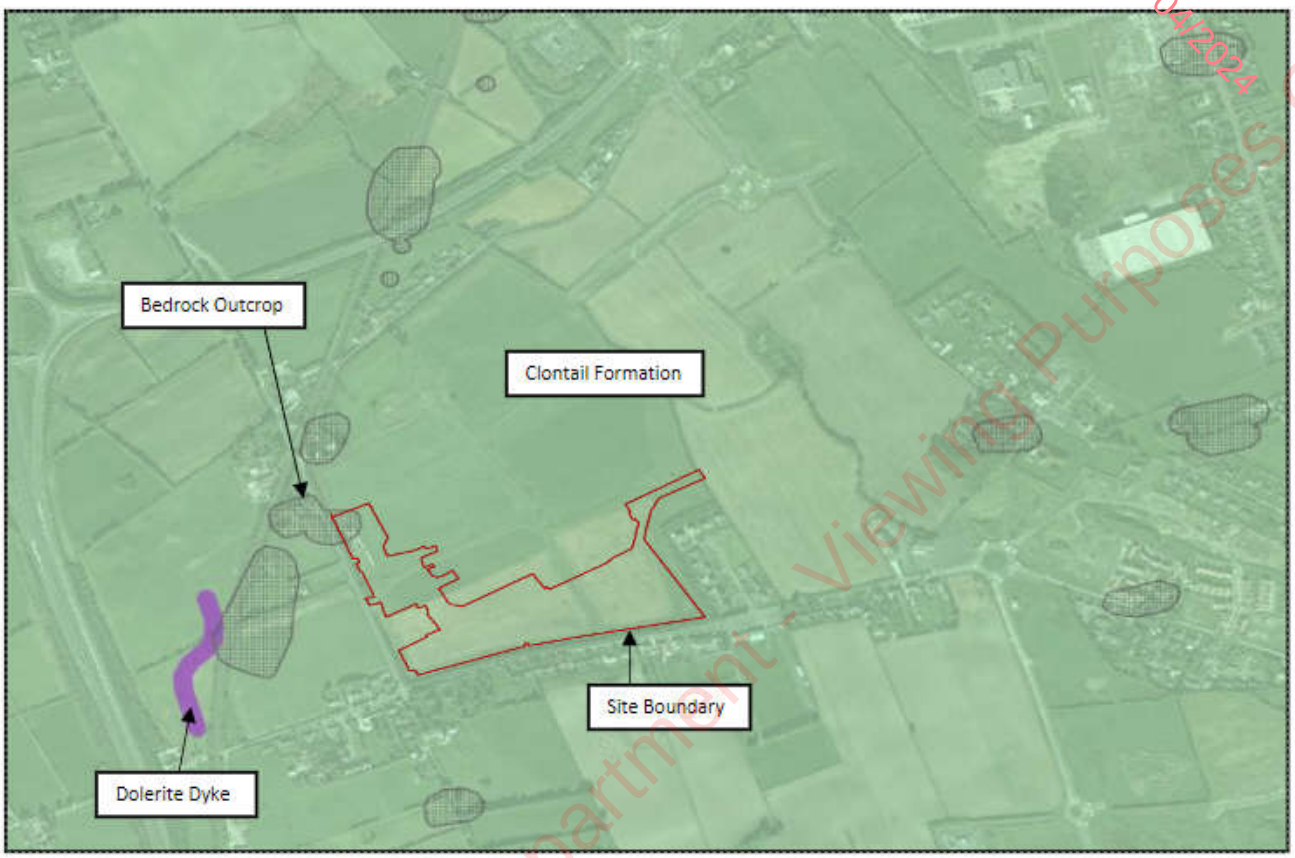


Figure 10.6 – Bedrock Geology (GSI, 2024)

There is a karst feature, or a 'borehole' located ca. 14.3km southwest of the proposed development based on the GSI regional geology mapping. Karst features would not be expected to be encountered beneath the proposed development or surrounding lands, based on a review of available geological records for the proposed site.

The regional geological descriptions were verified by the results of the ground investigation. Site specific records, as observed during the ground investigation (Ground Investigations Ireland, 2019), were relatively consistent and are summarised as follows;

- Cohesive deposit of soft, soft to firm or firm to stiff brown sandy gravely CLAY with occasional cobbles and boulders overlying a stiff or very stiff grey/brown sandy gravely CLAY with occasional cobbles and boulders was found beneath the Topsoil;
- Grey/brown/orange clayey slightly sandy GRAVEL with frequent angular cobbles and occasional boulders occurred at the base of cohesive deposits in TP3, TP7 and TP9 at depths between 1.8mbgl and 3mbgl, underlain by weathered bedrock which was excavatable; and

- Bedrock of weak to very strong grey thinly bedded fine grained sandstone was encountered between 1.2mbgl in RC05 and 5mbgl at BH03 and RC01.

10.3.6 Geological heritage

Dundalk Bay geological heritage area (site code: LH018) is located ca. 2.8km east of the Site as shown in Figure 10.7. The geological heritage area is described by the GSI (2023) as *a 'wide coastal embayment, incorporating wide expanses of coastal flats*'. Geologically, GSI describes Dundalk Bay as '*extensive flats, associated beach, dune and slack features; beaches, salt marshes and headlands.*' (GSI, 2023). The proposed development will not have any impact on the Dundalk Bay geological heritage area, based on the distance of the geological heritage area from the Site.

Figure 10.7 – Geological Heritage Areas (GSI, 2024)

10.3.7 Geo-hazards

No landslide susceptibility issues are reported within the Site (GSI, 2023). Landslide susceptibility is '*low'* within the Site. The closest reported landslide event is located approximately 14.6km north of the Site at Junction 20 for Jonesborough on M1 Drumaud.

10.3.8 Mineral occurrences

The GSI database (2023) indicates that lead (location reference: 3897) was discovered in a drain near a railway cutting ca. 1.3km north of the Site. Calcite strings (location reference: 3896) were noted in soft grey shales and grits ca. 2.9km east of the Site. A clay deposit (location reference: 3149) is noted ca.3.3km south of the Site.

10.3.9 Radon

Available EPA radon maps shows that about 1 in 10 of the homes within the vicinity of the Site have radon concentrations in excess of the national Reference Level of 200 becquerel per cubic metre (Bq/m^3) as shown in Figure 10.8 (EPA, 2023). Due to the nature and scale of the proposed development, radon is not likely to have a significant effect as a result of the proposed development.

Figure 10.8 – Regional Radon Levels (EPA, 2024)

10.4 Potential Effects on Land, Soils and Geology during Construction Phase

10.4.1.1 Land (Including Land Take)

The proposed development is not likely to have a significant effect on land (including land take). The proposed development will result in a change of land use from grassland around the margins of the existing facility, to the development of a WWTP within the existing facility. However the proposed change will occur within the existing licenced facility boundary and is in keeping with the industrial landuse of the current site. There will be no change in overall use of the relevant WuXi Biologics lands.

10.4.1.2 Soils and Geology

Activities during construction will primarily comprise the following;

The main Civil works are comprised of:

- Welfare establishment;
- Demolition of concrete pillars and relocation of gate at site entrance;
- Archaeological works;
- Site clearance including shrub removal;
- Bulk excavation;
- Existing services diversion/ temporary works;
- Site excavation and fill;
- Construction of reinforced concrete tanks;
- Construction of a new process/administration building;
- Ancillary works such as road, paths, foul and surface water drainage;
- Landscaping reinstatement; and,
- Permanent perimeter and internal fencing, walls, gates.

The main mechanical, electrical, instrumentation, control and automation (MEICA) works are comprised of:

- Screening equipment for waste from the WuXi Biologics biological plant;
- Preliminary treatment;
- Mixing systems in balance and off specification tanks;
- Flocculation and pumping systems;
- Metal and plastic storage tanks for chemicals and wastewater;
- Internal fit out of biological equipment in the aeration and anoxic systems;
- Membrane treatment facility;
- Chemical dosing systems;
- Sludge storage tanks;
- Sludge process facilities;

- Odour treatment equipment;
- Electrical distribution system;
- Electrical control panels; and,
- Testing and Commissioning.

As part of the development a significant volume of excavated material (ca. 34,407 m³) will be stripped and stockpiled in designated stockpiles located within the red line boundary. Bulk excavation will have a haul length of 200m from the excavation pit to the south of the site – all within the red line boundary. Maximum excavation depth is ca. 5m bgl. Tracked excavators will likely be sufficient to excavate soils to a maximum depth of 5m across the Site, and rock breaking will likely be required. The extent of excavation for service / utility trenches will vary. All excavations are anticipated to encounter made ground / sandy silt / clay and/or gravel / weathered rock / bedrock. All excavated soil will be kept within the red line boundary and used for landscaping purposes. The excavated soil will be located to the south of the site on the dry meadows and grassy verges between the two large man-made mounds which have been colonised by dry meadows and grassy verges habitat. Landscape design proposals for this area are included as part of this planning application. The proposed planting measures include a wildflower area to the main embankment on the plant road and rough pasture grass mixes across the on the new berm and any other areas of disturbed grounds within the Site. A landscape contractor will maintain these landscaped areas to ensure the new vegetation cover across these earthworks quickly become established to help prevent any potential soil erosion or dust and improve their visual appearance and their integration into the immediate landscape. The boundary trees will be maintained by pruning back whenever required. All newly landscaped areas across the proposed development will be incorporated into the overall landscape maintenance scheme of the wider WuXi Biologics lands.

Excavated bedrock (ca. 5,545 m^3) will be stockpiled within the red line boundary and removed for offsite disposal to a suitably licenced / permitted waste facility, with the appropriate soil testing carried out (total excavated rock volume 5,545 m^3). A total of ca. 3,750m^3 stone material will be imported.

During the construction phase of the development, the following potential impacts on soils and bedrock could occur and have been assessed accordingly;

- Stripping of hardstanding and made ground may result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff;
- Soils beneath the proposed development may become unnecessarily compacted by machinery during construction;
- Dust generation can also occur during extended dry weather periods as a result of construction traffic;
- Soil and exposed bedrock may be at risk of becoming contaminated through Site construction activity in particular the risk of spillages and leakage of any fuel oils and paint; and,
- Potential human health risks to construction workers could also occur associated with any such spillages and leakage.

These potential impacts / risks are likely to result in moderate adverse effects on receiving soils, bedrock and/or human health; however, any effects are considered to be short-term and localised. Furthermore, mitigation measures will be implemented during the Construction Phase to reduce and/or avoid these potential effects, and to address any potential waste soil / bedrock management issues.

10.5 Potential Effects on Land, Soils and Geology during Operational Phase

The WuXi Biologics Facility (P1122-01) currently discharges treated wastewater to the public sewer system through an existing balance system and pH correction system. However, the flow of and concentration of the waters arising from the production processes on the site is variable and could possibly limit the potential treatment capacity of the sewer system due to this variability. Therefore during the operational phase, the proposed effluent balancing system will help to address this problem by storing effluent during periods of high flow and concentration and releasing it to the sewer system during periods of low flow and concentrations. This will help to ensure that the sewer system is not overloaded, and that the environment is protected. The system will also recover water and potentially nutrients from the effluent for reuse. This will help to reduce the site's reliance on public water supplies and reduce pressure on the public water system.

Given the fact that the excavation of topsoil and subsoil will extend into bedrock in the vicinity of the proposed development, there is a potential risk of impact to the underlying sandstone bedrock of the Clontail Formation, in the event of a leak or spillage at the proposed new plant (of untreated wastewater, waste sludge, treatment chemicals including lime, molasses, urea, phosphorous, supernatant returns, sulphuric acid, caustic, aluminium sulphate, and poly) during the operational stage.

However, once fully commissioned, the operational EBRRP will comprise:

- A rectangular concrete tank structure comprising two off specification cells and four flow balancing cells which will receive inlet flows from the WuXi Biologics existing pH correction facility through step screens located on the roof of the tanks;
- two metal fabricated flocculation lamella tanks for primary treatment with a circular metal post primary tank and circular metal liquor return tank;
- A second rectangular concrete tank structure with three anoxic and aeration cells required for secondary treatment;
- A third concrete tank structure to hold three sludge processing cells; and,
- A metal bulk lime storage tank and metal sulphuric acid and HDPE aluminium sulphate storage tanks.

All of the above process and storage tanks will be located within concrete bunds with metal stairwells and platforms for access. All process tanks will be connected to a dedicated odour treatment facility and all tanks will be fully covered. A new sludge dewatering facility will deposit sludge into sealed skips with capability for trucks to remove and replace the sealed skips once filled. The works will include all process ancillary equipment such as pumps, fabricated structures, screening equipment, pipework and lifting equipment. The proposed new EBRRP has been designed specifically for the current site setting, and is intended to a be a key milestone in WuXi Biologics Net-Zero Journey. The existing and new bunds will be used to retain spillages from the treatment plant, for example, directing the flow into a sump that shall feed the existing screen.

A detailed breakdown of the processes during the operational stage is presented in Chapter 2 of the EIAR which includes all designed-in measures (storage, bunding, environmental protection and safety requirements). WuXi Biologics is subject to an Environmental Protection Agency (EPA) Industrial Emissions (IE) Licence (Ref. No. P1122-01) and therefore will be obliged to meet current (and any future) licence requirements with regards to monitoring, reporting, auditing and site inspections. It is also noted that the proposed development is located in a newly established modern industrial campus. Therefore based on the design of the proposed development, and the regulatory requirements associated with the operational phase, any potential risk to receiving soils and bedrock, during the operational stage, has been appropriately addressed. Potential effects to soils and geology during the operational stage will be likely temporary, not significant.

10.6 'Do Nothing Scenario'

The Site is located within WuXi Biologics lands. In the do-nothing scenario the existing site will not be changed. The do-nothing scenario will have a neutral and imperceptible effect on the Site with regards to Land, Soils and Geology.

10.7 Cumulative Effects

Provided the mitigation measures and monitoring requirements outlined in Sections 10.8 and 10.10 are in place for the duration of the construction phase, cumulative effects are not likely to be significant. There will be no effects with regards to land (including land take), soils or geology during the operational phase.

Therefore, no significant cumulative effects are likely.

10.8 Mitigation Measures

10.8.1 Construction Phase

The excavation of material will be minimised as much as possible to reduce the impact on soils and geology. The total volume of soil requiring excavation for the proposed development is expected to be ca. 34,407m^3. All excavated soil will be retained on site with a haul length of ca. 200m from the excavation pit to the south of the site and will be used for landscaping purposes. It is therefore anticipated that there will be no waste soils generated which will require offsite removal.

In the unlikely event that soil material is unsuitable for use/ excess soil is generated, all waste soils (including made ground) will be appropriately sampled and tested prior to offsite removal, and classified in accordance with the EPA Guidance Document *'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* (2015). It will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation.

Excavated bedrock / waste rock (ca. 5,545 m^3) will be stockpiled within the red line boundary and removed for offsite disposal to a suitably licenced / permitted waste facility, and will be appropriately sampled and tested prior to offsite removal. This material will be classified in accordance with the EPA Guidance Document *'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* (2015). It will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation.

It will be the Contractors responsibility to ensure that a project specific Detailed Resource and Waste Management Plan (developed in accordance with relevant 2021 EPA Guidance) is fully implemented onsite for the duration of the project.

Further mitigation measures for the prevention of soil / bedrock contamination during construction are proposed below. The Contractor will be responsible for ensuring these measures are fully implemented. Mitigation measures outlined in Chapter 11 - Water are also applicable to the protection of soils and geology during the construction phase:

- Earthworks / piling plant and vehicles delivering construction materials to Site will be confined to predetermined haul routes around the Site for each phase of the proposed development;

- The need for vehicle wheel wash facilities will be assessed by the Contractor depending on the phasing of works and onsite activity and will be installed as needed, near any Site entrances and road sweeping implemented as necessary to maintain the road network in the immediate vicinity of the Site;

- Dust suppression measures (e.g., dampening down) will be implemented as necessary during dry periods;

- All excavated materials will be stored away from the excavations / immediate works area, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3m;

- A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site;

- The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the proposed development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in Chapter 11 – Water; and,

- Specifically, regarding pollution control measures, the following will be adhered to;

    - Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice. All materials will be sufficiently bunded

    - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling;

    - Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the proposed development and properly disposed of;

    - The contractor will have a dedicated area within the compound for refuelling plant or any other equipment that is bunded and has the necessary spill kit equipment and adsorbents available as and when required in line with any statutory IEPA & H&S legislations.

    - The Environmental Manager will ensure that adequate supplies are available and replaced when used. Used spill kits, adsorbents will be stored in labelled containers awaiting disposal to a licenced waste disposal facility.

    - All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area;

    - All machinery will be serviced before being mobilised to Site;

    - Refuelling will be completed in a controlled manner using drip trays at all times;

- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Ancillary equipment such as hoses and pipes will be contained within the bund;
- Taps, nozzles, or valves will be fitted with a lock system;
- Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel plant on Site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills. All subcontractors will be provided with training on spillages as part of their site induction training;
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment;
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-Site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of soils and bedrock becoming contaminated through Site activity; and,
- The highest standards of Site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the Site to ensure that they are operating safely and effectively.

- In the highly unlikely event that ground contamination is encountered beneath the site during the construction works, all works will cease. Advice will be sought from an experienced contaminated land specialist and a phased environmental risk assessment (specifically to assess any associated potential environmental and/ or human health risks) will be undertaken in accordance with relevant EPA guidance 'Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites' (EPA, 2013) and UK Environment Agency Guidance 'Land contamination risk management (LCRM)' (UK EA, 2021).

The above mitigation measures will be incorporated (as required) during Detailed Design Stage and form part of the Construction Environmental Management Plan (CEMP) which will be implemented during the Construction Stage. The Outline CEMP submitted as part of this application may be altered, if necessary, in light of conditions which may be imposed on the planning permission.

10.8.2 Operational Phase

Based on the findings of this assessment no mitigation measures associated with the operational phase of the project are required.

Standard measures / monitoring requirements will be adhered to during the operational phase.

10.9 Residual Effects

10.9.1 Construction Phase

The proposed development is not likely to have a significant effect on land (including land take). There will be no change in overall use of the relevant WuXi Biologics lands.

Implementation of the measures outlined above will ensure that any residual effects will be adverse, not significant, and temporary in duration, based on the nature, scope and location of the proposed development, and taking account of proposed mitigation measures.

In summary, no significant effects are likely to occur with respect to Land, Soils and Geology, as a result of the proposed development.

10.9.2 Operational Phase

The proposed development is not likely to have a significant effect on land (including land take). There will be no change in overall use of the relevant WuXi Biologics lands.

Potential effects to soils and geology during the operational stage will be likely temporary, not significant, adverse.

In summary, no significant effects are likely to occur with respect to Land, Soils and Geology, as a result of the proposed development.

10.9.3 Land, Soils and Geology and Human Health

Potential human health risks associated with quality impacts to soils arising from the proposed development during the Construction Phase have been identified as follows;

- Potential risk to receptors (i.e., construction workers) through direct contact, ingestion or inhalation with any soils which may potentially contain hydrocarbon concentrations from Site activities (potential minor leaks and spills of fuels, oils, and paint).

However, this risk will be addressed by implementation of the mitigation measures outlined previously,

Taking account of the baseline environmental setting and the proposed mitigation measures during the Construction Phase, no human health risks associated with exposure to contaminants (via. direct contact, ingestion, or inhalation) resulting from the proposed development are anticipated.

In summary, no significant effects are likely to occur with respect to Land, Soils and Geology and Human Health, as a result of the proposed development.

10.10 Monitoring Requirements

10.10.1 Construction Phase

A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site.

10.10.2 Operational Phase

Standard measures / monitoring requirements will be adhered to during the operational phase.

10.11 Reinstatement

All temporary construction compounds and Site entrances are to be removed upon completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architect's site layout plan and engineer's drawings. All construction waste and / or scrapped building materials are to be removed from Site on completion of the construction phase. Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from Site and disposed of at an appropriately licenced waste facility.

10.12 Interaction with other Environmental Attributes

- **Potential human health** risks associated with quality impacts to soils arising from the proposed development during the Construction Phase have been identified as follows;
    - Potential risk to receptors (i.e., construction workers) through direct contact, ingestion or inhalation with any soils which may potentially contain hydrocarbon concentrations from Site activities (potential minor leaks and spills of fuels, oils and paint). However, this risk will be addressed by implementation of the mitigation measures outlined fully in Chapter 10 – Land, Soils and Geology.
    - Taking account of the baseline environmental setting and the proposed mitigation measures during the Construction Phase, minimal human health risks associated with exposure to contaminants (via. direct contact, ingestion or inhalation) resulting from the proposed development are anticipated.
- **Air Quality & Climate** - Potential impacts on the receiving Land, Soils and Geology environment could also impact on air quality conditions present. However, the mitigation measures described in Chapter 10 – Land, Soils & Geology, and those relevant in Chapter 7 - Air Quality, once in place, will result in no potential for impact when these topics do interact.
- **Water** - Potential impacts on the receiving land, soils and geology environment could also impact on hydrology and hydrogeology conditions present. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 10 – Land, Soils & Geology, once in place, will result in no potential for impact when these topics do interact.

- **Material Assets –** Resource and waste minimisation and management play a key role in minimising Land Soils and geology impacts. Mitigation measures described in Chapter 7 – Air Quality, and those relevant in Chapter 13 – Material Assets, once in place, will result in no potential for impact when these topics do interact.

10.13 Difficulties encountered during preparation of this chapter

No difficulties were encountered when compiling this chapter.

10.14 Risk of Major Accidents and/or Disasters

Based on the nature (including modern proposed design/ construction/ operation measures), location and scale of the proposed development, the risk of major accidents and/or disasters occurring which could significantly impact the receiving land, soils and geology environment is low and unlikely to occur.

11. Water

11.1 Introduction

This chapter describes the existing surface water and groundwater regime likely to be encountered beneath and in the general vicinity of the Proposed Development. It also addresses the potential impact of the proposed development on hydrology (i.e. surface water) and hydrogeology (i.e. groundwater) together with the mitigation measures that will be employed to eliminate or reduce any potential impacts. A detailed description of the proposed development is presented in Chapter 2 – Project Description of the EIAR.

This section of the EIAR was prepared by AtkinsRéalis.

11.2 Study Assessment and Methodology

The following scope of works was undertaken by AtkinsRéalis in order to complete this assessment:

- Desk-based study including review of available historical information; and,
- Site Walkover Survey carried out on the 23rd February 2024.

The purpose of the desk-based assessment is to characterise the current hydrological and hydrogeological setting of the Site. Relevant background information was compiled, specifically from the following data sources;

- Bing Maps Aerial photography (consulted 15/02/2024);
- Environmental Protection Agency (EPA) web mapping (consulted 15/02/2024);
- Geological Survey of Ireland (GSI) Datasets Public Viewer and Groundwater web mapping (consulted 15/02/2024);
- Google Maps Aerial photography (consulted 15/02/2024);
- Office of Public Works National Flood Hazard mapping web Site (consulted 15/02/2024);
- Ordinance Survey of Ireland (OSI) web mapping (consulted 15/02/2024);
- National Parks and Wildlife Service (NPWS) Map Viewer (consulted 15/02/2024); and,
- Water Framework Directive (WFD) Ireland web mapping (consulted 15/02/2024).

This assessment has been completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'* (IGI, 2013). The IGI guidance document is an updated version of the 2002 guidelines, '*Geology in Environmental Impact Statements, A Guide'* (IGI, 2002), which was revised to take account of legislative changes, and the operational experience developed by geoscientists in the production of relevant environmental assessments. This assessment has also been prepared in accordance with the relevant

Environmental Protection Agency (EPA) guidance, '*Guidelines on the information to be contained in Environmental Impact Assessment Reports'* published in May 2022.

A Flood Risk Assessment (FRA) has been prepared by AtkinsRéalis (2024) (Doc Ref. 100085897DG0005) for the Proposed Development in accordance with the following guidance documents, '*The Planning System and Flood Risk Management – Guidelines for Planning Authorities'* DOEHLG 2009 and the Louth County Council Development Plan 2021-2027.

11.3 Receiving Environment

11.3.1 Site Development

A review of historic maps (including available 6-inch historic maps, 25-inch historic maps, and aerial photographs (1995 to 2018) from the Ordnance Survey of Ireland) (OSI, 2024) and current aerial photography (Bing Maps, 2024) confirms that land use at the site has generally been transformed over the years from greenfield use to industrial use. The surrounding lands have been developed considerably since the late twentieth century. A detailed summary of land use both in relation to the site and surrounding lands is presented in Chapter 10 – Land, Soils and Geology.

11.3.2 Flood Risk

AtkinsRéalis has been commissioned to conduct a Flood Risk Assessment (FRA) on behalf of WuXi Biologics in support of the planning application for the proposed Effluent Balancing Resource Recovery System located within the WuXi Biologics facility (i.e., the red line boundary) which is hereafter referred to as 'the proposed development' or 'the site'. The site is located within the WuXi Biologics facility in the south of Dundalk in the townland of Haynestown. A detailed description of the proposed development is presented in Chapter 2 - Project Description.

- The Flood Risk Assessment (FRA) is presented within the documents submitted as part of this planning application. 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. If no potential flood risk is identified, then the overall assessment can conclude at this point. However, if a potential flood risk issue is identified the risk will be investigated in further detail by undertaking a *Stage 2 – Initial flood risk assessment.*

- Based on the Stage 1 – Flood risk identification findings, the following conclusions can be drawn:

    - *There is no historic risk of flooding at the site*
    - *The proposed development is not at risk of flooding from the 1% AEP event*
    - *Given that the proposed site is located in Flood Zone C (outside Flood Zone A and B), there is low probability of flooding*
    - *Given that the proposed development is located in Zone C, consideration of the Justification Test is not required.*

- The following recommendations should be considered:

    - *At the detailed design stage, climate change should be considered and designed accordingly.*
    - *If any changes to the existing ground level are made, future surface water design should take into the existing drainage network into consideration and be designed accordingly.*

- *The proposed discharge for the storm-water outfall into the existing storm water network should be set at a maximum discharge rate of QBAR or 2 l/s/ha, whichever is the greater as per the 'Greater Dublin Strategic Drainage Study Volume 2 – New Developments' guidelines .*
- *Suitable Sustainable Urban Drainage systems (SUDs) are to be used within the proposed development to reduce surface water runoff from the site where feasible and designed in accordance with CIRIA report C753 'The SuDS Manual V-6'.*

11.3.3 Hydrology

There are no reported natural surface water features within the proposed development. There is an attenuation pond located to the south eastern side of the proposed development site. This pond, which holds water, was constructed as part of the WuXi Biologic facility. Further details are provided in Chapter 5 – Biodiversity. There will be no change to the existing pond as a result of the proposed development.

The most immediate hydrological features in the vicinity of the site is the Carnabreagh Stream located ca. 700m west of the proposed development site and which is separated from the proposed site by a physical barrier of the M1 motorway. The Carnabreagh Stream flows into the Tates and Carrans Park Stream which outfalls into the Fane River. The Fane River subsequently outfalls to Dundalk Bay. EPA datasets identify that the Fane River had a Q-value score of 4 (during 2020) which indicates good water quality.

The Haggardstown River is located ca. 750m east and is separated from the proposed development site by the L3161 Marlbog Road. This river outfalls directly into Dundalk Bay. According to EPA mapping, the proposed development site is predominantly within the Haggardstown River catchment.

The Haynestown Stream is located ca. 1.1km south of the proposed development site. and is separated from the proposed development site by the L3161 Marlbog Road. This stream is a tributary of the larger Fane River.

The proposed development is located ca. 2km west of the Inner Dundalk Bay. Key hydrological features in the general vicinity of the site are presented in Figure 11.1.

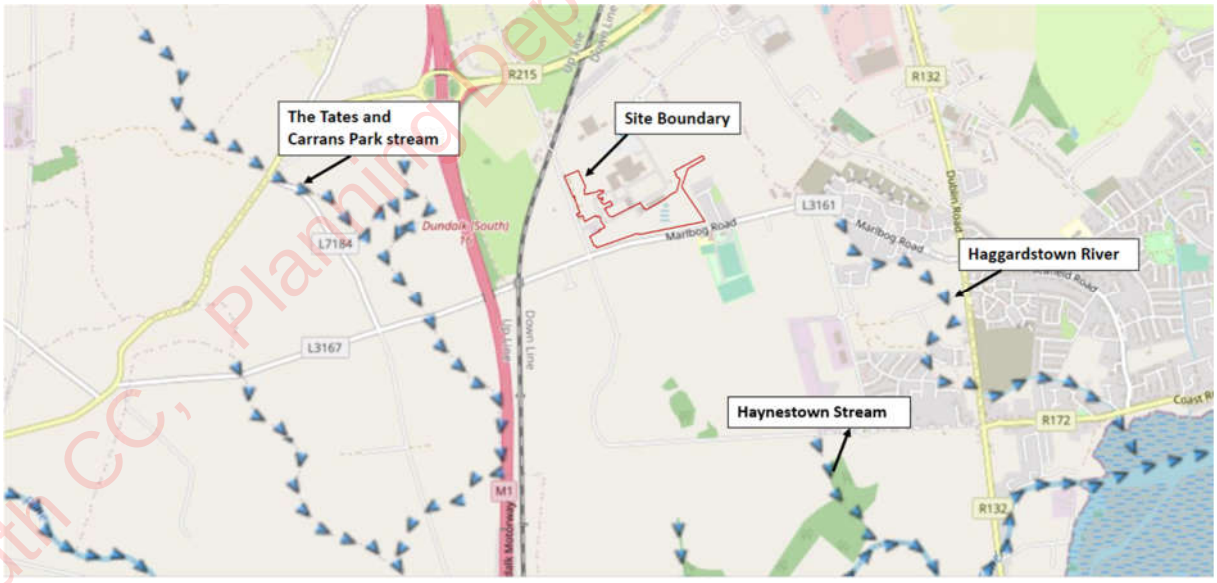


Figure 11.1 – Hydrological Features in the general vicinity of the Site (Source: EPA, 2024)

Dundalk Bay geological heritage area (site code: LH018) is located approximately 2km east of the site, as detailed further in Chapter 10 - Land, Soils and Geology. It is described by the GSI as *'a wide coastal embayment, incorporating wide expanses of coastal flats'* (GSI, 2024). The proposed development will not impact on Dundalk Bay geological heritage area.

11.3.3.1 Surface Water Quality

The EPA maintains a database of surface water features including rivers and lakes as well as water quality and risk status in accordance with the Water Framework Directive (WFD). The purpose of the WFD is to protect and enhance all waters including rivers, lakes, estuaries, coastal waters and groundwater as well as water dependent wildlife and habitats. This involves improving or maintaining current water quality status with the aim of achieving '*Good'* status for all waters; and mitigating against the risk of a decline in the water body quality status. The site is located within the Newry, Fane, Glyde and Dee WFD catchment and the Castletown_SC_020 WFD sub-catchment.

The Fane River (west of the proposed development) and the Haggardstown River (east of the proposed development) have been assigned WFD status of '*moderate' and 'poor'* respectively for river water quality by the EPA, for the 2016 to 2021 monitoring period (EPA, 2024), as presented in Figure 11.2. The Fane River is '*at risk'* of failing to meet the relevant WFD objectives by 2027 (EPA, 2024) while the Haggardstown River is currently under '*review'* with regards to meeting the relevant WFD objectives by 2027 (i.e. additional information is needed to determine their status before resources and more targeted measures are initiated or the measures have been undertaken). Both rivers ultimately discharge to the Inner Dundalk Bay ca. 2km east of the site, which is classified as having '*moderate'* transitional waterbody status by the EPA for the 2016 to 2021 monitoring period (EPA, 2024), and is currently at risk of failing to meet the relevant WFD objectives by 2027 (EPA 2024). The Inner Dundalk Bay in turn discharges to the Outer Dundalk Bay, which is classified as having '*high'* coastal waterbody status by the EPA for the 2016 to 2021 monitoring period (EPA, 2024), and is currently '*not at risk'* with regards to meeting the relevant WFD objectives by 2027.

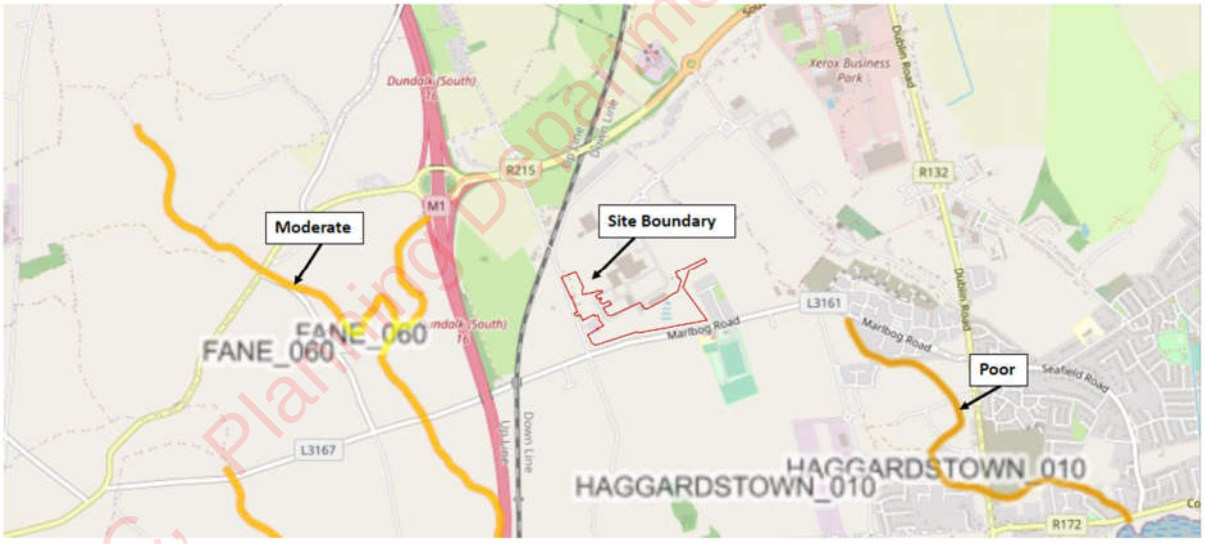


Figure 11.2 – Regional River Water Quality in the general vicinity of the Site (Source: EPA, 2024)

11.3.4 Hydrogeology

11.3.4.1 Aquifer Characteristics

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor) and vulnerability (extreme, high, moderate or low). Resource value refers to the scale and production potential of the aquifer whilst vulnerability refers to the ease with which groundwater may be contaminated by human activities (vulnerability classification is primarily based on the permeability and thickness of subsoils), as presented in Table 11-1.

Table 11-1 - Groundwater Vulnerability Rating Table (Source: GSI, 1999)

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

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

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 proposed site is underlain by a Poor Aquifer; bedrock which is generally unproductive except for in local zones. Refer to Figure 11.3. Groundwater vulnerability (in the bedrock aquifer) is predominantly High (H) in the vicinity of the site, with minor portions of the northern portion being classified as Extreme and Rock at or near Surface or Karst as presented in Figure 11.4 (GSI, 2024).

There are 2no. gravel aquifers located in the general vicinity; Dundalk and Dromiskin, located ca. 2km and ca. 2.3km respectively from the proposed site. Both are classified as locally important gravel aquifers.

There are no karst features located in the vicinity of the proposed development (GSI 2024). Based on the geological setting of the receiving environment, there is no potential for karst features (such as fractures or epikarst) to be present beneath the site. Accordingly, the potential for karst connectivity, and groundwater flow via. conduit pathways do not warrant consideration as part of this assessment.

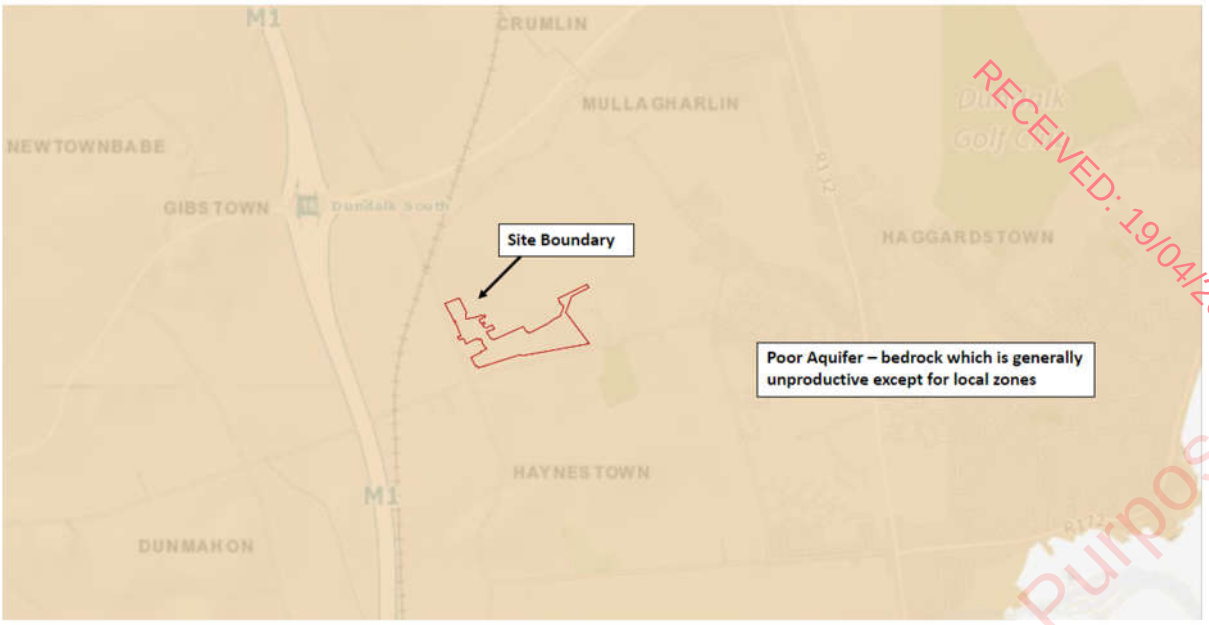


Figure 11.3 - Regional Aquifer Classification (Bedrock Aquifer) (Source: GSI, 2024)

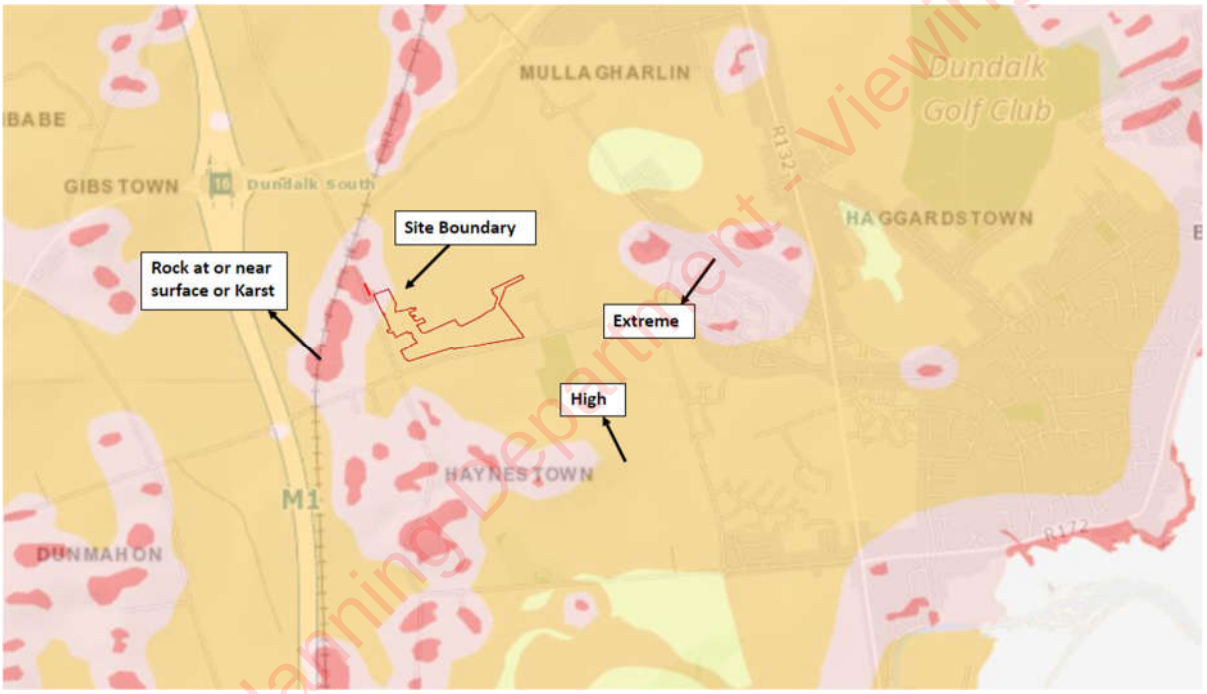


Figure 11.4 - Regional Groundwater Vulnerability Rating (Source: GSI, 2024)

11.3.5 Groundwater Recharge

Recharge is the amount of rainfall which infiltrates to ground and replenishes groundwater levels in the bedrock and gravel aquifers. It is dependent on the following key factors: effective rainfall (i.e. total rainfall less evaporation and surface water run-off), transpiration (i.e. uptake by vegetation) and aquifer characteristics (i.e. how easily the aquifer can accept water and store it). Additionally, not all effective rainfall will contribute to recharge due to impermeable materials in urbanised areas and associated drainage and water management

infrastructure. The average recharge rate to the poor bedrock aquifer beneath the general vicinity of the site is reported to be ca. 227mm/yr (GSI, 2024).

11.3.6 Groundwater Levels and Flow Direction

Groundwater levels across the WuXi land holding, recorded during the 2018 Ground Investigation ranged from 1.25 meters below ground level (mBGL) to 6.50 mBGL (Ground Investigations Ireland Ltd, 2019), as presented in Appendix 10.2. Hence shallow groundwater would be expected to be encountered across the site. Inferred groundwater flow is expected to follow topography in a general easterly / south easterly direction, towards the Hagardstown River and regionally towards Dundalk Bay and the Irish Sea.

11.3.7 Groundwater Use & Available Resource

The GSI maintains a record of groundwater abstractions consisting of wells and springs, in addition to designated drinking water protection zones (referred to as Source Protection Areas). According to the GSI database, there are no group water scheme or public water supply abstraction points, or designated group water scheme or public water supply Source Protection Areas within the vicinity of the site (GSI, 2024).

Based on the GSI database, there are 20no. wells and springs located within the general vicinity of the site, as summarised in Table 11-2 and presented in Figure 11.5.

Table 11-2 - GSI Groundwater Abstractions Within Study Area (GSI, 2024)

Abstraction ID	Abstraction Type	Location Accuracy (m)	Approximate Location (relative to the Site)	Depth (m)	Yield (m3/d)	Use
2929NWW117	Dug Well	2000	0.32km west of site	5.2	N/A	N/A
2929NWW116	Dug Well	2000	0.32km west of site	3.4	N/A	N/A
2929NEW084	Borehole	20	2.07km north east of site	36	43.2	Unknown
2929NEW088	Borehole	200	2.07km north east of site	36.9	54.6 - moderate	N/A
2929NEW093	Borehole	100	2.33km north east of site	9.1	218.2 - good	Industrial use
2929NEW089	Borehole	100	2.33km north east of site	25.6	21.8 - Poor	N/A
2929NWW135	Dug Well	1000	2.13km north of the site	N/A	N/A	N/A

Abstraction ID	Abstraction Type	Location Accuracy (m)	Approximate Location (relative to the Site)	Depth (m)	Yield (m3/d)	Use
2929NWW255	Borehole	100	3.01km from site	48.8	33 – poor	N/A
2929NWW252	Borehole	100	3.01km from site	9.1	153 - Good	Industrial use
2929NWW250	Borehole	200	3.01km from site	48.8	55 - Moderate	N/A
2929NWW251	Borehole	100	3.01km from site	10.1	20 – poor	N/A
2929NWW211	Borehole	50	3.06km from site	10	604.8 - excellent	N/A
2929NWW210	Borehole	50	3.06km from site	9	43.2 – poor	Unknown
2929NWW250	Borehole	200	3.06km from site	48.8	55 – moderate	N/A
2929NWW212	Borehole	20	3.06km from site	10	146.9 – good	N/A
2929NWW121	Dug well	2000	3.4km from site	2.4	N/A	N/A
2929NWW120	Dug well	2000	3.4km from site	5.5	N/A	N/A
2929NWW123	Borehole	2000	3.4km from site	16.8	N/A	N/A
2929NWW119	Borehole	2000	3.4km from site	30.8	N/A	N/A
2929NWW134	Dug well	1000	3.4km from site	6.4	N/A	N/A

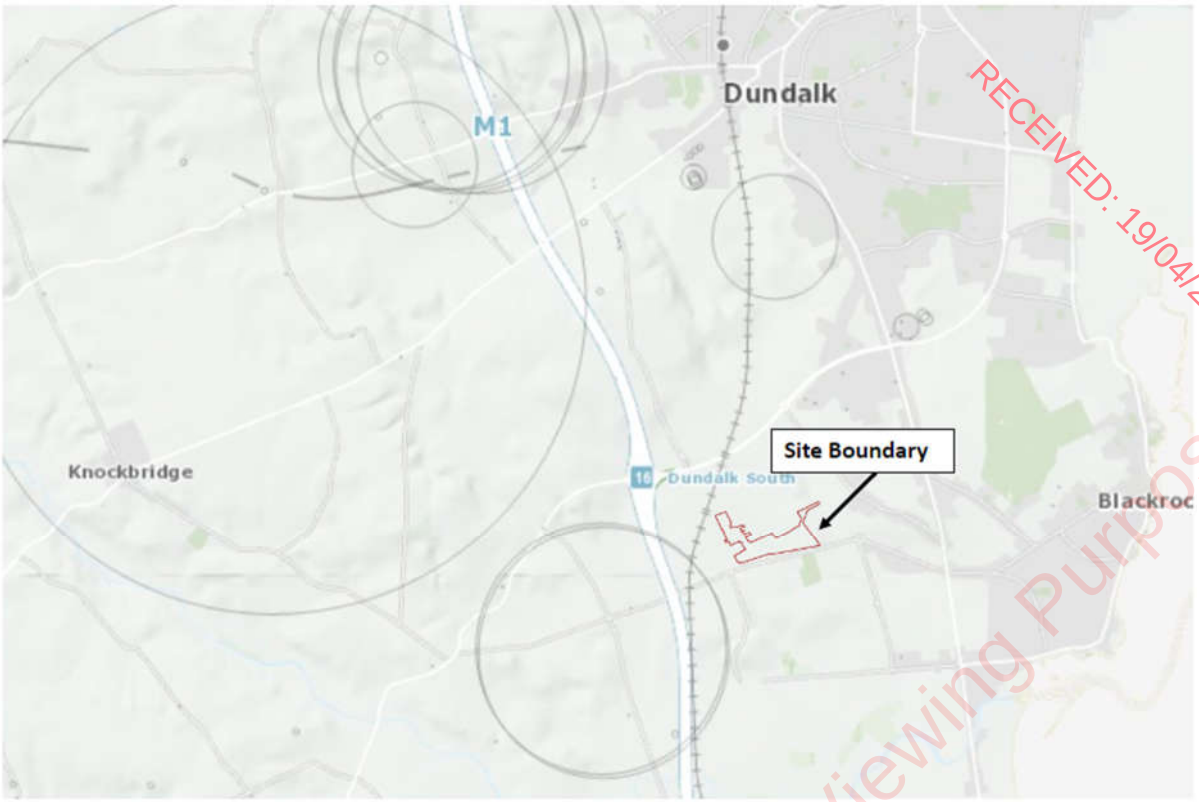


Figure 11.5 - Registered Groundwater Wells in The Vicinity of the Site (Source: GSI, 2024)

11.3.8 Groundwater Quality

The European Communities Environmental Objectives (Groundwater) Regulations, (S.I. No. 9 of 2010) came into effect on 27th January 2010. The aim of the Regulations is to achieve the environmental objectives established for groundwater by Article 4 (1) (b) of the Water Framework Directive (2000/60/EC), as amended. The 2010 Regulations, as amended, set down groundwater quality standards for nitrate (50mg/L) and active substances in pesticides in Schedule 4 and established threshold values for pollutants or indicators of pollutants in Schedule 5. Under these regulations the EPA must assign a status of '*Good*' or '*Poor*' to those bodies of groundwater where available data and knowledge allows.

Regional groundwater quality status for the 2016 to 2021 monitoring period (EPA, 2024) is classified under the WFD as '*Good*' for the Lough Groundwater Body beneath the proposed site (EPA GWB ref: Louth). Refer to Figure 11.6. The Groundwater Body (GWB) is the relevant management unit under the WFD. Groundwater bodies are subdivisions of large geographical areas of aquifers so that they can be effectively managed in order to protect the groundwater and linked surface waters (GSI, 2021). The Lough Groundwater Body beneath proposed site is classified as 'not at risk' of failing to meet the relevant WFD objectives by 2027 (EPA, 2024).

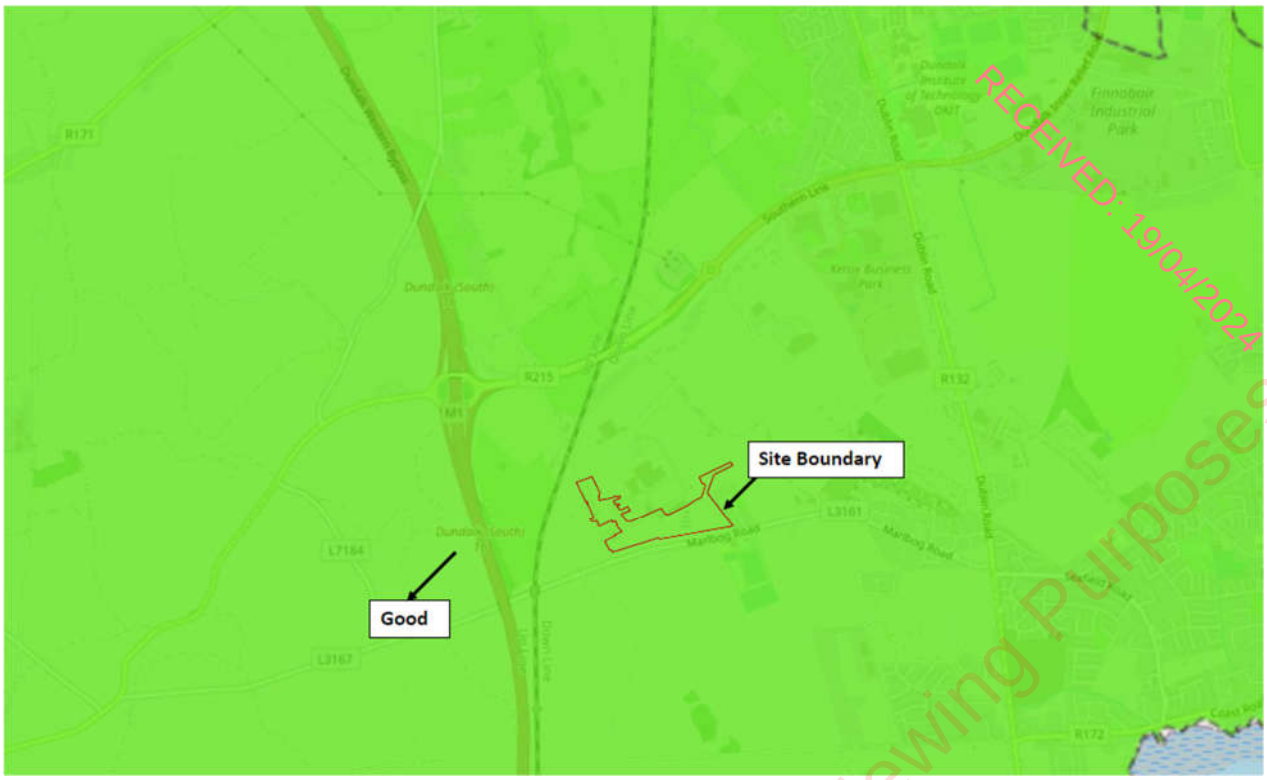


Figure 11.6 – Regional Groundwater Quality in the general vicinity of the Site (Source: EPA, 2024)

11.4 Potential Effects of the Proposed Development

11.4.1 Hydrogeological Conceptual Site Model

In addition to flood risk (which has been fully addressed above), the following criteria are typically applied when evaluating potential impacts to the water environment: -

- Effects to surface water / groundwater quality; and,
- Effects to surface water flows / groundwater resources.

In terms of surface water flows / groundwater resources, no significant effects are anticipated arising from the proposed development based on the following considerations: -

- According to the GSI (2024) database, there are 20no. groundwater wells located within the wider vicinity of the site. Refer to Table 11-2. However, due to the nature, scale and location of the proposed development, no offsite groundwater abstraction wells will be impacted by the proposed development.
- There will be no significant change to rainfall recharge rates to the underlying poorly productive bedrock aquifer at the proposed development.
- The maximum anticipated depth of excavation across the site is ca. 5m bgl. During excavations, it is anticipated that bedrock will be encountered. Therefore, rock breaking will be required. However, given the fact that the site is underlain by a poor aquifer (Pl - bedrock which is generally unproductive except for local

zones), no groundwater level impacts to regional groundwater resources, or surface water level/ flow impacts are likely as a result of potential temporary dewatering works during construction.

- Based on the proposed drainage design, and the location of the nearest surface water receptors, surface water level/ flow impacts are not likely to occur at either the Tates and Carrans Park Stream or the downstream Haggardstown river and Haggardstown River. There will be no change to the onsite attenuation pond, and no water quality impacts are anticipated to these waterbodies.

- A comprehensive surface water drainage design has been completed as part of the proposed works. This provides for adequate treatment of surface water. It is intended that any surface water that is collected within the bunded area will flow by gravity to a series of channels that will in turn discharge the runoff to 2 No. collection sumps located within the bunded area. These sumps will be fitted with submersible pumps that will recycle the surface water run-off within the bunded area back into the head of the Treatment Works. Final discharge will be to the public sewer. It is not intended to discharge any surface water runoff collected within the bunded area to the existing nearby surface water system so there will be no net increase in the volume of surface water entering the existing system from the proposed bunded area. All water emissions will ultimately be discharged to Dundalk WwTP.

- No onsite groundwater abstraction is proposed during the operational phase. Based on the proposed design, typical excavation depths and encountered ground conditions beneath the vicinity of the site, permanent dewatering will not be required during the operational phase.

Therefore, given the nature of the proposed development there will be no impact to regional or local groundwater resources or surface water levels / flows / quality, specifically at the Tates and Carrans Park Stream and subsequently the Fane River, and the Haggardstown river or Harrardstown River. Accordingly, potential effects on groundwater resources, groundwater levels or surface water levels/ flows / quality do not warrant further consideration.

The nearest European site is Dundalk Bay SAC/SPA, which is located ca. 2km east of the proposed development. There is no indirect or direct connectivity from the proposed development to Dundalk Bay SAC/SPA via surface water courses, as detailed previously in Chapter 5 – Biodiversity.

One key receptor (in terms of groundwater quality) has therefore been identified as follows;

- Bedrock aquifer beneath the site (Poor Aquifer(Pl) - Bedrock which is Generally Unproductive except for Local Zones).

The focus of this assessment will therefore be on potential groundwater quality impacts associated with the proposed development.

Based on relevant IGI guidance (2013) the generic type of geological/hydrogeological environment into which the proposed development will be placed has been determined as *'Type A – Passive geological / hydrogeological environment'*, defined by the IGI as '*areas of thick low permeability subsoil, areas underlain by poor aquifers, recharge areas, historically stable geological environments.'*

11.5 Potential Effects on Water during the Construction Phase

There is potential for degradation in groundwater quality resulting from potential pollution caused by construction activities e.g., plant, fuel/ chemical spillage etc., particularly during excavations. The maximum anticipated

depth of onsite excavation will be approximately 5mbgl. During the construction phase of the proposed development, the following potential effects on groundwater quality could occur:

- Accidental spillages or leaks onsite in the vicinity of exposed groundwater pose a potential pollution risk as follows;
    - Groundwater vulnerability under the proposed development is high indicating groundwater is close to the surface. Therefore, the area is highly vulnerable to water quality effects through accidental spillages or leaks of oils, fuels, paints or chemicals. This could result in likely moderate adverse temporary effects directly to the quality of groundwater receptors (i.e., bedrock aquifer).
- General site activities during the construction phase associated with cement handling and pouring, pose a potential pollution risk as follows;
    - Such general site activities could result in likely moderate adverse temporary effects (via. groundwater pathways) directly to groundwater quality beneath the site (i.e. bedrock aquifer).

Mitigation measures will be implemented during the construction phase to further reduce these potential effects, and to address any potential water management issues; these are listed below in Section 11.8.

11.6 Potential Effects on Water during the Operational Phase

Given the fact that the excavation of topsoil and subsoil will extend into bedrock in the vicinity of the proposed development, there is a potential risk of impact to the underlying sandstone bedrock aquifer, in the event of a leak or spillage at the proposed new facility (of untreated wastewater, waste sludge, treatment chemicals including lime, molasses, urea, phosphorous, supernatant returns, sulphuric acid, caustic, aluminium sulphate, and poly) during the operational stage.

However as outlined previously within Chapter 10 – Land, Soils and Geology, the operational EBRRP will comprise:

- A rectangular concrete tank structure comprising two off specification cells and four flow balancing cells which will receive inlet flows from the WuXi Biologics existing pH correction facility through step screens located on the roof of the tanks;
- two metal fabricated flocculation lamella tanks for primary treatment with a circular metal post primary tank and circular metal liquor return tank;
- A second rectangular concrete tank structure with three anoxic and aeration cells required for secondary treatment;
- A third concrete tank structure to hold three sludge processing cells; and,
- A metal bulk lime storage tank and metal sulphuric acid and HDPE aluminium sulphate storage tanks.

All of the above process and storage tanks will be located within concrete bunds with metal stairwells and platforms for access. All process tanks will be connected to a dedicated odour treatment facility and all tanks will be fully covered. A new sludge dewatering facility will deposit sludge into sealed skips with capability for trucks to remove and replace the sealed skips once filled. The works will include all process ancillary equipment such as pumps, fabricated structures, screening equipment, pipework and lifting equipment. The proposed new EBRRP has been designed specifically for the current site setting, and is intended to a be a key milestone in WuXi Biologics Net-Zero Journey. The existing and new bunds will be used to retain spillages from the treatment plant, for example, directing the flow into a sump that shall feed the existing screen. WuXi Biologics

will be obliged to meet current (and any future) licence requirements with regards to monitoring, reporting, auditing and site inspections. It is also noted that the proposed development is located in a newly established modern biologics campus. Therefore based on the hydrological / hydrogeological site setting, the design of the proposed development, and the regulatory requirements associated with the operational phase, any potential risk to receiving groundwater, during the operational stage, has been appropriately addressed. Potential effects to the receiving groundwater environment during the operational stage will be likely temporary, not significant.

A rainwater harvesting tank is proposed to reduce the amount of stormwater runoff located adjacent to the building administration and process building at ground level. Any rainwater collected via the rainwater harvesting can be utilised for the wash down of tanks etc.

During the operational phase of the development, the following potential effects on groundwater quality could also occur;

- Groundwater could be at risk of quality impacts in the unlikely scenario of an unplanned event (traffic collision, emergency onsite fuel / oil spill, fire water arising from a fire). The risk of such an event occurring is low given the regulatory setting of the facility. The proposed development will be designed, constructed and maintained in accordance with all relevant statutory building and fire safety requirements. Taking account of the proposed surface water drainage design, potential adverse effects to groundwater (i.e. bedrock aquifer) are negligible, and unlikely to occur, and do not warrant further consideration.

- Groundwater is at risk of becoming contaminated through routine site maintenance activity during the operational phase. Maintenance of the proposed plant, access roads and paved areas, utilities, foul, watermain and storm water drainage system may result in small quantities of lubricant oils, fuel and chemicals being brought to the site. In the highly unlikely event of a spill this could result in a not significant adverse temporary effect to groundwater quality.

11.7 Do Nothing Scenario

The 'Do-nothing' scenario describes the circumstances where no development occurs. The baseline environment is unlikely to change in the absence of the development as there will be no impact on hydrological or hydrogeological features on the site. Therefore, there will be no impact on the receiving water environments if the 'Do-nothing' scenario is followed.

11.8 Mitigation Measures

The mitigation factors and measures for the control of pollution and protection of groundwater quality are described below.

11.8.1 Construction Phase

With regard to groundwater quality effects the following mitigation measures are proposed. The Contractor will be responsible for ensuring these measures are fully implemented:

- The construction management of the site will take account of the recommendations of the Construction Industry Research and Information Association (CIRIA) guidelines '*Control of water pollution from construction sites. Guidance for consultants and contractors (C532)'* and *'Groundwater control: design and practice (second edition) (C750)'* and CIRIA 2015 '*Environmental good practice on site guide (fourth edition) (C741)'* to minimise as far as possible the risk of pollution.

- All of the mitigation measures (for the protection of soils and geology) listed in Chapter 10 will be implemented onsite during the construction phase.

- The Contractor will be responsible for ensuring that the existing drainage network, onsite attenuation pond and any onsite groundwater monitoring wells will be suitably protected (via. the use of physical barriers and / or the implementation a Site-specific water run-off management plan as required).

- In order to prevent any potential surface water / groundwater impacts via. release of hydrocarbon / chemical contaminants the following standard measures will be implemented:

    - Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice; All material will be adequately bunded.

    - The contractor will have a dedicated area within the compound for refuelling plant or any other equipment that is bunded and has the necessary spill kit equipment available as and when required in line with any statutory IEPA & H&S legislations.

    - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling;

- A response procedure will be put in place to deal with any accidental pollution events. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the proposed development and properly disposed of in accordance with all relevant waste management legislation;

    - All site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area. Tanks containing diesel or any fuel will be double skinned.

    - Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the site. This will minimise the risk of groundwater becoming contaminated through site activity. Contractors will be made aware of spill control procedures during their site induction training.

    - All oil stored on site for construction vehicles will be kept in a locked and bunded area;

    - Generators, pumps and similar plant will be placed on drip-trays to prevent contamination;

    - All temporary construction fuel tanks will also be located in a suitably bunded area and all tanks will be double skinned. Relevant Material Safety Data Sheets along with oil absorbent materials will be kept on site in close proximity to any fuel storage tanks or bowsers during proposed site development works; and,

    - All fuel / oil deliveries to on-site oil storage tanks will be supervised, and records will be kept of delivery dates and volumes.

- In order to prevent any potential groundwater impacts via. release of cementitious materials the following measures will be implemented where poured concrete is being used on site;

- The production, transport and placement of all cementitious materials will be strictly planned and supervised. Site batching/production of concrete will not be carried out onsite and therefore these aspects will not pose a risk to the waterbodies or sensitive receptors present, namely any exposed groundwater, the onsite attenuation pond or onsite groundwater monitoring wells;
- Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that all joints between panels achieve a close fit or that they are sealed;
- Any spillages will be cleaned up and disposed of correctly;
- Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening;
- Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete;
- Mixer washings and excess concrete will not be discharged directly into the drainage network, or any drainage ditches, surface water bodies, exposed groundwater, the onsite attenuation pond or onsite groundwater monitoring wells; and,
- Surplus concrete will be returned to batch plant after completion of a pour.

- Foul drainage from site offices and site compound will be directed to the existing wastewater network via a new foul drainage facility. This discharges to the public sewer and ultimately to Dundalk WwTP. Alternatively, it will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations.
- In the unlikely event that ground contamination is encountered beneath the site during the construction works, all works will cease. Advice will be sought from an experienced contaminated land specialist and a phased environmental risk assessment (specifically to assess any associated potential environmental and/ or human health risks) will be undertaken in accordance with relevant EPA guidance '*Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites'* (EPA, 2013) and UK Environment Agency Guidance *'Land contamination risk management (LCRM)*' (UK EA, 2024).
- In the event that dewatering works are required during the construction phase, a temporary works design including key details such as estimated volumes of water, onsite water treatment required, disposal arrangements and permit /licence requirements as well as water quality monitoring requirements will be prepared by the Contractor and agreed with WuXi in advance of commencement of dewatering works.

The above mitigation measures will form part of the Outline CEMP submitted as part of this planning application, and which will be further developed by the Contractor within the project-specific Detailed CEMP which will be in operation during the construction phase.

11.8.2 Operational Phase

With regard to groundwater quality effects the following mitigation measures are proposed;

- Any minor volumes of fuel, oil or chemicals required during routine maintenance works will be brought to and from site by the maintenance contractor. While temporarily onsite all chemicals will be kept in secure and bunded areas, with relevant Material Safety Data Sheets available onsite. Any fuel / oil tanks temporarily stored on site will be located in a suitably bunded area and all tanks will be double skinned, with oil / chemical

absorbent materials held onsite in close proximity to the tanks. Relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented;

- In the unlikely event of a fuel / oil or chemical spill / leak during routine maintenance works, emergency spill response measures will be implemented with the aim of limiting the volume spilled and recovering as much of the lost product as possible (relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented); and,

- A maintenance programme for the proposed surface water drainage system should be implemented. The Contractor, in consultation with the Client and the design team, will be responsible for ensuring that these measures are fully implemented.

11.9 Cumulative Effects

Provided the mitigation measures listed above are in place for the duration of the construction phase, anticipated effects on the receiving surface water / groundwater environment will be temporary and not significant adverse during the Construction Phase. Taking account of proposed mitigation measures, effects on the receiving surface water / groundwater environment will also be temporary and not significant adverse during the Operational Phase of the proposed development. Therefore, no significant cumulative effects are likely.

11.10 Residual Effects

The development as proposed shall not result in an adverse impact to the existing hydrological or hydrogeological regime of the area. The development will not result in any flood risk to the proposed site or surrounding lands. The proposed development is therefore considered to be appropriate from a flood risk perspective.

Taking account of the relevant mitigation measures, the residual impact to the receiving surface water / groundwater environment including receiving transitional waters (Inner Dundalk Bay), resulting from both the construction stage, and the operational stage of the proposed development is likely to be not significant adverse and temporary.

On a regional scale, the proposed development is not likely to affect or result in further deterioration of the current '*Moderate'* surface water quality status of the Fane River, the current '*Poor'* surface water quality status of the Haggardstown River, and is not likely to affect the current '*moderate'* transitional waterbody status of the Inner Dundalk Bay, as required under the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (as amended).

Similarly, the proposed development will not affect the current '*Good'* groundwater quality status of the Louth Groundwater Body as required under the European Communities Environmental Objectives (Groundwater) Regulations, 2010, as amended. The proposed development will not be likely to cause a deterioration in surface or groundwater status or compromise the ability of any affected waters to comply with the objectives of the Water Framework Directive.

No significant effects to receiving surface waters or groundwater are likely as a result of the proposed development.

11.11 Monitoring Requirements

11.11.1 Construction Phase

A comprehensive monitoring and supervisory regime including visual monitoring of all excavations and any exposed groundwater as required will be put in place by the Contractor. In the event that dewatering works are required during the construction phase, a temporary works design including key details such as estimated volumes of water, onsite water treatment required, disposal arrangements and permit /licence requirements as well as water quality monitoring requirements will be prepared by the Contractor and agreed with WuXi in advance of commencement of dewatering works.

11.11.2 Operational Phase

Standard measures / monitoring requirements will be adhered to during the operational phase. Regular checks and maintenance of the proposed surface water drainage system should be implemented.

11.12 Water and Human Health

Taking account of the baseline environmental setting and proposed mitigation measures during both the construction and operational phases, any human health risks to onsite or offsite receptors as a result of groundwater or surface water effects will be imperceptible. No human health risks associated with long term exposure to contaminants (via. surface water or groundwater pathways) resulting from the proposed development are likely.

No significant human health effects (via. water) are likely as a result of the proposed development.

11.13 Interaction with other Environmental Attributes

Water attributes interact with other environmental attributes are summarised as follows: -

- **Population & Human Health** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on human health. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 4 – Population and Human Health, once in place, will result in no potential for impact when these topics do interact.
- **Biodiversity** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on biodiversity conditions present, due to indirect connectivity. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 5 – Biodiversity will ensure that this will not occur.
- **Land, Soils & Geology** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on land, soils, and geology conditions present. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 10 – Land, Soils and Geology will ensure that this will not occur.

11.14 Difficulties encountered during preparation of this chapter

No difficulties were encountered during the data collection and assessment stages of this Water Impact Assessment.

11.15 Risk of Major Accidents and/or Disasters

Based on the nature (including modern proposed design/ construction/ operation measures), location and scale of the proposed development, the risk of major accidents and/or disasters occurring which could significantly impact the receiving water environment is low and unlikely to occur.

12. Archaeology

This chapter of the EIAR, prepared by Dr. Enda O'Flaherty (BA, H-Dip, PhD) and Ciarra O'Sullivan (BA, MPhil) of Rubicon Heritage Services Ltd, details the archaeological, architectural and cultural heritage issues that need to be addressed in respect of a proposed Effluent Balancing and Resource Recovery System on Wuxi Biologics lands at Haynestown, Co. Louth (Figure 12.1; see Chapter 2).

This study assesses the baseline archaeological and cultural heritage environment, in order to evaluate the likely effects that the proposed development will have on this environment, and to provide mitigation measures to avoid, reduce or offset these effects in accordance with the policies of the Department of Housing, Local Government and Heritage (DHLGH), Louth County Council Development Plan (2021-2027), the National Monuments Acts 1930-2014, as amended, and best practice guidelines.

12.1 Study Area

A study area with a radius of 1 km has been established for the proposed development (Table 12-1; Figure 12.1). The study area has been defined in respect of two factors:

1. The ability of sites/information sources to provide information pertaining to the archaeological potential of the proposed development site, and
2. The potential physical impact, as well as impact on setting, that the proposed development may have on sites of cultural heritage significance.

Figure 12.1 CH sites included in this chapter

Table 12-1 Dimensions of Study Area

Subject	Study Area
National Monuments	Within approx. 1 km of proposed development site
Recorded archaeological monuments (RMPs)	Within approx. 1 km of proposed development site
Protected Structures and/or their curtilage	Within approx. 1 km of proposed development site
Architectural Conservation Areas (ACAS)	Within approx. 1 km of proposed development site
Structures recorded in the NIAH	Within approx. 1 km of proposed development site
Undesignated features of cultural heritage	Within proposed development site
Townland boundaries	Within proposed development site
Areas of archaeological potential	Within proposed development site
Previous Excavations	Within townlands encompassed by and adjacent to the proposed development site including Haynestown and Crumlin
Topographical files	Within townlands encompassed by and adjacent to the proposed development site including Haynestown and Crumlin

12.2 Methodology

This section presents the methodology used in assessing the baseline cultural heritage environment. The scope and methodology for the baseline assessment has been devised in consideration of the following guidelines:

- Environmental Protection Agency (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'
- Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) (1999) 'Frameworks and Principles for the Protection of the Archaeological Heritage'
- Environmental Protection Agency (2003) 'Advice notes on current practice (in the preparation of Environmental Impact Statements)'
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018)
- Department of the Environment, Heritage and Local Government (2011) 'Architectural Heritage Protection Guidelines for Planning Authorities'

- TII (2022) Guidelines for Cultural Heritage Impact Assessment of TII National Road and Greenway Projects.

12.2.1 Desktop Study Methodology

The present assessment of the archaeological and cultural heritage of the proposed development area is based on a desktop study of a number of documentary and cartographic sources. The desktop study was further augmented by an examination of aerial photography as well as a field survey. The main sources consulted in completing the desktop study are listed here:

- Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP);
- National Inventory of Architectural Heritage (NIAH);
- Louth County Development Plan 2021–2027;
- National Museum of Ireland (NMI) Topographical Files;
- Excavations Bulletin;
- Heritage Maps Archaeology GIS;
- Aerial Photographs; and,
- Cartographic Sources.

The UNESCO definition of Cultural Heritage has been used throughout this chapter to define Cultural Heritage Receptors (CH Receptors):

“Cultural Heritage (CH) includes artefacts, monuments, groups of buildings, sites, and museums that have a diversity of values including symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social significance. It includes tangible heritage (movable, immobile and underwater), intangible cultural heritage (ICH) embedded into cultural, and natural heritage artefacts, sites or monuments. The definition excludes ICH related to other cultural domains such as festivals, celebration etc. It includes industrial heritage and cave paintings” (UNESCO 2009).

12.2.2 Field Inspection Methodology

A field inspection of the proposed development site was undertaken by Rubicon Heritage Services Ltd on 27th of July 2023 (Appendix 12.1 Plates 12.1–12.10). The primary purpose of a field inspection is to assess local topography in order to identify any potential low-visibility archaeological and/or historical sites that are not currently recorded and which may be impacted upon negatively by the proposed development. It is also the purpose of the field inspection to survey any known monuments or sites and to consider the relationship between them and the surrounding landscape, all of which need to be considered during the assessment process.

The methodology used during the field inspection involved recording the present land use as well as the existing topography for the entire area comprising the proposed development site. A photographic record and written description were compiled for any known and/or potential sites of archaeological, architectural and/or cultural significance.

12.2.3 Methodology used for assessing baseline value of sites

In order to categorise the baseline environment in a systemised manner, 'baseline values' have been assigned to each identified site of cultural heritage significance and/or potential within the study area. The baseline value of a site is determined with reference to the 'importance' and 'sensitivity' of the site.

In accordance with NRA Guidelines, the importance of a site is determined based on the following criteria: legal status, condition, historical associations, amenity value, ritual value, specimen value, group value and rarity. The sensitivity of a site is determined based on its susceptibility to physical impact, as well as susceptibility to impact on setting.

It should be noted that the National Monuments Act 1930–2004 does not differentiate between recorded archaeological sites on the basis of relative importance or sensitivity. In addition, the Planning and Development Act 2000, as amended, does not differentiate between Protected Structures (PSs) or Areas of Architectural Conservation (ACAs) on the basis of relative importance or sensitivity either. Consequently, professional judgement has been exercised to rate these features based on their perceived importance and sensitivity in relation to physical impacts and impacts on setting.

Taking the above factors into consideration, the criteria that have been defined are provided in Table 12-2 below.

Table 12-2- Baseline values of sites

Subject	Baseline Value
Recorded Archaeological Monuments Protected Structures Architectural Conservation Areas Shipwrecks known to be more than 100 years old or whose date is uncertain	Effluent Balancing and Resource Recovery System EIAR.
Sites listed in the NIAH that are not Protected Structures Shipwrecks that are known to be less than 100 years old. Undesignated built heritage sites that comprise extant remains which are in good condition and/or which are regarded as constituting significant cultural heritage features Unrecorded features of archaeological potential	High
Undesignated built heritage sites that comprise extant remains which are in poor condition Undesignated cultural heritage sites (not including built heritage sites) that comprise extant remains Townland boundaries that comprise extant remains	Medium/High

Subject	Baseline Value
Marshy/wetland areas	
Undesignated cultural heritage sites for which there are no extant remains but where there is potential for associated subsurface evidence Townland boundaries for which there are no extant remains	Medium/Low
Undesignated cultural heritage sites for which there are no extant remains and where there is little or no potential for associated subsurface evidence	Low

Note: 'All other areas' collectively refers to the areas within the proposed development site that do not contain or comprise features of cultural heritage significance.

12.2.4 Types of Impact

The following Table 12-3 lists the type of effects that a proposed development may have on the cultural heritage resource (EPA, 2022):

Table 12-3- Types of Impacts

Types of effect	Definition
Direct	Direct effects arise where an archaeological, architectural and/or cultural heritage feature or site is physically located within the footprint of the proposed development, or its associated physical effect zone, whereby the removal of part, or all of the feature or site is thus required.
Indirect	Indirect effects arise when an archaeological, architectural or cultural heritage feature is not located within the footprint of the proposed development, or its associated physical effect zone, and thus is not effected directly. Such an effect could include effect on setting or effect on the zone of archaeological potential of site whereby the actual site itself is not physically affected.
Do-nothing effects	The environment as it would be in the future should the subject project not be carried out.
Worst-case Effects	The effects arising from a project in the case where mitigation measures substantially fail.
Cumulative	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects
Indeterminable	Whereby the full consequence that the proposed development may have on the cultural heritage resource is not known
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents

12.2.5 Methodology used for assessing magnitude of impact

The methodology used to assess the magnitude of potential pre-mitigation effects, as well as residual effects, of the proposed development on the baseline environment is presented in Table 12-4 below (EPA, 2022).

Table 12-4- Criteria used for rating magnitude of impacts

Effect Magnitude	Criteria
Profound	An effect which obliterates sensitive characteristics Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, adverse effects only. These effects arise where an archaeology site is completely and irreversibly destroyed. An effect that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse effects.
Very Significant	An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
Significant	An effect which, by its magnitude, duration or intensity, alters an important aspect of the environment. An effect like this would be where part of a site would be permanently effected, leading to a loss of character, integrity and data about an archaeological feature/site. An effect that by its magnitude, duration or intensity alters the character and/or the setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently effected leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigate is likely to reduce the effect. A beneficial or positive effect that permanently enhances or restores the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. A medium effect arises where a change to a site/monument is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised, and

	which is reversible. This arises where an archaeological feature can be incorporated into a modern-day development without damage and that all procedures used to facilitate this are reversible. A medium effect to a site/monument may also arise when a site is fully or partly excavated under license and all recovered data is preserved by record. An effect that results in a change to the architectural heritage which, although noticeable is not such that alters the integrity of the heritage. The change is likely to be consistent with existing and emerging trends. Effects are probably reversible and may be of relatively short duration. Appropriate mitigation is very likely to reduce the effect. A beneficial or positive effect that results in partial or temporary enhancement of the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities An effect which causes changes in the character of the environment, such as visual effect, which are not high or very high and do not directly effect or affect an archaeological feature or monument. An effect that causes some minor change in the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly affect the architectural structure or feature. Effects are reversible and of relatively short duration. Appropriate mitigation will reduce the effect. A beneficial or positive effect that causes some minor or temporary enhancement of the character of an architectural heritage significance which, although positive, is unlikely to be readily noticeable.
Not-significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Imperceptible	An effect on archaeological features or monument capable of measurement but without significant consequences. An effect on architectural heritage of local importance that is capable of measure merit but without noticeable consequences. A beneficial or positive effect on architectural heritage of local importance that is capable of measurement but without noticeable consequences.

12.2.6 Assessing the impacts on setting

The definition of setting follows the guidance set by English Heritage as they have developed a range of comprehensive guidance on this subject specific to heritage assets (English Heritage 2005; 2008). Hence

setting is not simply the visual envelope of the asset in question. Rather, it is those parts of the asset's surroundings that are relevant to the significance of the asset and the appreciation thereof, and in which a heritage asset is experienced.

In most instances setting will relate to the historical value of the asset, where an appreciable relationship between the asset and an element of its surroundings helps the visitor understand and appreciate the asset. This may be in terms of a physical relationship, such as between a castle and the natural rise that it occupies, or a more distant visual relationship, such as a designed vista or the view from, for example, one ringfort to another. The former is referred to as immediate setting and the latter as landscape setting. Many assets will only have an immediate setting. Some assets will have aesthetic value that relates to the surrounding landscape, such as in the case of a designed view incorporating a distant hill, or that relates to the contribution the asset makes to the local landscape, for example a church spire providing a focal point in a view down a valley.

English Heritage has provided a list of factors to be considered when assessing effects upon setting. These are broad factors and have been taken into consideration when assessing magnitude of effect and sensitivity. They are summarised in Table 12-5.

Table 12-5- Factors to be considered when assessing effects upon setting (after English Heritage, 2005)

Factor	Discussion
Visual dominance	Where an historic feature (such as a hilltop monument or fortification, a church spire, or a plantation belonging to a designed landscape) is the most visually dominant feature in the surrounding landscape, adjacent construction of the proposed development may be inappropriate.
Scale	The extent of a proposed development and the number, density and disposition of its associated elements will also contribute to its visual effect.
Intervisibility	Certain archaeological or historic landscape features were intended to be seen from other historic sites. Construction of a proposed development should respect this intervisibility.
Vistas and sight-lines	Designed landscapes invariably involve key vistas, prospects, panoramas and sight-lines, or the use of topography to add drama. Location of a proposed development within key views, which may often extend beyond any designated area, should be avoided.
Movement, sound or light effects	The movement associated with a proposed development may be a significant issue in certain historic settings. Adequate distance should always be provided between important historic sites and proposed developments to avoid the site being overshadowed or affected by noise.
Unaltered settings	The setting of some historic sites may be little changed from the period when the site was first constructed, used or abandoned. Largely unaltered settings for certain types of sites, particularly more ancient sites, may be rare survivals and especially vulnerable to modern intrusions such as wind turbines. This may be a particular issue in certain upland areas.

The following are guidelines to the assessment of magnitude of effect on setting (after English Heritage, 2005):

- Obstruction of or distraction from key views. Some assets have been sited or designed with specific views in mind, such as the view from a country house with designed vistas. The obstruction or cluttering of such views would reduce the extent to which the asset could be understood and appreciated by the visitor. Developments outside key views may distract from them and make them difficult to appreciate on account of their prominence and movement. In such instances the magnitude is likely to be greatest where views have a particular focus or a strong aesthetic character. Sympathetic development may improve key views by removing features that obstruct or distract from key views and hence preserve or enhance the importance of the asset.

- Changes in prominence. Some assets are deliberately placed in prominent locations in order to be prominent in the surrounding landscape, for example prehistoric cairns are often placed to be silhouetted against the sky and churches in some areas are deliberately placed on ridges in order to be highly visible. Developments can reduce such prominence and therefore reduce the extent to which such sites can be appreciated or the contribution that they make to the local landscape. Similarly, sympathetic development can enhance the setting of such sites by, for example, removing modern forestry that would otherwise compromise the setting of a cairn that had been placed on a skyline.

- Changes in landscape character. A particular land use regime may be essential to the appreciation of an asset's function, for instance the fields surrounding an Improvement period farmstead are inextricably linked to its appreciation. Changes in land use can leave the asset isolated and reduce its value. In some instances, assets will have aesthetic value or a sense of place that is tied to the surrounding landscape character. Conversely, sympathetic development may restore or preserve the relevant land use and hence preserve or enhance the relevant value of the asset.

- Duration of effect. Effects that are long term or permanent are generally of greater magnitude than those that are short term.

- Readily reversible effects are generally of lesser magnitude than those that cannot be reversed. Effects upon the defined setting will be of greater magnitude than those that affect unrelated elements of the asset's surroundings or incidental views to or from an asset that are unrelated to the appreciation of its value. The magnitude of effects can be rated from Negligible to Major using a similar scale to that for physical effects.

12.2.7 Methodology used for assessing significance of effect

The significance level of a construction or operation impact on a feature is assessed by combining the magnitude of the impact and baseline value of the feature. The matrix in Table 12-6 provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the baseline value or impact magnitude levels are not clear or are borderline between categories. The permanence of the effects is also taken into account, with irreversible effects being more significant while temporary or reversible changes are likely to be less significant.

Table 12-6- Criteria for assessing significance level of impacts

Magnitude of Effect	Baseline Value				
	Very High	**High**	**Medium / High**	**Medium / Low**	**Low**
Profound	Very significant	Very significant	Significant	Moderate	Slight

Very Significant	Significant	Significant	Moderate	Slight	Slight
Significant	Significant	Moderate	Moderate	Slight	Slight
Moderate	Moderate	Moderate	Slight	Slight	Negligible
Slight	Moderate	Slight	Slight	Negligible	Negligible
Not Significant	Slight	Slight	Imperceptible	Imperceptible	Imperceptible
Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible

Positive significance level of a construction or operation effect on a feature may also be expressed.

- **Significant positive**: a beneficial effect that permanently enhances or restores the character and/ or setting of the architectural heritage in a clearly noticeable manner;
- **Moderate positive**: a beneficial effect that results in partial or temporary enhancement of the character and/ or setting of the architectural heritage and which is noticeable and consistent with existing and emerging trends;
- **Slight positive**: a beneficial effect that causes some minor or temporary enhancement of the character of architectural heritage or local or regional importance which, although positive, is unlikely to be readily noticeable; and
- **Imperceptible positive**: a beneficial effect on architectural heritage of local importance that is capable of measurement but without noticeable consequences.

12.2.8 Assessing the duration and frequency of effect

'Duration' is a concept that can have different meanings for different topics. The EPA (2022) has issued the below guideline definitions when discussing duration in the context of environmental impact assessment.

Table 12-7- Assessing the duration and frequency of effect

Term	Discussion
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

Frequency of Effects	Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

12.2.9 Limitations of Assessment

There were no significant limitations or restrictions encountered during the compilation of this assessment. All third-party reports, data and mapping were reviewed and considered to be correct.

12.3 Baseline Receiving Environment

The abbreviation 'CH' is used in this chapter to identify individual cultural heritage receptors. Figure 12.1 shows a distribution map of CH sites. Appendix 12.2 includes a list of all CH sites identified within the study area. Cultural heritage (CH) includes artefacts, monuments, groups of buildings, sites, and museums that have a diversity of values including symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social significance. It includes tangible heritage (movable, immobile and underwater), intangible cultural heritage (ICH) embedded into cultural, and natural heritage artefacts, sites or monuments. The definition excludes ICH related to other cultural domains such as festivals, celebration etc. It includes industrial heritage and cave paintings (UNESCO 2009).

12.3.1 Designated Archaeological Sites

Designated Archaeological Sites

Record of Monuments and Places (RMPs) (see Figure 12.1)

Section 12 (1) of the National Monuments Act 1994 made provision the establishment and maintenance of a Record of Monuments & Places (RMP). Under this Act, each site recorded in the Record of Monuments and Places is granted statutory protection. When the owner or occupier of a property, or any other person proposes to carry out, or to cause, or to permit the carrying out of any work at or in relation to a recorded archaeological monument they are required to give notice in writing to the Minister for Culture, Heritage and the Gaeltacht 2 months before commencing that work.

There are 23 RMPS within the study area. Of the 23, one is also Protected Structures (CH017), while CH018 is a Protected Structure and also listed in the NIAH. CH023 is a redundant record and has been re-distributed as four separate RMPs (CH009-CH012). The redline boundary of the proposed development crosses the Zone of Notification for three RMPS; a souterrain (CH001), an enclosure (CH003) and habitation site (CH004). In the case of CH001 and CH003, the recorded location for both RMPS place them within the redline boundary of the proposed development. Refer to Table 12-8. However, archaeological investigations (see Section 12.3.8) indicates that these the sites are located to the east of the proposed development. Nonetheless, given the proximity of the CH001, CH004 and CH004, it is necessary to notify the Minister for Housing, Local Government and Heritage if it is intended to carry out works with their Zone of Notification. If work is intended, notice must be given in writing two months in advance, even if planning permission is not needed for the works. Works undertaken through the planning process is via a formal notification mechanism and acts as notification in accordance with Section 12 of the National Monuments Act.

Table 12-8- Record of Monuments and Places (RMPs) within the Study Area

CH ID	Type	RMP No;	Short Description	Townland
CH001	RMP	LH012-055----	Souterrain	Haynestown
CH002	RMP	LH012-101----	Ring-ditch	Haynestown
CH003	RMP	LH012-102----	Enclosure	Haynestown
CH004	RMP	LH012-116----	Habitation site	Haynestown
CH005	RMP	LH007-180----	Enclosure	Crumlin
CH006	RMP	LH012-067----	Fulacht fia	Crumlin
CH007	RMP	LH012-068----	Fulacht fia	Crumlin
CH008	RMP	LH012-079----	Souterrain	Haynestown
CH009	RMP	LH012-064004-	Burnt mound	Haynestown
CH010	RMP	LH012-064002-	Excavation - miscellaneous	Haynestown
CH011	RMP	LH012-064003-	Burnt mound	Haynestown
CH012	RMP	LH012-064001-	Excavation - miscellaneous	Haynestown
CH013	RMP	LH012-082----	Barrow - ring-barrow	Haynestown
CH014	RMP	LH012-083----	Kiln - corn-drying	Haynestown
CH015	RMP	LH012-084----	Excavation - miscellaneous	Haynestown
CH016	RMP	LH012-004----	Earthwork	Haynestown
CH017	RMP,	LH012-022---	Castle - tower house	Haynestown
CH018	RMP,	LH012-023----,	Church	Haynestown
CH019	RMP	LH012-024----	Souterrain	Haynestown
CH020	RMP	LH012-025----	Castle - motte and bailey	Haynestown
CH021	RMP	LH012-092----	Souterrain	Haynestown
CH022	RMP	LH012-118----	Ringfort-Rath	Mullagharlin
CH023	RMP	LH012-064----	Redundant record	Haynestown

National Monuments

National monuments are broken into two categories; National Monuments in the ownership or guardianship of the state and National Monuments in the ownership or guardianship of a local authority. Section 8 of the National Monuments (Amendment) Act 1954 provides for the publication of a list of monuments, the preservation, of which, are considered to be of national importance. Two months' notice must be given to the Minister for Arts, Heritage and the Gaeltacht where work is proposed to be carried out at or in relation to any National Monument.

There are no National Monuments incorporated by the study area.

Sites with Preservation Orders

The National Monuments Act 1930-2004 provide for the making of Preservation Orders and Temporary Preservation Orders in respect of National Monuments. Under Section 8 of the National Monument Act 1930 (as amended) the Minister for Culture, Heritage and the Gaeltacht, can place a Preservation Order on a monument if, in the Ministers' opinion, it is a National Monument in danger of being or is actually being destroyed, injured or removed or is falling into decay through neglect. The Preservation Order ensures that the monument shall be safeguarded from destruction, alteration, injury, or removal, by any person or persons without the written consent of the Minister.

There are no sites with preservation orders incorporated by the study area.

National museum of Ireland Topographical Finds (see Figure 12.1)

The national museum of Ireland Topographical finds database was consulted to see if there was a record of an archaeological object within the study area. The database is a representation of the distribution of archaeological objects at a local and national level, based on the Irish Antiquities Division's Collections Database. Section 2 of the 1930 National Monuments Act (amended) defines an archaeological object as (in summary) any chattel in a manufactured or partly manufactured state or an unmanufactured state but with an archaeological or historical association. This includes ancient human, animal or plant remains. The database produced two results for the study area (Table 12-9). Both finds were located in excess of 700 m outside the proposed development site.

Table 12-9- National Museum of Ireland Topographical Finds within the Study Area

CH ID	Type	No.	Short Description	Townland
CH039	NMI Finds	1977:2335-6	Earthenware Mug (:2335); Two Potsherds, Post Medieval (:2336)	Crumlin
CH040	NMI Finds	1978:129	Medieval Rimsherd	Haynestown

12.3.2 Designated Architectural Heritage Sites

In 1997 Ireland ratified the Granada Convention on architectural heritage. This provided the basis for a national commitment to the protection of the architectural heritage throughout the country. The Local Government (Planning and Development) Act 2000, and the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999, made the legislative changes necessary to provide for a strengthening of the protection of architectural heritage.

Record of Protected Structures (see Figure 12.1)

The Louth County Development Plan 2021–2027 was consulted for schedules of Protected Structures. These are buildings that a planning authority considers to be of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social, and/or technical point of view. Protected Structures receive statutory protection from injury or demolition under Section 57 (1) of the Local Government (Planning and Development) Act 2000. Protected structure status does not exclude development or alteration but requires the developer to consult with the relevant planning authority to ensure that elements which make the structure significant are not lost during development.

There are four Protected Structures within the study area. Both CH017 and CH018 are also listed as RMPs, while CH018, CH024 and CH025 are also listed in the NIAH. None of the Protected structures are located within the application boundary of the proposed development. The closest Protected Structure to the proposed development site is CH025 located approximately 50 m south of the application boundary. CH024 is located approximately 150 m NW of the application boundary, while CH017 and CH018 are located approximately 400 m south of the application boundary. Refer to Table 12-10.

Table 12-10- Record of Protected Structures within the Study Area

CH ID	Type	RPS No	Short Description	Townland
CH017	RPS	RPS no. Lhs012-027	Castle - tower house	Haynestown
CH018	RPS	RPS no. Lhs012-021,	Church	Haynestown
CH024	RPS	RPS no. LHS012-050,	House	Haynestown
CH025	RPS	RPS no. Lhs012-023	House	Haynestown

Architectural Conservation Areas

The Louth County Development Plan 2021–2027 was consulted for records relating to Architectural Conservation Areas ((hereinafter 'ACAs'). The stated objective of ACAs is to conserve and enhance the special character of the area, including traditional building stock and material finishes, spaces, streetscapes, landscape and setting.

There are no areas listed as ACAs within the study area.

National Inventory of Architectural Heritage (NIAH) (see Figure 12.1)

The National Inventory of Architectural Heritage (hereinafter the 'NIAH') is a state initiative under the administration of the Department of Culture, Heritage and the Gaeltacht and was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. Its purpose is to identify, record and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently, as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Arts, Heritage and the Gaeltacht to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

There are three structures listed in the NIAH within the study area (Table 12-11). These are also Protected Structures and CH018 is also listed as an RMP. None of the NIAH sites are located within the application boundary of the proposed development. The closest NIAH site to the proposed development site is CH025 located approximately 50 m south of the application boundary. CH024 is located approximately 150 m NW of the application boundary, while CH018 is located approximately 400 m south of the application boundary.

Table 12-11- National Inventory of Architectural Heritage (NIAH) within the Study Area

CH ID	Type	No:	Short Description	Townland
CH018	NIAH	13901215	Church	Haynestown
CH024	NIAH	13901217	House	Haynestown
CH025	NIAH	13901216	House	Haynestown

12.3.3 Undesignated Cultural Heritage site

This section deals with sites that are considered to be of cultural heritage value but which do not fall within the above categories as they are not registered. Such sites may include lime kilns, dwellings / outhouses, trackways or townland boundaries etc. identifiable on the 1st edition 6-inch/25-inch OS maps. Aerial photography from the 1995, 2000, and 2005 fly-overs was inspected, as well as the latest OSI images, Google Earth and Bing Maps satellite imagery. In addition, publicly available LiDAR data published by TII and OPW was also consulted.

Undesignated cultural heritage sites that comprise extant remains

Undesignated cultural heritage sites which comprise extant remains are typically, though not always, post-1700 in date. The majority of these sites are represented on the 6" and/or 25" Ordnance Survey maps. Many constitute country houses and associated lodges, while others may be bridges or industrial features, hollow-ways, mass rocks etc.

There are no undesignated cultural heritage sites that comprises extant remains within the study area.

Undesignated cultural heritage sites that do not comprise extant remains

Undesignated cultural heritage features which do comprise extant remains typically include features such as lime kilns, dwellings, outhouses, trackways, etc. which are identifiable on maps such as the 6" and / or 25" Ordnance Surveys but which no longer have an above-ground presence.

There are no undesignated cultural heritage sites that do not comprises extant remains within the study area.

Townland boundaries

A townland is the smallest official land unit in the country. Ireland is made up of approximately 60,000 townlands. As a result, townland boundaries are ubiquitous in the Irish countryside, and have been incorporated into the modern agricultural landscape. Many townlands predate the arrival of the Anglo Normans, and Irish historical documents consistently use townland names throughout the historic period to describe areas and locate events accurately in their geographical context. This suggests that many the boundaries of many of these territorial units preserve landscape divisions from the medieval period and perhaps earlier. The townland names and boundaries were standardised in the nineteenth century when the Ordnance Survey began to produce large-scale maps of the country. Research into the name of these land units frequently provides information relating to its archaeology, history, folklore, ownership, topography or land use.

The proposed development does not cross or overlie any townland boundaries.

12.3.4 Areas of Archaeological Potential

Analysis of historic mapping (see Section 12.3.7 below) does not reveal any previously unrecorded areas of archaeological potential within the proposed development area based on topographical or historical indicators. However, two area of archaeological potential have been identified based on excavated evidence.

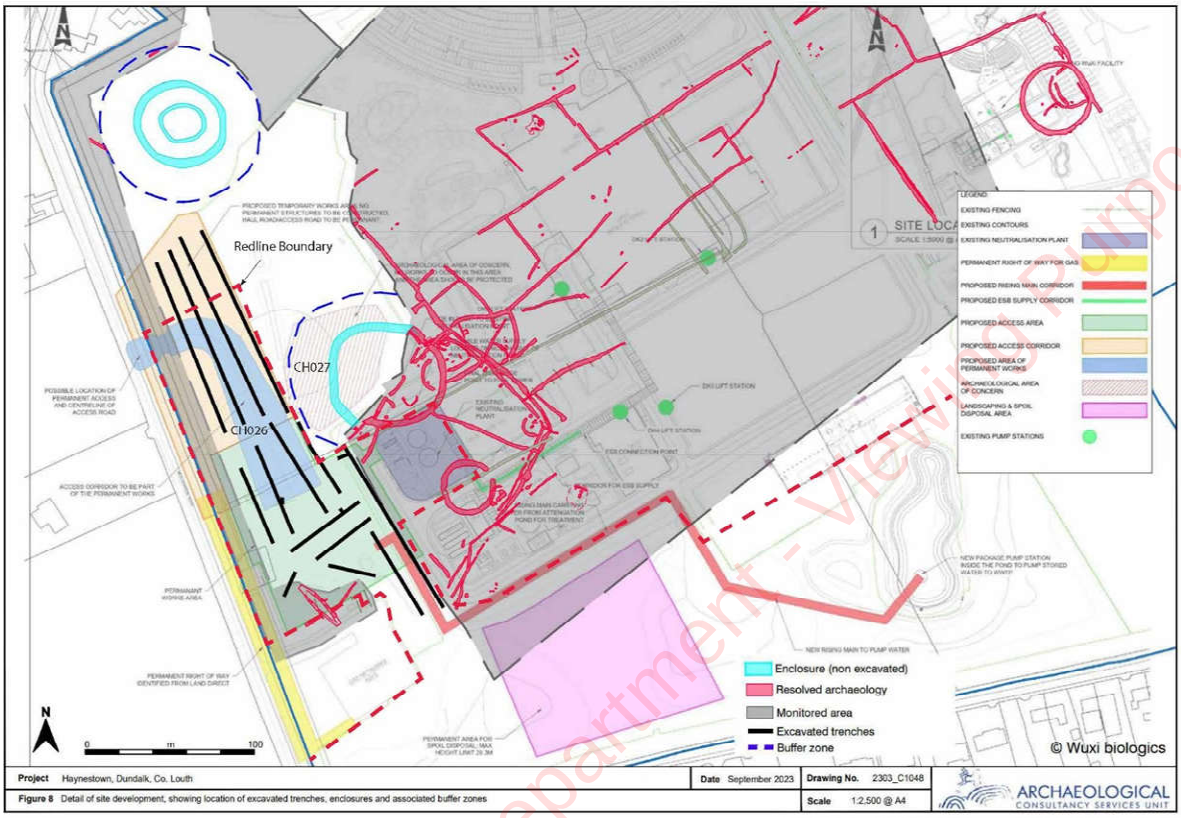


Figure 12.2 - Locations of CH026 (inside the redline boundary) and CH027 (immediately adjacent and to the east of the redline boundary

CH026 represents the entirety of the area within of the application boundary that has not been previously disturbed. Preceding archaeological test-trenching was undertaken by Donald Murphy of Archaeological Consultancy Services Unit Ltd (2023) at the request of the client to assess the archaeological potential of the site, following a preceding geophysical survey carried out in May 2021 under licence number 23R0044. The test trenching was conducted between the 31st July to 8th August 2023 (Licence no. 23E0452). Archaeological test trenching succeeded in identifying the remains of at least 31 individual features. These were dominated by pits and linear ditches.

CH027 represents 'an area of archaeological concern' identified during the preceding geophysical survey (23R0044) which abuts the proposed development site. Part of this area has previously been subject to archaeological investigations in 2004, 2007, 2008, 2014 and 2019-2020. Monuments identified during these investigations included a prehistoric enclosure, burials/cremation pits of the Bronze Age and Iron Age and two early medieval enclosures with associated features, including souterrains, kilns, pits, posts, and field systems, as well as causeway/trackway were exposed and excavated. Refer to Table 12-12.

Table 12-12- Areas of Archaeological Potential within the Study Area

CH ID	Type	No	Short Description	Townland
CH026	AAP	AAP01	The development site as a whole is regarded as an area of archaeological potential.	Haynestown
CH027	AAP	AAP02	Area of Archaeological concern previously identified to the east of the proposed development.	Haynestown

12.3.5 Archaeological and Historical Context (after Stirland 2021)

Prehistoric Period

Prehistoric activity is well represented within the study area. While there is evidence of Mesolithic activity in Co. Louth in the form of several shell middens excavated at Rockmarshall in the 1940s, there is currently no proof of such activity in the study area (Stirland 2021,3). The earliest evidence of prehistoric activity in the study area dates to the Neolithic period. This is indicated by a Late Neolithic habitation site (CH004) which was found and excavated in advance of an Above Ground Installation for Bórd Gais Networks (McLoughlin 2014). This site is located 20m outside and to the west of the boundary of the proposed development. Other evidence of Neolithic activity was produced by the excavations carried out under Licence No. 19E0060 by ACSU in 2019 (CH030 located 125 m NE of the proposed development site). During the excavations, a Neolithic enclosure and pits containing Neolithic pottery were discovered. The Neolithic enclosure also produced evidence of continued use in the Chalcolithic and Bronze Age period (Stirland 2021, ii).

There is abundant evidence of Bronze Age activity within the study area including four burnt mounds (CH006-CH007,CH009, CH011 – all located greater than 500 m north of the proposed development site) located to the north of the proposed development. Further evidence of Bronze Age activity was produced by the 2019/2020 excavation. This included a possible Bronze Age field system, human cremations and three burnt spreads (Stirland 2021, ii). In addition, evidence of Iron Age activity is shown by an excavated ring-barrow (CH013 – located approximately 500 m north of the proposed development site) which has been dated to this period. Finally, other evidence of prehistoric activity could be indicated by an earthwork (CH016 – 400 m north of the proposed development site) and a ring ditch (CH002 located 75 m north of the proposed development site) identified through aerial photography.

Medieval Period (AD 400-1540)

Early medieval settlement is represented by a ringfort (CH022) located 750 m to the north-west of the proposed development. Ringforts are the most common field monument within the Irish landscape. A ringfort is a space surrounded by an earthen bank formed of material thrown up from a fosse or ditch located immediately outside the earthen bank. Generally, ringforts vary in size from 25–50 metres in diameter and are usually circular in plan but can also be oval or D-shaped. Some have more than one bank and ditch, but such examples are rarer than the simpler type. These structures were erected as protective enclosures around farmsteads, mainly during the Early Medieval period (c.AD 500–1100) (Stirland 2021, 2).

In addition, CH003, one of the two enclosures located adjacent to but outside the proposed development area was interpretated as an early medieval ringfort/enclosure as a result of the excavations carried out in 2019/2020.

The southern extent of the enclosure was excavated while the northern extent remains *in situ.* The previous excavation produced evidence of a field system, annexes and two souterrains associated with this enclosure. One of the two souterrains is thought to be the recorded souterrain LH012-055 (CH001) (Murphy 2023, 6). There are three other recorded souterrains within the study area. Souterrains (or underground passage) are one of the most frequent field monuments found within this area of County Louth. There are over 300 known souterrains in Louth, with over half of these being found between the Castletown and Fane Rivers (Stirland 2021,5). Souterrains are early medieval monuments, often found in association with ringforts but can be found in apparent isolation. The term souterrain is antiquarian in origin and comes from the French *sous* (tr. under) *terre* (tr. ground) (Power and Lane *et al* 2000, 367). Souterrains are 'artificial underground structures cut into bedrock or, more commonly, built into dug-out trenches with drystone walling and large stone lintels' (Stirland 2021,3). The extent of souterrains varies with some examples being short and simple structures while others are more complex, extending for many meters and leading to several underground chambers. Souterrains were entered through narrow openings which were often concealed, and it is believed that some souterrains were used as places of refuge during times of attack. However, their primary function was for food storage as they maintain a constant temperature (c.10°c) (*ibid*). A common myth surrounding souterrains is that they are tunnels linking one place with another, but all recorded souterrains so far have been self-contained, usually with a single entrance. Due to their concealed nature, souterrains are often found discovered unexpectedly during activities such as silage cutting, ploughing, and quarrying (Power and Lane *et al* 2000, 367). Other monuments that indicate early medieval activity include a corn drying kiln (CH014) located to the north of the proposed development. The 2019/2020 also produced evidence of multiple other cereal drying kilns within the study area (Stirland 2021, iv).

During the early medieval period, the study area was part of the territory of the Uí Chonaill Mhuirthemne in the last few centuries of the first millennium AD. They had close contact with the Ulidian kingdoms of Antrim and Down. This is reflected in the distribution of souterrain ware, a type of pottery usually found in Antrim and Down but now being increasingly discovered from settlement sites in north Louth during excavation. The southern half of Louth was the sub-kingdom of the Fir Arda in the later Early Medieval period. There are few souterrains found in this area, suggesting that they had a stable kingdom which was not along the "buffer zone" of inter-tribal warfare (Stirland 2021, 3).

The 12th century witnessed the conquest of Ireland by the Anglo-Normans. According to the documentary evidence, the Anglo-Normans did not begin colonising this area until after 1185. The initial Anglo-Norman settlement in north Louth was probably centred around mottes, which were fortified outposts that provided a measure of security to the new landowners (Stirland 2021, 4). The mottes were a very steep-sided mound of earth with a flat top where wooden tower and palisade would have been located. Often there was an enclosure called a bailey attached to the motte, which would have contained houses and other structures (*ibid*, 156). There is one example of motte and bailey (CH020) within the study area, located to south of the proposed development in Haynestown.

The most prominent motte in north Louth, both in terms of its size and location, is Castletown Mount located on the summit of Castletown ridge. This earthwork was built between 1185 and 1190 by Bertram de Verdon. Castletown was also the headquarters of the de Verdons until the construction of Castleroche in the 1230s (Stirland 2021, 4). There is evidence of settlement at this site from before the Anglo-Normans. This is indicated by the presence of a souterrain beneath the earthwork suggesting here in the latter half of the first millennium AD. The earthwork is also commonly equated with the site of Dún Dealgan (Dundalk). Literary references connect it with the early manuscript versions of the Ulster Cycle stories. In the story Mesca Ulad ('the intoxication of the Ulstermen'), Dún Dealgan is described as one of the chief places of assembly in Ulster at the feast of Samhain. Within this story, it is portrayed as equal in status to Dún da Bend and second only to Emain Macha (i.e., Navan Fort, Armagh) (*ibid*, 3).

There is also a tower house (CH017) located to the south of the proposed development. Tower house were built between in the fifteenth and sixteenth centuries (Stout and Stout 1997, 57-58). They were usually three-storey

buildings built in an international style, but they developed architectural characteristics which were essentially Irish (Stirland 2021, 2).

Post Medieval (AD 1600-1900)

In the 19th century, the Clermont Demesne dominated the landscape of the study area. The 6-inch and 25-inch map shows the extent of the estate in the 19th century. It covered much of the southern half of Haynestown estate, and extended east into Haggardstown. It was owned by the Fortesques of Dromiskin, who were one of the most important landholders in Louth, having built up their landholdings from the early 17th Century. During the 18th Century they continued to acquire land in Louth and elsewhere. In 1777, William Henry Fortescue was made Earl of Clermont (Stirland 2021, 6). A gate lodge (CH025) associated with the demesne is located to south of the proposed development.

The middle of 19th century also saw the construction of the railway between Drogheda and Dundalk, which opened in February 1849 (Mulligan 1983, 89). This railway runs north-east through the study area, to the west of the proposed development.

Dundalk Town

The study area is situated south of Dundalk, which marked the northernmost limit of Anglo-Norman settlement and administration in Ireland. Therefore, the study area lies within the boundary of the Pale (Stirland 2021, 2). Dundalk town was founded during the early thirteenth century. There was earlier twelfth-century settlement focused around St. Leonard's Priory and the hospital in Seatown. However, Dundalk would have been a key point within the landscape since the medieval period. For instance, the town was the site of a marketplace in the medieval period, which was focused in Church Street area where the 13th century market cross once stood. It also had a number of other marketplaces since the 17th century, such as Market Square, Roden Place and the Fairgreen (Stirland 2021,4).

A key feature of the medieval town was one long street, which was laid out in the 13th century. This is now divided into Bridge Street, Church Street and Clanbrassil Street. The properties within the medieval town were 'laid out in the burgage plot system set at right angles to the main street and extending as far as the town defences' (Stirland 2021, 4). Evidence from documentary sources, including the late 14th century town charter indicate that each burgage plot in the town was connected to a plot of agricultural land in the liberties outside the town walls. The medieval town was divided into quarters. For example, the present Bridge Street, Linenhall Street, John Street, Nicholas Street, Wolfe Tone Terrace and Church Street are all located within the north quarter (*ibid,* 4).

The Urban Archaeological Survey of Dundalk has identified numerous buildings that existed in the northern area of the medieval town. For example, Church Street contained an array of significant medieval buildings though none presently survive. These included three fortified houses or urban tower houses, the tholsel or sessions house, and St. Nicholas's Church of Ireland church and graveyard. The church is first mentioned in the 13th century, although little remains of the medieval church. It lies to the south of Dundalk's oldest and best documented tower house, known as Dowdall's Castle. Dowdall's Castle is first mentioned in 1443 as standing on the east side of Church Street and a little to the north of St. Nicholas's Church (Stirland 2021, 4).

12.3.6 Toponomy of townland/s

The Irish landscape is divided into approximately 60,000 townlands and the system of landholding is unique in Western Europe for its scale and antiquity. Many townlands predate the arrival of the Anglo Normans, and Irish historical documents consistently use townland names throughout the historic period to describe areas and locate events accurately in their geographical context. The townland names and boundaries were standardised

in the nineteenth century when the Ordnance Survey began to produce large-scale maps of the country. The original Irish names were eventually anglicised to varying degrees, depending in part upon the linguistic skills of the surveyors and recorders. A study of the townland names can provide information on aspects of cultural heritage including descriptions of the use of the landscape by man and the potential presence of archaeological or cultural heritage sites or features (see Table 12-13).

Table 12-13- Townlands within the Study Area

English Name	Irish Name	Glossary
Haynestown	*Baile Héine*	the town of Héin; the wretched town
Crumlin	*Cromghlinn*	Glen
Mullagharlin	*Mullaigh Chairlinn*	Carlin's summit or hill top

12.3.7 Cartographic Evidence

First Edition Ordnance Survey 6-inch Series (1838) (see Figure 12.2)

This map shows the proposed development site within two agricultural fields. There are no structures or features of cultural heritage significance depicted within the development area. A tree lined road (now known as Marlbog road) borders the southern limit of the proposed development site. This road meets a cross roads, where another tree-lined road runs in a north-west direction off Marlbog road, following the western border of the two fields.

On the south side of Marlbog road, the map shows Clermont Demesne, which is an extensive estate covering a large portion of the townland of Haynestown, and extends east into Haggardstown townland. The estate was owned by Fortesques of Dromiskin, who were one of the major landowners in Louth in the 19th century (Stirland 2021, 6). From the crossroads, there is a laneway running south-east to Clermont Demesne.

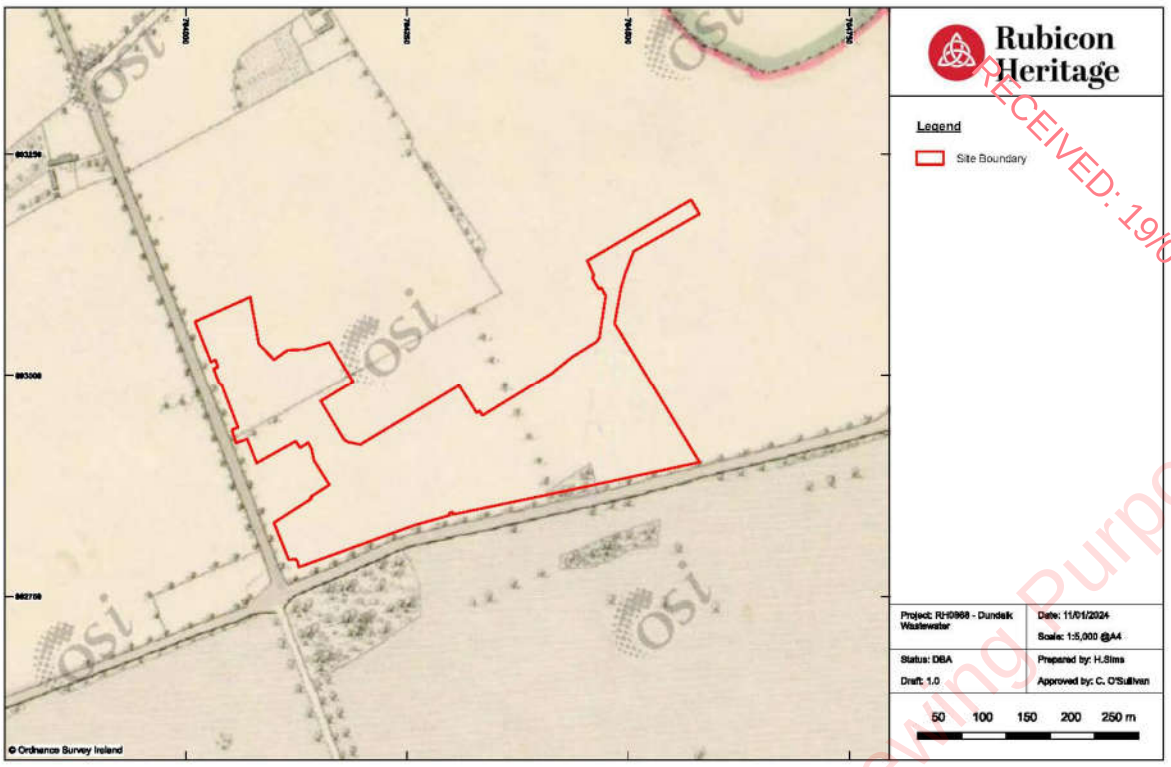


Figure 12.3 - First Edition 6-inch Ordnance Survey map

Ordnance Survey 25-inch Series (1909)

This map shows changes to the field boundaries within the study area. There are still no structures or features of cultural heritage significance depicted within the development area. Clermont Demesne is still shown on the map to the south of the proposed development. The map depicts the gate lodge (CH025) associated with the demesne, and built in 1820. It is located on the east side of the laneway which runs into the demesne. The lodge is a protected structure, and still stands today.

One of the most significant changes to the landscape since the publication of the earlier map is the Great Northern Railway. The railway is located to the west of the proposed development site, and runs in a north-east direction to Dundalk town. This section of railway connected Drogheda to Dundalk and was opened in February 1849 (Mulligan 1983, 89). It became known as the Great Northern railway at the end of the 19th century (*ibid*, 91).

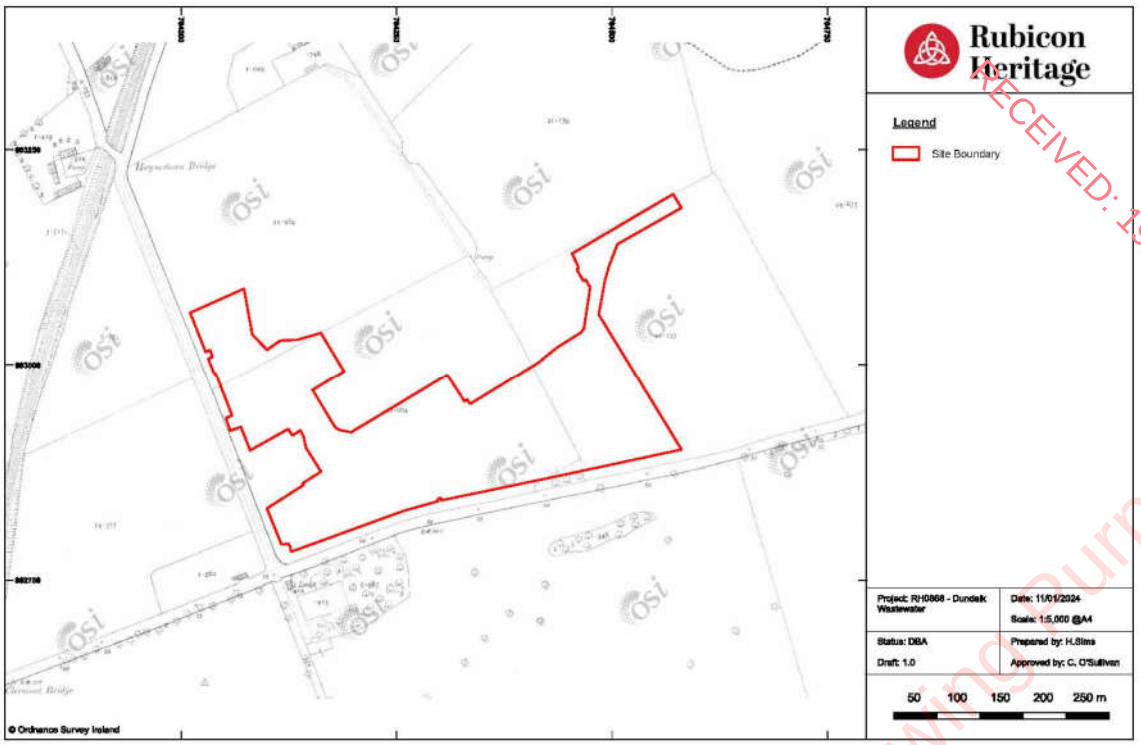


Figure 12.4 - First Edition 25-inch Ordnance Survey map

Ordnance Survey Cassini 6-inch Series Map (1940)

This map does not show significant changes from the previous editions map. No structures are depicted within the proposed development area.

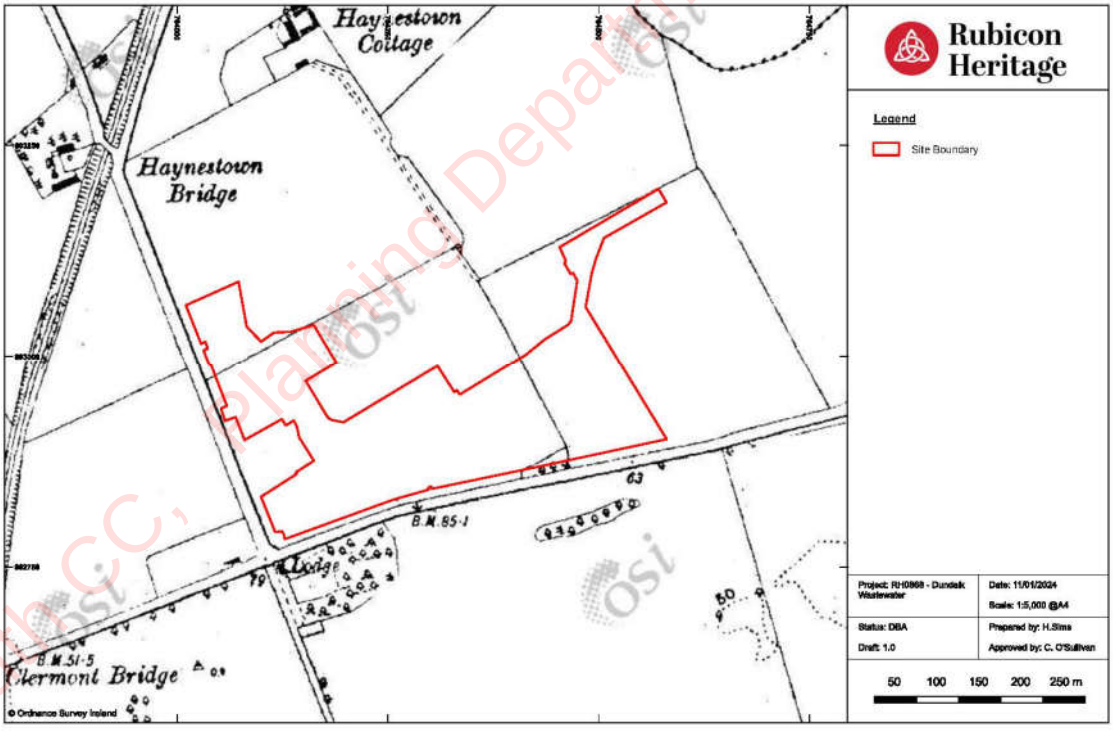


Figure 12.5 - Cassini Edition 6-inch Ordnance Survey map

12.3.8 Recent Excavations

Several archaeological investigations have been undertaken at adjacent sites. The Excavations Bulletin is an annual account of all excavations carried out under license. The database is available online at www.excavations.ie and includes excavations from 1985 to 2023. This database was consulted as part of the desktop research for this report to establish if any archaeological investigations had been carried out within the study area. The database produced 11no. results for archaeological excavations undertaken within the study area. Refer to Table 12-14.

The most relevant excavation (CH029) is the programme of test trenching carried out in summer 2023 by Donald Murphy of ASCU (Licence No. 23E0452) in advance of the proposed Effluent Balancing and Resource Recovery System. The test trenching was carried out within the proposed development site and produced evidence of 31no. features including 15no. pits and 10no. linear features. Some of the 15no. pits were found in isolated locations, while other showed evidence of irregular clustering. The features also included 2no. possible postholes, a hearth, and a metalled surface (Murphy 2023, 9).

Another pertinent excavation (CH030) is that carried out by ACSU between 2019/2020 under Licence No. 19E0060. It took place in the lands immediately adjacent to proposed development site, on the east and north sides. This excavation revealed a multi-phase prehistoric and Early medieval landscape. The earliest evidence produced from the excavation is Neolithic in date and included a Neolithic enclosure, and pits (Stirland 2021, ii). There is abundant evidence of settlement continuing during the Chalcolithic and Bronze age periods with some minor evidence of Iron Age activity occurring (*ibid*, iii). The vast majority of what was found was Early Medieval in date, and included early medieval ringforts/enclosures, one of which is the recorded enclosure, LH012-102 (CH003). The excavations also produced evidence of multiple figure of eight cereal drying kilns, many of which were concentrated near the enclosure CH003 (Stirland 2021, iv). The work also revealed a complex field system, of which a small percentage had its origin in the Bronze Age. For example, Bronze age pottery was found in one the of centrally located field boundaries. However, the field system was developed and added to the during the Early Medieval period. In fact, the development of the field system seems to be closely associated with the development of the enclosures/ringforts (*ibid*, iii).

The results of the 2023 testing have suggested that several of the features found during the 2019/2020 excavations continue into the proposed development site. For example, the evidence suggests that the Early Medieval field system found during the 2019/2020 excavations is also present within the proposed development site, and is likely just as extensive. Furthermore, the test trenching also revealed a new section of a linear metaled trackway seen in the 2019/2020 excavations (Murphy 2023, 17). The evidence from both recent excavations indicates the rich archaeological landscape within the proposed development site.

Table 12-14- Previous Excavations within the Study Area

CH ID	Excavation No:	Type	Short Description	Townland
CH028	04E0876	Archaeological Excavation	Early Christian? and post-medieval	Haynestown
CH029	23E0452	Archaeological Excavation	Test Trenching revealed 31 archaeological features	Haynestown

CH ID	Excavation No:	Type	Short Description	Townland
CH030	19E0060	Archaeological Excavation	Multi-phase prehistoric and Early Medieval landscape	Haynestown
CH031	14E0027	Archaeological Excavation	Late Neolithic pits	Haynestown
CH032	93E0098	Archaeological Excavation	Kiln - corn-drying and Barrow - ring-barrow	Haynestown
CH033	2006:1386	Archaeological Excavation	Corn-drying kiln and spread	Mullagharlin
CH034	99E0430	Archaeological Excavation	*Fulacht fia*	Crumlin
CH035	99E0430	Archaeological Excavation	*Fulacht fia*	Crumlin
CH036	99E0430	Archaeological Excavation	No archaeological significance	Crumlin
CH037	08E0486	Archaeological Excavation	Souterrain and enclosure	Haynestown
CH038	1992:139	Archaeological Excavation	Souterrain	Haynestown

12.4 Potential Effects on Cultural Heritage during Construction Phase

Most impacts during construction phase are likely to be direct impacts as a result of subsurface disturbance or construction works. Direct impact refers to a 'physical impact' on a monument or site. The construction phase of the development consists largely of earthmoving activities. All impacts at this phase are considered to be negative and permanent. The CH sites which may be impacted upon are summarised in Table 12-15.

The development will require ground reduction for the construction of a new Effluent Balancing and Resource Recovery System, with associated pump station and rising main. The ground reduction required to facilitate construction will have a direct impact on the archaeological features revealed during the test trenching (CH029) carried out in July to August 2023. The evidence from the test trenching and previous excavations indicates the archaeological potential of the site, and the further possibility of additional subsurface features (CH026). The proposed development will have a direct impact on the potential subsurface archaeology CH026.

The proposed development will also include groundworks for the construction of the new permanent access road from Mullagharlin road to the Effluent Balancing and Resource Recovery System, which will be used during the construction of the plant. The construction work associated with the road will have a direct impact on the archaeological features discovered during testing (CH029), and any unknown potential archaeology (CH026).

The redline boundary of the proposed development crosses the Zone of Notification for three RMPS; a souterrain (CH001), an enclosure (CH003) and habitation site (CH004). In the case of CH001 and CH003, the recorded location for both RMPS place them within the redline boundary of the proposed development. However, archaeological investigations carried out by ACSU in 2019 (Licence No. 19E0060) indicates that these the sites are located to the east of the proposed development (Murphy 2023,7). Nonetheless, given the proximity of the CH001, CH004 and CH004, it is necessary to notify the Minister for Housing, Local Government and

Heritage if it is intended to carry out works with their Zone of Notification. If work is intended, notice must be given in writing two months in advance, even if planning permission is not needed for the works. Works undertaken through the planning process is via a formal notification mechanism and acts as notification in accordance with Section 12 of the National Monuments Act.

Table 12-15- Summary of Impacts and Impact Magnitude Prior to Mitigation

CH No.	Site	Impact type	Construction Phase Impact	Magnitude of Impact Prior to Implementation of Mitigation Measures	Baseline Value	Significance Level of Impact Prior to Implementation of Mitigation Measures
CH001	Souterrain	Direct	Zone of Notification crossed by redline boundary of the proposed development. Potential subsurface archaeology associated with the monument may be impacted by the ground reduction	Major	Very High	Significant
CH003	Enclosure	Direct	Zone of Notification crossed by redline boundary of the proposed development. Potential subsurface archaeology associated with the monument may be impacted by the ground reduction	Major	Very High	Significant
CH004	Habitation site	Direct	Zone of Notification crossed by redline boundary of the proposed development. Potential subsurface archaeology associated with the monument may be impacted by the ground reduction	Major	Very High	Significant
CH026; CH029	AAP	Direct	Subsurface archaeology will be directly impacted by the ground reduction and other groundworks associated with the construction of Effluent Balancing and Resource Recovery System, and associated access road	Major	High	Significant
CH027	AAP	Direct	Subsurface archaeology may be directly impacted by construction traffic	Major	High	Significant

12.5 Potential Effects on Cultural Heritage during Operational Phase

Subject to the implementation of the appropriate archaeological mitigation measures during the construction phase of the development, no impacts on archaeological, architectural or cultural heritage are anticipated during the operational phase of this proposed development.

12.6 Do Nothing Scenario

The 'do-nothing' scenario seeks to describe the consequences that are reasonably likely to occur without the proposed development. If the proposed development was not to proceed, no potential impact to the Archaeological, Architectural or Cultural Heritage would occur.

12.7 Cumulative Effects

Cumulative effect is defined as 'The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects' (EPA 2022). Cumulative impacts encompass the combined effects of multiple developments or activities on a range of receptors. In this case the receptors are the archaeological monuments and architectural/cultural heritage sites in the immediate vicinity of the proposed development. Cumulative effects at the construction and operational stages are considered.

The proposed development site for the Effluent Balancing and Resource Recovery System is located in the southwest portion of an existing biopharmaceutical facility, WuXi Biologics Dundalk. The proposed development will see the proposed development Effluent Balancing and Resource Recovery System located to the west of the existing WuXi Biologics biopharmaceutical facility. The construction phase of the proposed development will have a direct impact on the subsurface archaeological features highlighted by the test trenching carried out in 2023, as well as additional potential subsurface archaeology which was not picked up through testing. The rich archaeological potential of this area was demonstrated through the results of previous excavations, in particular the excavations carried under Licence No. 19E0060 (CH030). Hence, the evidence suggests that there is a strong potential of subsurface archaeology being impacted during the construction phase. However, given the subsurface nature of potential archaeology, the potential to excavate this site through the construction phase will provide data to the archaeological community from the potential subsurface sites. The potential to gain knowledge outweighs the negative impact. Furthermore, the implementation of mitigation measures for the proposed development will ensure that the cumulative effect is neutral and not significant.

Subject to the implementation of the appropriate archaeological mitigation measures during the construction phase of the development, no residual cumulative impacts on archaeological, architectural and cultural heritage are predicted.

12.8 Mitigation Measures

The mitigation strategies outlined in this section detail the techniques to be adopted in order to ameliorate the impacts that the proposed development may have on features of archaeological, architectural and/or cultural heritage within the study area during both the construction and operational phases of the development. The residual impacts that will remain once these mitigation measures have been implemented as identified in Section 12.7.

The following mitigation measures proposed are subject to approval by the Louth County Council, the National Monuments Service of the Department of Housing, Local Government and Heritage.

The current policy of the Minister for Housing, Local Government and Heritage is that preservation *in situ* of archaeological material is the preferred option. Where this cannot be achieved then a programme of full archaeological excavation should be implemented to ensure the preservation by record of all affected archaeological material.

The redline boundary of the proposed development crosses the Zone of Notification for three RMPS; a souterrain (CH001), an enclosure (CH003) and habitation site (CH004). In the case of CH001 and CH003, the recorded location for both RMPS place them within the redline boundary of the proposed development. However, archaeological investigations carried out by ACSU in 2019 (Licence No. 19E0060) indicates that these sites are located to the east of the proposed development (Murphy 2023,7).

CH026 represents the entirety of the area within of the application boundary that has not been previously disturbed. Preceding archaeological test-trenching was undertaken by Donald Murphy of Archaeological Consultancy Services Unit Ltd (2023) at the request of the client to assess the archaeological potential of the site, following a preceding geophysical survey carried out in May 2021 under licence number 23R0044. The test trenching was conducted between the 31st July to 8th August 2023 (CH029: Licence no. 23E0452). Archaeological test trenching succeeded in identifying the remains of at least 31 individual features. These were dominated by pits and linear ditches.

CH027 represents 'an area of archaeological concern' identified during the preceding geophysical survey (23R0044) which abuts the proposed development site. Part of this area has previously been subject to archaeological investigations in 2004, 2007, 2008, 2014 and 2019-2020. Monuments identified during these investigations included a prehistoric enclosure, burials/cremation pits of the Bronze Age and Iron Age and two early medieval enclosures with associated features, including souterrains, kilns, pits, posts, and field systems, as well as causeway/trackway were exposed and excavated.

The following mitigation measures are recommended:

1. The preceding archaeological assessment identified the presence of archaeological remains within the redline boundary. Thirty-one features identified included 10 linear deposits, 15 pits identified in isolated locations, 2 possible postholes, a hearth, and a metalled surface. As preservation *in-situ* is not possible, it is recommended that all archaeological features impacted by the proposed development are stripped of topsoil under archaeological supervision and preserved by record (archaeological excavation) in advance of construction.

2. A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site *in situ*, where possible. Where preservation *in situ* cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.

3. The 'Area of Archaeological Concern' (CH027) identified in the preceding geophysical survey and located immediately adjacent to the proposed development site application boundary, should entirely

excluded, fenced off, and protected from all development traffic or other potential impacts from the development for the duration of the construction phase.

4. The results of any archaeological test testing, surveys and/or excavation will be submitted in a report to the Local Authority, the Heritage and Planning Division, Department of Housing, Local Government and Heritage and the National Museum of Ireland.

Please note all recommendations are subject to the approval of the Louth County Council and the National Monuments Service, Department of Housing, Local Government and Heritage.

12.9 Residual Effects

Table 12-16 below summarises the impacts and impact magnitude after implementation of mitigation for the proposed development.

Table 12-16- Summary of impacts and impact magnitude after implementation of mitigation

CH No	Phase	Effect type	Mitigation Measures	Magnitude of Impact after Implementation of Mitigation Measures
CH001	Construction	Direct	A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site in situ, where possible. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.	Moderate
CH003	Construction	Direct	A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National	Moderate

CH No	Phase	Effect type	Mitigation Measures	Magnitude of Impact after Implementation of Mitigation Measures
			Monuments Service to preserve the site in situ, where possible. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.	
CH004	Construction	Direct	A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site in situ, where possible. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.	Moderate
CH026	Construction	Direct	The preceding archaeological assessment identified the presence of archaeological remains within the application boundary Thirty-one features identified included 10 linear deposits, 15 pits identified in isolated locations, 2 possible postholes, a hearth, and a metalled surface. As preservation in-situ is not possible, it is recommended that all archaeological features impacted by the proposed development are stripped of topsoil under archaeological supervision and preserved by record (archaeological excavation) in advance of construction. A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued	Moderate

CH No	Phase	Effect type	Mitigation Measures	Magnitude of Impact after Implementation of Mitigation Measures
			by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site in situ, where possible. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.	
CH029	Construction	Direct	The preceding archaeological assessment identified the presence of archaeological remains within the application boundary Thirty-one features identified included 10 linear deposits, 15 pits identified in isolated locations, 2 possible postholes, a hearth, and a metalled surface. As preservation in-situ is not possible, it is recommended that all archaeological features impacted by the proposed development are stripped of topsoil under archaeological supervision and preserved by record (archaeological excavation) in advance of construction. A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site in situ, where possible. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.	Moderate

CH No	Phase	Effect type	Mitigation Measures	Magnitude of Impact after Implementation of Mitigation Measures
CH027	Construction	Direct	The 'Area of Archaeological Concern' (CH027) identified in the preceding geophysical survey and located immediately adjacent to the proposed development site application boundary, should entirely excluded, fenced off, and protected from all development traffic or other potential impacts from the development for the duration of the construction phase.	Negligible

12.10 Monitoring Requirements

A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site in situ, where possible. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.

12.11 Interaction with other Environmental Attributes

This section will assess how the cultural heritage interacts with other environmental attributes. The attribute of particular relevance is landscape setting and visual amenity. None of the archaeology within the vicinity of the proposed development have above ground surviving elements. The closest site to the proposed development is the enclosure (CH003) of which the southern side was excavated in 2019. The northern side is still extant but does not survive above ground. Sites which have no above ground surviving elements are not currently visual amenities and so are not considered in terms of an amenity impact. The archaeological and architectural heritage sites that do above ground surviving are located at such a distance that the proposed development will not have visual impact on the sites. In can therefore be concluded that here will be no significant visual impact on the amenity associated with any CH features from the proposed development.

12.12 Difficulties encountered during preparation of this chapter

No difficulties were encountered during preparation of this chapter.

12.13 Risk of Major Accidents and/or Disasters

No risk of major accidents and/or disasters is anticipated.

13. Material Assets

13.1 Introduction

According to relevant EPA guidance (EPA, 2022) the following topics warrant consideration under material assets:

- Built Services;
- Roads and Traffic; and
- Waste Management.

Roads and traffic have been assessed separately as part of this EIAR. Refer to Chapter 9 – Traffic. Therefore, this chapter identifies, describes and assesses the likely significant effects on material assets serving the proposed development specifically in relation to existing and proposed built services (i.e., foul sewerage, surface water drainage, water supply, gas, electricity, and telecommunications utilities), and waste management; both of which are assessed separately within this section.

This section was prepared by AtkinsRéalis .

13.2 Built Services

13.2.1 Assessment Methodology

The methodology used to prepare this section of the EIAR is in accordance with the EPA '*Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)'* (2022). The study area for assessment of built services is the redline boundary of the proposed development depicted in Figure 1.2. The following sources have been used to collate information on built services within the proposed development:

- Proposed Red Line Boundary, drawing ref: 1011-000121-FGCL-XX-XX-DR-C-1001A_P03 (Murphys, FGCL, 2024);
- Existing utilities, drawing ref: ATK-WuXi-SK-0007 (AtkinsRéalis, 2024);
- Surface water runoff, foul drainage discharge and water supply requirements have also been designed in accordance with the following guidelines / policies:
- Greater Dublin Strategic Drainage Study (GDSDS, 2005) Volume 2 – New Developments
- CIRIA C697 (2007), The SuDS Manual V6; and,
- Uisce Éireann's Code of Practices and Technical Standards (IW-CDS-5030-03 & IW-TEC-800).

13.2.2 Receiving Environment

The site is located within Louth County Council (LCC) and entirely on land owned by WuXi Biologics. The proposed site is located within a vegetated / grassland area within the existing WuXi Biologics IED Licence

Facility (Ref. No. P1122-01). The site is bounded to the north and east by the existing operational WuXi Biologics Facility, to the west by Mullagharlin road, residential dwellings and agricultural land, and to the south by Marlbog Road, residential dwellings and agricultural land.

A combined set of all underground services in the general vicinity of the proposed development is presented in the planning drawings submitted to support this planning application.

13.2.2.1 Storm Water Drainage

Existing surface water drainage infrastructure is presented on the planning drawings submitted to support this planning application (DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1003). Existing surface water infrastructure is located within the red line boundary along the existing internal access roads. Surface water run-off from the existing facility is currently attenuated, with existing hydrocarbon interceptors in place along the drainage system to remove potential residual contaminants from storm water run-off across the site. All storm water drainage from the existing facility goes to the attenuation pond on site before discharge via SW-1 in line with the IED licence requirements.

13.2.2.2 Process Wastewater

Processed wastewater arising from the process is collected and pH corrected before discharge to SE-1 as per the IED licence and is directed by the IDA network and pump station to Dundalk Wastewater Treatment Plant (WwTP).

13.2.2.3 Foul Water Drainage

The existing foul drainage network discharges, via SE-1 to the Dundalk WwTP. Foul services have been identified to the east of the proposed development, along the internal access road as shown on the planning drawings submitted to support this planning application (DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1003).

13.2.2.4 Water Supply & Distribution

There is a 200mm watermain located within the red line boundary running along the western boundary of the proposed development adjacent the existing internal access road. Refer to the planning drawings submitted to support this planning application (DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1003).

13.2.2.5 ESB Supply

An existing ESB cable is located within the red line boundary to the west of the site. An existing ESB duct has also been identified within the red line boundary along the western boundary of the existing internal access road, i.e. along the eastern boundary of the proposed development. An existing electrical manhole is located within the red line boundary to the east. Refer to planning drawings submitted to support this planning application (DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1003).

13.2.2.6 Gas Supply

There is a Gas Network Ireland (GNI) substation; Haynestown AGI, located adjacent to the proposed development to the south. There is an existing gas line located within the red line boundary at the southern and western boundaries of the proposed development. Refer to the planning drawings submitted to support this planning application (DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1003).

13.2.2.7 Firemains

An existing 300mm firemain is located within the red line boundary running along the western boundary of the proposed development adjacent the existing internal access road. Fire hydrants have been identified at 2no. locations along the existing internal access road indicated on the planning drawings submitted to support this planning application (DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1003).

13.2.2.8 Lighting

Existing lighting ducts have been identified along the existing internal access roads and within the vicinity of the existing facility, as well as a number of lighting poles. Refer to the planning drawings submitted (DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1003) for further details.

13.2.2.9 Communications Utilities

No communications utilities have been identified within the proposed development.

13.2.2.10 Sources of Energy for Existing Facility – P1122-01

The main source of energy to the existing facility is electricity from the national grid.

There are 3no. emergency diesel generators onsite. As per the existing IED licence these will be operated for more than 500 hours annually as a rolling average over 3-years period. The 3no. emergency diesel generators are currently in the process of being converted to Hydrotreated Vegetable Oil (HVO).

There are 3no. steam boilers onsite. As per the IED licence, operation of the stream boilers on light fuel oil (LFO) will be limited to a maximum of 500 hours per annum.

13.2.3 Impact Assessment

13.2.3.1 Characteristics of the proposed development

A detailed description of the proposed development is presented in Chapter 2 - Project Description. To identify, describe and assess the likely significant effects from the proposed development, the characteristics of the proposed built services / utilities are considered, as summarised below.

13.2.3.2 Surface Water / Storm Water Drainage

The proposed design includes a separate stormwater network which will discharge to the existing WuXi stormwater network which includes silt traps, interceptors and attenuation to green field rates. The flows from the proposed development will be attenuated to the calculated QBar value. Outfall, from the Wuxi Biologics facility drainage network, is via SW-1 which connects to local sewer and then Dundalk WwTP. No surface water is discharged to a watercourse, it is all contained within the existing drainage system. The proposed design includes a rainwater harvesting system which will feed the proposed WC's as well as washdown facilities for use of cleaning down the tanks etc.

The existing attenuation pond capacity is 2403m^3. The attenuation pond has existing hydrocarbon interceptors, flow control and emergency storage for the existing site infrastructure surface water run-off. The existing attenuation pond serves the entire campus for the purpose of SuDS. It captures the existing stormwater runoff from the site and stores it. The stored water is then slowly released back to the external environment at the

calculated greenfield runoff rate i.e. the rate of discharge if there was no development there. There is currently no treatment to the captured water prior to release.

The storm water pump system being installed in the existing attenuation pond is intended to be used to direct waters from the attenuation pond back to the treatment plant. It is not intended that the system will be used other than in emergencies or to supplement water reuse system within the site as required. The water will enter the start of the treatment process and will be treated the same as effluent from the manufacturing process.

13.2.3.3 Process Wastewater

The proposed project involves the balancing and treatment of effluent from the WuXi Biologics facility (P1122-01). During the operational phase of the proposed development (following the proposed treatment) treated waters will be discharged to the local IDA pumping station, via SE-1 (as per the EPA Licence) which connects to Dundalk Wastewater Treatment Plant (WwTP) (Licence No: D0053-01). Any Surface water from the bunded treatment plant process area is captured and re-circulated into the treatment process with eventual discharge (after treatment) to the local foul sewer which connects to Dundalk WwTP.

13.2.3.4 Foul Drainage

The proposed design includes a dedicated foul sewer which will discharge to the existing Wuxi foul sewer network. The system has been designed as a gravity system. The discharge point will be located downstream of the outfall of the existing treatment plant onsite and will not discharge any effluent (manufacturing process) to the existing WWTP for treatment. All washdown facilities on the proposed project will discharge to the proposed foul sewer. All foul drainage related works will be carried out in consultation with Uisce Éireann and in accordance with all relevant Uisce Éireann guidelines and any Site-specific additional requirements.

In addition, in order to control the discharge of potentially contaminated runoff in the case of a fire, it is proposed to put a pump station in the existing attenuation pond. In the event of a fire, contaminated water will be detected by sensors shutting closed the penstock valve at the outfall of the existing attenuation pond. The contaminated water will be stored in the pond and then pumped to the proposed treatment facility to be treated before final discharge to the foul sewer. A sensor will be placed on the rising main from the pump station to the proposed WWTP to detect the water quality. Once the water has reached suitable quality levels the penstock will be reopened on the attenuation pond and normal operations will resume.

13.2.3.5 Water Supply and Distribution

The existing 200mm watermain located within the red line boundary will be diverted as part of the proposed development. Refer to planning drawings submitted; DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1006.

13.2.3.6 ESB

The existing ESB cable and ESB duct will be diverted as part of the proposed development. The existing electrical manhole will be demolished / removed as part of the proposed development and the existing cables will be diverted. Refer to planning drawings submitted; DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1006.

Power supply, and the requirement for any alterations to the existing power supply network for the development of the subject Site, will be agreed with ESB Networks in advance of construction. All power supply related works will be carried out in accordance with ESB Networks relevant guidelines.

13.2.3.7 Firemains

The existing firemain will be diverted as part of the proposed development. Refer to drawing; DWG Ref: 1011-000121-FGCL-XX-XX-DR-C-1006.

13.2.3.8 Lighting

Diversion and rerouting of existing public lighting ducts will take place prior to the proposed development construction. Along with the relocation of existing light poles.

13.2.4 Potential Effects during the Construction phase

The following potential impacts could occur during the Construction phase:

- Damage to existing utilities services within the proposed development site boundary;
- Potential power outages to existing services in the surrounding area during the diversion and rerouting of the supply networks within the proposed development site; and,
- Contamination to the existing public water supply network during diversion and rerouting of the water supply network within the site boundary.

Given the nature and scale of proposed development and the fact that a CEMP will be prepared and implemented by the contractor during construction and demolition these potential effects are considered to be unlikely and should they occur, would be temporary and not significant in nature.

13.2.5 Potential Effects during the Operational Phase

As previously stated, utilities will be connected into the proposed development in accordance with the relevant service providers guidelines and requirements and standard best practice guidelines. There will be a requirement for wastewater discharge and use of electricity during the operational phase. The potential effects are considered to be not significant and long term during the operational phase.

13.2.6 Do Nothing Effect

The material assets assessment assumes that under the 'Do-Nothing' scenario the proposed development would not be developed. Thus, there would be a neutral effect on built assets within the vicinity of the proposed development. There will be no likely significant effects regarding built services under the 'Do-Nothing' scenario. The environmental effects of this are negligible.

13.2.7 Proposed Mitigation Measures

13.2.7.1 Construction Phase

The following mitigation measures will be implemented during the construction phase;

- Prior to demotion and construction, Ground Penetrating Radar (GPR) surveys will be undertaken to accurately locate existing utilities along the boundaries of the site;

- An Outline CEMP has been prepared to support this planning application. Prior to the commencement of construction works the appointed contractor will alter, if necessary, in light of conditions which may be imposed on the permission, the CEMP further. This CEMP will take account of all of the environmental considerations (including water, dust and noise nuisance control; soil / stockpile management; temporary groundwater management; appropriate Site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the CEMP submitted as part of this planning application;

- Diversion, rerouting and relocation of the following services will take place prior to construction; existing watermains and hydrants, existing lighting ducts and light poles, and existing underground electrical cables.

- The construction compounds will include adequate temporary welfare facilities including foul drainage and potable water supply;

- All newly installed utilities/ services will be assessed, tested and certified as required prior to being fully commissioned;

- Connections to the existing and proposed foul networks will be coordinated with the relevant utility provider. All works associated with the existing utilities for the proposed development will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, and Uisce Éireann), Health and Safety Authority and any additional site-specific requirements;

- A copy of all available existing, and as built utility plans will be maintained on Site during the construction of the proposed development. The underground power lines and foul and water mains within the existing Uisce Éireann services, located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase; and,

- Local drainage will be surveyed and, where necessary, blocked off to prevent runoff of potentially contaminated surface water entering the surface water drainage system. A detailed Surface Water Management Plan will be included in the CEMP to be prepared by the Contractor, to deal with the treatment of surface water runoff prior to discharge to the site drainage system.

13.2.7.2 Operational Phase

No mitigation measures are required during the operational phase.

13.2.8 Cumulative Effects

Due to the nature and scale of the proposed development, no cumulative impacts are anticipated during the construction or operational phases of the proposed development associated with built services. There will be no likely significant effects regarding built services due to cumulative effects.

13.3 Waste Management

The principles of waste management are given in the EU Waste Framework Directive (2008/98/EC). This Directive was transposed into Irish law under the Waste Directive Regulations (S.I. No. 126 of 2011). These regulations introduced the waste management hierarchy concept where waste generation is firstly prevented, if possible, reduced, reused and recycled/energy recovery before considering disposal.

Construction and Demolition waste represents a significant waste stream in Ireland in terms of weight and volumes. According to recent data provided by the EPA, 85% of C&D waste comprises soil and stone.

13.3.1 Assessment Methodology

This section of the EIAR has been prepared in accordance with the EPA '*Guidelines on the information to be contained in Environmental Impact Assessment Reports'* (2022), 'and '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*' (EPA 2021).

This assessment has also been informed by findings of the Chapter 10 – Land, Soils and Geology section of this EIAR.

13.3.2 Receiving Environment

Based on a review of available historic mapping and aerial photography, historic land-use at the Site was greenfield before being developed as a biopharmaceutical manufacturing site. The GSI bedrock geology 100k map identified the underlying bedrock of the site as the Clontail Formation, comprised of Calcareous red-mica greywacke as detailed in Chapter 10 – Land, Soils and Geology. Based on all available evidence, and taking account of proposed mitigation measures, soils beneath the Site are not considered likely to have a significant effect on human health, building and services, or environmental receptors.

13.3.3 Impact Assessment

13.3.3.1 Characteristics of the proposed development

A detailed description of the proposed development is presented in Chapter 2 – Project Description. The following summary relates to the characteristics of the proposed development specifically in relation to waste management. The proposed development will be designed, planned, constructed, and operated to minimise waste generation at every stage.

The Proposed Development will necessitate the excavation of a large amount of soil and stone (ca. 34,407 m^3 of soil and ca. 5,545 m^3 of rock). The Proposed Development has been designed to ensure that none of this material is taken off site for disposal. The amount of imported material for the proposed development is ca. 3,750m^3 and is broken down as follows:

- Imported stone and pea gravel around pipes and services 1,400 m^3
- 6F2 imported stone to bund wall: 150 m^3
- 6F2 imported stone to admin area: 200 m^3
- 6F2 imported stone for DK23 site road: 1,000 m^3
- Clause 804: 1,000 m^3

The management of waste generated during the construction of the proposed development will be in accordance with the Outline CEMP submitted as part of this application. The scope of works for the project includes the construction of an Effluent Balancing and Resource Recovery System and associated infrastructure and access road. The following waste streams will be generated during the construction phase: concrete, mechanical, electrical containment, wood, glass, aluminium, iron and steel and soils.

13.3.3.2 Potential Effects during Construction phase

During the construction phase, it has been estimated that the various waste streams will be generated and managed as follows (refer to the CEMP submitted as part of this application). Table 13-1 identifies the estimated volume of waste for each key stream that will be generated during the demolition and construction phases of the proposed development. These are broad estimates for the key construction materials and are presented for illustrative purposes only. The exact quantities of these materials will be determined during the design stage of the Project.

Table 13-1 - Estimated Volume of waste generation

Waste Stream	Estimated Volume (tonnes)
Mixed C&D Waste	8
Wood/Timber	16
Metals	11
Paper, Plastics & Packaging	7
Waste Oil from construction plant/spill absorbents	0.5
Canteen Office Waste	11
Miscellaneous Waste	3
Total Demolition Waste	57

As part of the development a significant volume of excavated material (ca. 34,407 m^3) will be stripped and stockpiled in designated stockpile located within the red line boundary. Bulk excavation will have a haul length of 200m from the excavation pit to the south of the site – all within the red line boundary. Maximum excavation depth is ca. 5m bgl. All excavated soil will be kept within the red line boundary and used for landscaping purpose. The excavated soil will be located to the south of the site on the dry meadows and grassy verges (GS2) between the two large man-made mounds which have been colonised by GS2 habitat.

Excavated rock (ca. 5,545 m^3) will be stockpiled within the red line boundary and removed for offsite disposal to a suitably licenced / permitted waste facility, with the appropriate soil testing carried out.

The waste management strategy during the construction phase of the proposed development has been developed in accordance with the waste management hierarchy and relevant EU and Irish policy. The overarching objectives of the Eastern-Midlands Region Waste Management Plan 2015-2021 have been incorporated into the latest development plans pertinent to this Site i.e., Louth County Council Development Plan 2021 – 2027. The Regional Waste Management Plan has the following objectives:

- Prevent or minimise the production of waste in the first instance;
- Reduce, re-use and recycle to the maximum extent possible;
- Endeavour to recover energy from waste where possible; and
- Ensure the efficient and safe disposal of any residual waste.

The Louth Development Plan 2021-2027 sets out the following objective with regards to vision of the County:

- *'SO5 – Ensure a more sustainable and integrated concept of development with regards to land use transportation, water services, energy supply and waste management over the lifetime of the Plan.'*

- *'SO16 – Ensure the efficient and sustainable use and development of water and wastewater service infrastructure throughout the County in a manner that supports a healthy society, economic development and a cleaner environment'.*

As with any construction project, there is potential for nuisance issues to arise during the construction phase, associated with dust or waste materials impacting residents, commercial industrial and roads adjacent to the proposed development. Therefore, while waste will be generated during the construction of the proposed development, all waste streams will be managed in accordance with statutory waste management and environmental requirements, regional waste related policy, best practice waste management guidance, and a project specific Resource and Waste Management Plan (RWMP) which will be developed by the Contractor in advance of the commencement of construction or demolition works. The potential effects of waste generated during the construction phase (via. transport and disposal / recovery to appropriately permitted / licenced facilities; and potential nuisance issues) will be temporary and slight adverse in nature. Mitigation measures will be implemented as required to further manage these potential effects. There will be no likely significant effects associated with waste management during construction.

13.3.3.3 Potential Effects during Operational Phase

The proposed design includes a separate stormwater network which will discharge to the existing WuXi stormwater network which includes silt traps, interceptors and attenuation to green field rates. The flows from the proposed development will be attenuated to the calculated QBar value. Outfall, from the Wuxi Biologics facility drainage network, is via SW-1 which connects to local sewer and then Dundalk WwTP. No surface water is discharged to a watercourse, it is all contained within the existing drainage system. The proposed design includes a rainwater harvesting system which will feed the proposed WC's as well as washdown facilities for use of cleaning down the tanks etc.

The existing attenuation pond capacity is 2403m^3. The attenuation pond has existing hydrocarbon interceptors, flow control and emergency storage for the existing site infrastructure surface water run-off. The existing attenuation pond serves the entire campus for the purpose of SuDS. It captures the existing stormwater runoff from the site and stores it. The stored water is then slowly released back to the external environment at the calculated greenfield runoff rate i.e. the rate of discharge if there was no development there. There is currently no treatment to the captured water prior to release.

The storm water pump system being installed in the existing attenuation pond is intended to be used to direct waters from the attenuation pond back to the treatment plant. It is not intended that the system will be used other than in emergencies or to supplement water reuse system within the site as required. This water will enter the start of the treatment process and will be treated the same as effluent from the manufacturing process.

A rainwater harvesting tank is proposed to reduce the amount of stormwater runoff located adjacent to the building administration and process building at ground level. Any rainwater collected via the rainwater harvesting can be utilised for the wash down of tanks etc.

Sludge will be produced during the operation phase; ca. 5 tonnes per day will be produced. The sludge will be collected by a licensed waste hauler and treated at a licensed waste facility in accordance with the relevant waste legislation.

As part of the proposed development solar photovoltaic system for renewable power generation will be mounted on the roof of the proposed administration building. The roof is covered with approximately 460m2 of solar

panels producing 121 kWh/s PA per m2 and 98,859 kwh per year. This power is to be used onsite to run the site when the power is available thereby reducing dependence on fossil fuels and resulting in a reduction in greenhouse gas emissions. At a preliminary calculation the installation of the proposed solar photovoltaic system will export 95,859kWh/year to the grid, and 24,725 kg/year of CO_2 emissions will be avoided.

While waste will be generated during the operational phase of the proposed development, all such waste will be managed in accordance with statutory waste management and environmental requirements, regional waste related policy, and best practice waste management guidance. The potential effects of waste generated during the operational phase (via. transport and disposal / recovery to appropriately permitted / licenced facilities;) will be long-term and imperceptible. There will be no likely significant effects associated with waste management during operation.

13.3.4 Cumulative Effects

Based on the scale and nature of the proposed development and given that a RWMP will be prepared and implemented for the construction phase, no cumulative effects are anticipated during the construction or operational phases of the proposed development associated with waste generation. There will be no likely significant effects associated with waste management and / or generation.

13.3.5 Proposed Mitigation Measures

13.3.5.1.1 Construction Phase

The following mitigation measures will be implemented during the construction phase:

- All waste management procedures implemented onsite during the construction phase will be in accordance with the Outline CEMP submitted as part of this planning application, and a project specific RWMP to be prepared by the Contractor, in accordance with the '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*' (EPA 2021). The RWMP will take account of the relevant requirements of the Outline CEMP, the EIAR and any relevant planning conditions etc., and will be prepared by the Contractor in advance of the commencement of any construction or demolition works.

- The contractor will supply all waste containers / skips, as required, for each of the identified waste streams. Waste will be segregated and removed to licensed facilities by licenced hauliers and all containers will be emptied before they are full to avoid overflowing. The contractor is to provide a waste forecast for waste types and quantities expected to be generated.

- Good working practices and take back schemes will be used to reduce the amount of waste generated, as an initial step, with waste management routes for each waste stream to be recorded in the site Resource and Waste Management Plan. There is a target of 98% diversion of construction waste from landfill to be achieved with a minimum diversion of 90%. In order to reduce waste generation as far as possible, off cuts, surplus materials and packaging is to be returned to suppliers for closed loop recycling, single used plastics are to be avoided where possible and all materials are to be stored correctly to avoid waste generation from damage and contamination of incorrectly stored materials.

- All waste materials will be segregated onsite into the various waste streams, via. dedicated skips and storage areas. All waste will be removed from Site by one or more waste haulage contractor(s) who hold a current valid waste collection permit issued by the National Waste Collection Permit Office (NWCPO). All waste materials generated during the construction phase will be removed offsite to an appropriately permitted or licenced waste disposal / recovery facility. All waste removed offsite will be appropriately

characterised (under the correct LoW / EWC code), transported and disposed of in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996 and 2001, as amended and all subsequent waste management regulations). All waste management and disposal / recovery records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (LCC, EPA) as required.

- Scheduling and planning the delivery of materials will be carried out on an '*as needed*' basis to limit any surplus materials;
- Materials will be ordered in sufficient dimensions so as to optimise the use of these materials onsite and will be carefully handled and stored so as to limit the potential for any damage;
- Where feasible, sub-contractors will be responsible for the provision of any materials they require onsite in order to help reduce any surplus waste;
- All loaded trucks entering and exiting the Site will be appropriately secured and covered;
- Dust will be controlled at entry and exits to the Site using wheel washes (as required) and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Wheel / road sweeper washings will be contained and treated prior to discharge; and,
- Secure lockable and controlled storage to be provided for the storage of chemicals and other hazardous materials, e.g., asbestos.

13.3.5.1.2 Operational Phase

- The proposed project involves the treatment of effluent from the WuXi Biologics facility (P1122-01). During the operational phase of the proposed development (following the proposed treatment) treated waters will be discharged to the local IDA pumping station, via SE-1 (as per the EPA Licence) which connects to Dundalk Wastewater Treatment Plant (WwTP) (Licence No: D0053-01). All Emission Limit Values in Schedule B.3 Emission to Sewer of the EPA licence P1122-01 will be adhered to during the operation phase.
- The proposed design includes a separate stormwater network which will discharge to the existing WuXi stormwater network which includes silt traps, interceptors and attenuation to green field rates. The flows from the proposed development will be attenuated to the calculated QBar value. Outfall, from the WuXi Biologics facility drainage network, is via SW-1 which connects to local sewer and then Dundalk WwTP. No surface water is discharged to a watercourse, it is all contained within the existing drainage system. The proposed design includes a rainwater harvesting system which will feed the proposed WC's as well as washdown facilities for use of cleaning down the tanks etc. All Emission Limit Value in Schedule C.2.3 Monitoring of Storm Water Emission of the EPA licence P1122-01 will be adhered to during the operation phase.
- Sludge will be produced at a rate of ca. 5 tonnes per day. Sludge will be removed in sealed tankers by licenced hauliers and will be treated at a licenced waste facility. The sealed tankers will prevent release of odour emissions at any significant rate. The operation and disposal of the sludge will be in accordance with Urban Wastewater Treatment Directive 91/271/EEC and Waste Management Act 1996 as amended. The sludge cake will meet the Class A Bio Solids standards.
- Waste management during the operational phase of the development will be undertaken by private waste contractors (in accordance with statutory waste management and environmental requirements, regional waste related policy, and best practice waste management guidance), and regulated by Louth

County Council. Therefore, no further mitigation measures are required with regards to the transport and disposal or recovery of all waste streams which will be generated during the operational phase.

13.4 Residual Effects

Cumulative effects on built services and waste management have been considered between both project elements and with other proposed / committed future developments within the vicinity of the study area. Further details are provided in Chapter 14 – Cumulative Effects. It has been determined that there will be no likely significant as a result of cumulative effects.

Taking account of the proposed mitigation measures for Material Assets, specifically built services the residual effects of the proposed development will be short-term and not significant during the construction phase, and long-term and not significant during the operational phase. There will be no likely significant residual effects associated with built services.

Taking account of the proposed mitigation measures for Material Assets, specifically waste management, the residual effects of the proposed development will be short-term and imperceptible during the construction phase, and long-term and imperceptible during the operational phase. There will be no likely significant residual effects associated with waste management and / or generation.

13.5 Do Nothing Scenario

The Material Assets Assessment assumes that under the 'Do-Nothing' scenario the proposed development would not be developed. The disposal of excavation and other construction wastes associated with the proposed development would not occur. There will likely be significant effects regarding waste under the 'Do-Nothing' scenario as the current flow and concentration of the waters arising from the production processes on site (P1122-01) is variable and could limit the potential treatment capacity of the sewer system due to this variability. UÉ have indicated that there is insufficient headroom in the Dundalk WwTP (in accordance with the wastewater discharge licence D0053-01) to treat the expected loads arising from the facility due to both capacity issues and an inability to accommodate fluctuations in loading. In order to maintain production capacity, the current pre-treatment capacity will need to be increased, as will effluent balancing/storage to ensure that the site maintains compliance with proposed end user agreement effluent limits.

13.6 Monitoring Requirements

The Contractor will be responsible for maintaining waste records and documentation for the full duration of the construction phase. The Contractor will track and monitor all waste volumes transported offsite. All waste records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (UÉ, LCC, EPA) as required.

All waste soils (including made ground) will be classified in accordance with the EPA Guidance Document 'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous' (2015). It will be the Contractors responsibility to ensure that representative soil samples are taken in advance of removal and disposal offsite. As noted previously, it will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation.

WuXi Biologics will be required to continue to carry out monitoring under the requirements of the IED EPA license during the operational phase.

13.7 Difficulties encountered during preparation of this chapter

There were no difficulties encountered when preparing this chapter.

14. Cumulative Effects

14.1 Introduction

This chapter assesses the potential for the proposed development to act in combination with committed developments within the vicinity to result in cumulative impacts on the environment. Each of the technical chapters within this EIAR (i.e. Chapters 4 to 13) have considered the potential for cumulative impacts with committed developments in the vicinity of the proposed development.

The EIA Directive states that an EIAR should contain cumulative effects, which are defined as:

'A description of the likely significant effects of the project on the environment resulting from…the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.'

The cumulative effects assessment considers developments which have potential for cumulative effects with the proposed development and which have planning permission and/ or which are in the planning system but where a planning decision is not expected to have been made by the time the proposed development is operational. Those developments that already exist, including existing facilities in the airport itself, are part of the Current State of the Environment and therefore are already part of the assessment baseline. The assessments of interactions and cumulative effects presented in this chapter draw on the method of assessment and assessment findings reported in Chapters 4 to 13 and information available in the public domain relating to other known schemes within the study area (as described below).

14.2 Methodology

Potential cumulative impacts are defined as 'the addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects' (EPA 2022) and have been considered for each environmental topic within this EIAR.

A summary of all relevant developments i.e. consented developments which have been approved by Louth County Council and an Bord Pleanála (ABP) within the last 5 years and planned projects currently pending a planning decision, and any major infrastructure developments and/or strategic plans or projects which are in the pre-planning stages have been reviewed.

The majority of these developments have already been constructed or are of small scale in nature (i.e. extension works or property retention works) or are considered to be a reasonable distance from the proposed development and do not warrant further consideration as part of this assessment.

Based on a review of planning records a list of committed developments has been compiled which require further consideration in relation to potential cumulative effects with the Proposed Development, as part of this assessment.

14.3 Cumulative Effects Assessment

Cumulative effects consider the impacts of other schemes which have potential for cumulative effects with the proposed development. As explained above, this chapter focusses on developments which have planning permission and / or which are in the planning system pending a planning decision but which do not form part of the Current Receiving Environment or the Future Receiving Environment.

- Refer to Table 14-1 for the Cumulative Impacts Assessment for Projects.

Table 14-1 - Cumulative Effects Assessment for Projects

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
WuXi Biologics	Permission to erect a 3MW Wind Turbine, located at the East area of our existing biopharmaceuticals plant; the Wind Turbine will be installed with a hub height of 80 meters and a blade radius of 45 meters, with underground ducting connecting to the existing ESB substation. The application relates to the development which comprises of an activity which holds an Industrial Emissions Discharge (IED) Licence (Licence No. P1122-01)	LCC Planning ref: 2360356 - pending	This wind turbine development is within WuXi Biologics land and is located ca. 400m east of the proposed development. Due to the nature of the wind turbine development, it is unlikely there will be significant cumulative effects during construction and/ or operation. Therefore, no cumulative significant effects are likely to occur.
Ion Renewables Limited	Permission for (i) Construction of a Stationary Battery Storage Facility which includes eighty four 20 ft containers and fourteen medium voltage transformers; (ii) Construction of single storey substation building and bund to facilitate transformer plant along with a new internal access road to connect to the existing road network within the Xerox Technology Park lands; (iii) All associated site and development works	LCC Planning Ref: 23419 - pending	Due to the location (1.3km north east of the proposed development) of this project, and that the project is at the construction stage, it is unlikely there will be significant cumulative effects during construction and operation of the proposed development. No cumulative operational effects are likely. Therefore, no cumulative significant effects are likely to occur.
Pentagon Technologies (Ireland) Limited	Modifications to the existing building's façade and roof to include: 3 No. flue and 3 No. roof exhaust ducts of 0.86m max height above the parapet level, 1 No. personnel door and 5 No. ductwork penetrations to the North Façade, 1 No. personnel door, 1 No. 3.7m X 3m plant access roll-up door, 3 No. 500mm dia exhaust fans and 4 No. pipework penetrations on the East Façade; Proposed cable tray penetration into East façade of an existing ESB substation; Construction of a new 110sqm external MV Switchroom Compound consisting of a 13sqm	LCC Planning Ref: 2360372 – approved	Due to the location (950m north east of the proposed development) of this project, and that the project is at the construction stage, it is unlikely there will be significant cumulative effects during construction and operation of the proposed development. No cumulative operational effects are likely.

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
	single storey Client MV Substation building of 3m total height and a transformer within 2.5m security fencing enclosure; Construction of a 355sqm external plant compound with 2 No. air handling units, 2 No. scrubbers, associated fans and exhaust stacks of 13.1m max height, all within 3.5m high acoustic enclosure; Construction of a 860sqm external plant yard to consist of Waste Water Treatment Plant with 9 No tanks of varying sizes of maximum 2.5dia x 5m high, 6 No. chemical tanks and associated pumps, 2 No. heat pumps within 3.5m high acoustic enclosure, 8.5m high liquid nitrogen tank and vaporiser within 2.5m high security fencing enclosure, a generator, and 5.5m high elevated steel pipe bridge with associated pipework and cable tray penetrations into the North façade; Construction of a 22sqm external waste store with associated 2m high screens; together with associated amendments to both soft and hard landscaping & paving and all other ancillary site works		Therefore, no cumulative significant effects are likely to occur.
Groveview Ltd. Builders	Permission for development to consist of 96 houses comprising of : 6 no. mid-terraced 2 storey 2 bedroom dwellings (Type H), 11 no. end of terrace 2 storey 3 bedroom dwellings (Type K), 25 no. semi-detached 2 storey 3 bedroom dwellings (Type K), 6 no. semi-detached 2 storey 3 bedroom dwellings (Type K1), 41 no. semi-detached 2 storey 4 bedroom dwellings (Type M), 3 no. semi-detached 2 storey 4 bedroom dwellings (Type M1), 1 no. detached 2 storey 4 bedroom dwelling (Type M1), 1 no. detached 2 storey 4 bedroom dwelling (Type M2) , 1 no. detached 2 storey 4 bedroom dwellings (Type S), 1 no. detached 2 storey 4 bedroom dwellings (Type S1) and all associated ancillary site development works, boundary treatments, landscaping and open spaces on lands of circa 7.18Ha. (Previous Permission 03/1754) with existing vehicular and pedestrian access from the Dublin Road via The	LCC Ref: 2360257 approved	Due to the location (1.2km south east of the proposed development) of this project, and that the project is at the construction stage, it is unlikely there will be significant cumulative effects during construction and operation of the proposed development. No cumulative operational effects are likely. Therefore, no cumulative significant effects are likely to occur.

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
	Boulevard, Raynoldstown Village, Haynestown, Dublin Road, Dundalk, Co. Louth. This application is accompanied by a Natura Impact Statement (NIS)		
Groveview Ltd. Builders	Permission for the construction of 65 houses comprising of 6 no. 2 storey 2 bedroom terraced house, Type A, 2 no. single storey 3 bedroom detached bungalows, Type B, 31 no. 2 storey 3 bedroom detached (1 no.), semi-detached (18 no.) and terraced (12 no.), house Type C, 1 no. 2 storey 4 bedroom detached house, Type D, and 25 no. 2 storey 4 bedroom detached (1 no.) and semi-detached (24 no.) houses, Type E, all associated ancillary site development works, boundary treatments, landscaping and open spaces on lands of circa 2.50 ha (Previous Permission 03/1754) with existing vehicle and pedestrian access from the Dublin Road via The Boulevard and Green Gates Manor Avenue. This application is accompanied by a Natura Impact Statement (NIS) **Significant further information received on 25.5.23 which includes additional house type designs and reduction in total number of houses proposed from 65 to 62, amended site layout plan, amended red line boundary (new red line area measures c.3.89 Ha,), updated Natura Impact Statement and additional technical information regarding the planning application	LCC Ref: 22688 approved	Due to the location (1.4km south east of the proposed development) of this project, and that the project is at the construction stage, it is unlikely there will be significant cumulative effects during construction and operation of the proposed development. No cumulative operational effects are likely. Therefore, no cumulative significant effects are likely to occur.
Groveview Ltd. Builders	Permission to amend approved development (Ref. no. 22/127) on a parcel of land with a site area of 1.64 hectares at the western extent of the Marlmount Housing Development, which includes revisions to the site layout and a reduction in the number of dwellings from 35no. units to 31no. units, including changes to 17no. house types and will consist of the following: construction of 31no. 2 storey dwellings comprising 1no. detached 4 bedroom house (type Q), 4no. detached 4 bedroom	LCC Ref: 238 approved	Due to the location of the scheme, ca. 490m east of the proposed development it is unlikely there will be significant cumulative effects during construction and/ or operation. Therefore, no cumulative significant effects are likely to occur.

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
	houses (Type S), 6no. semi detached 3 bedroom houses (Type P) at the following addresses: numbers 1 to 31 Marlmount Close (inclusive), repositioning of a 2 storey creche facility with a gross floor area of 490sqm, 20no. ancillary car parking spaces and 22no. covered bicycle spaces to serve staff and children drop off/pick up, together with 3,250sqm of public open space, construction of the local access road, 4no. visitor car parking spaces, landscaping and all site development works.		
Groveview Builders Ltd.	Permission for the construction of 55 houses comprising of 2 no. 3 storey 5 bedroom detached houses Type A; 10 no. 3 storey 5 bedroom semi-detached houses, Type A-A; 6 no. 2 storey 3 bedroom semi-detached/terraced houses, Type B, 14 no. 2 storey 3 bedroom terrace houses, Type B1, 19 no. 2 storey 3 bedroom semi-detached/terrace houses, Type B2; 2 no. 3 storey 3 bedroom semi-detached houses, Type C and 2 no. 3 storey 3 bedroom semi-detached houses, Type C1, all associated ancillary site development works, boundary treatments, landscaping and open spaces on lands of circa 2.08HA. (Previous Permission 03/1754) with existing vehicular and pedestrian access from the Dublin Road on sites 2-52 even numbers inclusive and 1-41 odd numbers inclusive, The Boulevard and sites 1-8 inclusive, Green Gates Manor Avenue, Raynoldstown Village. This application is accompanied by a Natura Impact Statement **Significant further information received on 20/12/2022 including addiitional house type, relocation of vehicular access from The Boulevard to serve sites 10-52 inclusive even numbers, amended red line boundary(new red line area measures c.3.05 Ha.) and additional technical information regarding the planning application.	LCC Ref: 2360257 approved	Due to the location (1.4km south east of the proposed development) of this project, and that the project is at the construction stage, it is unlikely there will be significant cumulative effects during construction and operation of the proposed development. No cumulative operational effects are likely. Therefore, no cumulative significant effects are likely to occur.

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
McParland Bros Builders Limited	ARGE-SCALE RESIDENTIAL DEVELOPMENT - Permission for an LRD consisting of a total of 183 no. residential units along with provision of creche as follows: Site excavation works. Provision of 64 no. dwellings (38no. 3 bed semi-detached; 8 no. 4 bed semi-detached; 8 no. 3 bed semi-detached; 1 no. 4 bed semi-detached; 1 no. 3 bed semi-detached; 4 no. 4 bed detached; 3 no. 4 bed detached and 1 no. 3 bed detached). Provision of a total of 119 no. apartments/duplex units (21 no. 1 bed; 57 no. 2 bed; and 41 no. 3 bed units across 6 no. blocks ranging in height up to 6 storeys). Provision of a creche. Provision of associated car parking at surface level via a combination of in-curtilage parking for dwellings and on-street parking for the creche, duplexes and apartments. Provision of electric vechicle charging points with associated infrastructure. Associated bicycle storage facilities and bin storage facilities. Use of existing access from Dublin Road with associated upgrade works to the existing internal access road to facilitate vehicular, pedestrian and cycle access. Internal access roads and footpaths and associated connections to the existing Bellfield residential estate. Residential communal open space areas with formal play area along with hard and soft landscaping, public lighting, boundary treatments including walls, railing and fencing. ESB substation. Internal site works and attenuation systems and all ancillary site development/construction works to facilitate foul, water and service networks for connection to the existing foul, water, gas and ESB networks. A Natura Impact Statement has been submitted with this application. See www.bellfieldlrd.com for more information	LCC Ref: 2364 - approved	Due to the location (2.1km east of the proposed development) of this project, and that the project is at the construction stage, it is unlikely there will be significant cumulative effects during construction and operation of the proposed development. No cumulative operational effects are likely. Therefore, no cumulative significant effects are likely to occur.

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
Haggardstown Landscaping Ltd	Permission for proposed works to lands for the purposes of a logistics yard, for the existing garden centre, including new vehicular entrance, gates, erection of boundary fencing and the installation of a permeable gravel yard surface	LCC Ref: 2360205 Pending	Due to the nature of the scheme, and its located to the north of the proposed development it is unlikely there will be significant cumulative effects during construction and/ or operation. Therefore, no cumulative significant effects are likely to occur.
John Lambe	Construction of 1 pig house together with all ancillary structures, (to include meal storage bins). This application was subject to an EIA procedure.	ABP Ref: 305468	Due to the location of the scheme, ca. 2.3km southwest of the proposed development it is unlikely there will be significant cumulative effects during construction and/ or operation. Therefore, no cumulative significant effects are likely to occur.
Kingsbridge Consultancy Limited (Applicant)	483no. residential units (258no. houses, 225no. apartments), childcare facility and associated site works. This application was subject to an EIA procedure.	ABP Ref: 304782	Due to the location of the scheme, ca. 2.3km east of the proposed development it is unlikely there will be significant cumulative effects during construction and/ or operation. Therefore, no cumulative significant effects are likely to occur.
Marina Quarter Limited	Large-Scale residential development on a site of ca. 18.54 hectares for the construction of 502no. residential units, a creche and all associated site works including strategic amenity, space, access, parkin, circulation infrastructure. This application was subject to an EIA procedure.	ABP Ref: 2360474	Due to the location of the scheme, ca. 2.6km east of the proposed development it is unlikely there will be significant cumulative effects during construction and/ or operation.

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
			Therefore, no cumulative significant effects are likely to occur.
Uisce Eireann	The works involve the upgrade of Cocklehill wastewater pump station and is part of a project to improve the capacity of the existing wastewater network in the area and improve operational performance. These works will involve the upgrading of the existing pump station located at the end of Carrig Ard cul-de-sac.	Cocklehill Wastewater Pump Station	Due to the location of the scheme, ca. 1.3km southeast of the proposed development it is unlikely there will be significant cumulative effects during construction and/ or operation. Therefore, no cumulative significant effects are likely to occur.
Oxigen Environmental ULC	Permission for development that will consist of waste recovery and recycling facility for the treatment of up to 90,000 tonnes per annum of municipal solid waste, comprising; a processing building with a floor area of c. 9263m2 to a maximum height of 13.85m, ancillary administration building (floor area of c. 252m2 and 5.4m in height), gated vehicular access off the L3168 (Ardee Road) and an internal access road with two weighbridges, ESB substation (c 42m2) fuel storage, two 40m3 underground tanks, underground drainage including c. 385m3 underground tank, 33no. car parking spaces, 10no. bicycle parking spaces, and photovoltaic panels on the roof of processing building. The development also included security cameras, lighting, boundary treatment to include 2m high boundary fence and 1-1.5m mounding on southern boundary and all associated landscaping, plant, site and construction works on an overall site of c. 2.6ha. An Environmental Impact Assessment Report and Natura Impact Statement have been prepared in respect of the proposed development. The proposed development will require an Industrial	LCC Ref: 21486	Due to the location of the scheme, ca. 4km northeast of the proposed development it is unlikely there will be significant cumulative effects during construction and/ or operation. Therefore, no cumulative significant effects are likely to occur.

Applicant	Project Summary	Project Status / Planning Status	Cumulative Effect Assessment
	Emissions Licence from the Environment Protection Agency in order to operate.		

14.3.1 Population and Human Health

The proposed development will not have any significant negative effects on population and human health and it is considered that the mitigation measures and monitoring requirements outlined in regard to the other environmental topics will ensure that the proposed development is unlikely to result in any significant cumulative effects in relation to population and human health.

14.3.2 Biodiversity

Given the inclusion of design, construction phase and operational phase mitigation measures, no significant effects will occur on sites designated for conservation value, protected habitats, protected species, watercourses or features of high ecological value as a result of the construction and/or operation of the proposed development.

Other plans and projects within development site area and also within the wider environs of the WuXi Biologics facility were reviewed in context with the proposed development and have been assessed for their potential to act in-combination with the proposed development to give rise to cumulative effects on local biodiversity. Refer also to Chapter 5 for further details.

No cumulative or in-combination effects on sites designated for conservation value, protected habitats, protected species, surface water features or features of high ecological value will occur as a result of the proposed development.

14.3.3 Landscape and Visual

A review of Louth County Council planning portal was undertaken in March 2024 to help determine if there are any other relevant active planning submissions that because of their scale or type of development could potentially have notable cumulative landscape or visual effects with the proposed development.

The majority of applications in the area are for new singular rural housing or extensions to existing houses.

There are limited applications falling within the extent of the Mullagharlin Framework lands. The latest of which include a proposed Battery storage facility (LCC Planning Ref: 23419 - pending) on lands immediate northwest of the Xerox Toner buildings and directly west of this is approved variations to the existing Pentagon Technologies P7 (LCC Planning Ref: 2360372 – approved) which includes a new wastewater treatment plant. Which are both located ca. 1.3km and 1.1km respectively to the northwest of the proposed development. Closer to the proposed development and within the WuXi Biologics grounds is a pending application for a single turbine 125m to blade tip (LCC Planning ref: 2360356 - pending) which is located ca. 545m northwest of the nearest proposed development structures.

14.3.3.1 Cumulative landscape effects

The proposed development will slightly further add to this development type occurring within the Mullagharlin framework lands along the above recently approved Pentagon Technologies plant. However, such elements are a requirement to be able to safely process any waste materials from any individual industrial units. Both plants are suitably spaced away from each other, with each to be located near to their respective existing buildings and contained within the local landscape. The proposed development is located well away from the above energy storage/production applications. The proposed development will not result in any additional loss of key landscape elements such as field boundaries with it and the others to be contained within areas of open worked grounds or agricultural improved grassland.

Given the intended uses of the Mullagharlin framework lands as guided through planning policy it is expected that a range of different development types will occur across these lands in the future as it evolves to become a major source of employment. This will include the need for further wastewater treatment plants and energy sources as new industry developments are established on these lands.

Thus, the proposed development will not have any notable cumulative landscape effects with the other above applications within the Mullagharlin framework lands, resulting in some negligible, neutral and long-term cumulative landscape effects.

14.3.3.2 Cumulative visual effects

The potential for the proposed development to be viewed alongside the other listed developments above is considered here.

As indicated in the viewpoint assessment the proposed development in general was found to have very limited visibility across the area. The only viewpoint with some visibility was that of viewpoint 1 by the Site's western entrance, which is experienced only by-passing road users. Similarly, potential cumulative views with the other developments are also limited. There will be some combined cumulative views of the proposed development and the proposed turbines which would be peering above the existing WuXi Biologics building. Of the two developments the proposed turbine would be more prevalent given its scale and moving blades. The existing WuXi buildings and the proposed development will block any potential views in the direction of the other approved wastewater and pending energy storage applications from this point.

There will be the potential to experience cumulative sequential views of the proposed development with the other approved wastewater plant but only when directly passing by both as one travel along Mullagharlin road and Chapel Road respectively. There will also be views of the proposed development with the proposed turbine, again the proposed development's structure only being visible as one passes by the entrance gap at viewpoint 1. While given its vertical form the turbine will be more visible across a wider range of roads in the area.

Thus, there be limited potential cumulative views effects as a result of the proposed development being viewed in combination or sequential with these other approved/pending developments, were they all to be approved, and thus result in negligible, neural and long term cumulative visual effects.

14.3.4 Air Quality

The cumulative effects of the project in conjunction with current and future developments in the vicinity of the subject site are considered in this section.

The most relevant nearby sites are the WuXi Vaccines Ireland Ltd. (LCC 19861), Pentagon Technologies (Ireland) Limited (LCC 2360372), Oxigen Environmental ULC (LCC 21486), IDA Ireland (LCC 18187), and Pig Farm (ABP Ref: 305468) facilities.

The Wastewater Treatment Plant associated with Pentagon Technologies (Ireland) Limited (LCC 2360372) has the potential to emit odour into the environment, however as the WwTP is located 1 km northeast of this site, this is at a distance which will not lead to measurable cumulative impacts.

The waste recovery and recycling facility of Oxigen Environmental ULC (LCC 21486) has the potential to emit odour into the environment, however as the recycling facility is located ca. 4 km northeast of this site, this is at a distance which will not lead to measurable cumulative impacts.

The utility yards that process water and wastewater associated with IDA Ireland (LCC 18187) have the potential to emit odour into the environment, however as IDA Ireland is located 2 km northeast of this site, this is at a distance which will not lead to measurable cumulative impacts.

The pig farm (ABP Ref: 305468) has the potential to emit odour into the environment, however as the pig farm is located 2 km southwest of this site, this is at a distance which is will not lead to measurable cumulative impacts.

The construction of dwellings, a wind turbine, and electricity developments do not contribute to odour emissions, so these additional developments will not have any cumulative impact on odour associated with the proposed development.

The remainder of the projects are at a distance which is beyond the distance that could lead to measurable cumulative impacts. There will be no significant adverse air quality, climate, or odour impacts on the receiving environment as a result of the project or in conjunction with other local developments that are planned for the area.

14.3.5 Noise and Vibration

14.3.5.1 Construction

The phasing/commencement of any other permitted developments in the locality could potentially result in the scenario where a number of other construction sites are in operation at the same time as the proposed development. The location of these proposed development sites in relation to each other and to nearby noise sensitive locations, means that there is minimal risk of cumulative construction noise emissions resulting in an exceedance of the relevant criteria. The same conclusion is likely to be reached in the event that there are other nearby construction sites active at the same time as the sites discussed above.

A planning application has been submitted by WuXi Biologics Ireland Ltd erect a 3MW wind turbine, located at the East area of the existing biopharmaceuticals plan. The proposed wind turbine is located to the east of the proposed facility away from the location of proposed Effluent Balancing and Resource. Therefore it is unlikely to result in significant cumulative effects. It is recommended that construction is phrased at both sites to reduce the risk of cumulative significant effects.

14.3.5.2 Operational

In order to assess the potential cumulative impacts of the development, the predicted noise levels from the proposed plant items have been added to the current noise levels from the facility which was estimated using noise surveys carried out by RSK (detailed in Section 8.3.5). The background noise levels (L_{A90}) from the surveys completed in August 2023 have been used to estimate current noise levels from the facility (approach as per the 2023 annual IED licence compliance noise report). As shown in Table 8-15 cumulative calculated noise levels are predicted to comply with the WuXi Biologics IED Licence noise emission limits. The 2023 WuXi Biologics IED Licence Noise Survey has been included in Appendix 8.

Table 14-2- Predicted cumulative operation noise levels

Receptor Number	Estimated Existing Site Noise Emission Levels (dB $L_{A90,T}$)		Predicted Noise Levels from Proposed Development (dB $L_{Aeq,T}$)		Calculated Cumulative Noise Levels (dB $L_{Aeq,T}$)		Compiles with IEL Noise Limits?	
	Day	Evening & Night	Day	Evening & Night	Day	Evening & Night	Day	Evening & Night
R1	49	41	42	38	50	43	✓	✓
R2	49	41	42	38	50	43	✓	✓
R3	49	41	44	38	50	43	✓	✓
R4	43	34	42	41	46	42	✓	✓
R5	43	34	41	40	45	41	✓	✓
R6	43	34	43	41	46	42	✓	✓
R7	43	34	42	40	46	41	✓	✓
R8	43	34	42	40	46	41	✓	✓
R9	43	34	42	40	45	41	✓	✓
R10	43	39	35	34	44	40	✓	✓
R11	43	39	35	35	44	40	✓	✓
R12	43	39	36	35	44	41	✓	✓
R13	43	39	34	34	44	40	✓	✓
R14	43	39	37	37	44	41	✓	✓
R15	43	39	37	36	44	41	✓	✓
R16	43	39	33	33	43	40	✓	✓
R17	43	39	33	32	43	40	✓	✓
R18	43	39	33	32	43	40	✓	✓
R19	36	37	30	29	37	38	✓	✓
R20	36	37	30	29	37	38	✓	✓

14.3.6 Traffic

No significant trip-generating developments were found near the proposed development. Therefore, in terms of traffic and transport, no cumulative effects are anticipated.

14.3.7 Land, Soils and Geology

Provided the mitigation measures outlined in Chapter 10 – Land, Soils and Geology are in place for the duration of the construction phase, cumulative effects are not likely to be significant. There will be no effects with regards to land (including land take), soils or geology during the operational phase.

Therefore, no significant cumulative effects are likely.

14.3.8 Water

Provided the mitigation measures listed in Chapter 11 - Water are in place for the duration of the construction phase, anticipated effects on the receiving surface water / groundwater environment will be temporary and not significant adverse during the Construction Phase. Taking account of proposed mitigation measures, effects on the receiving surface water / groundwater environment will also be temporary and not significant adverse during the Operational Phase of the proposed development.

Therefore, no significant cumulative effects are likely.

14.3.9 Cultural Heritage

Cumulative effect is defined as 'The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects' (EPA 2022). Cumulative impacts encompass the combined effects of multiple developments or activities on a range of receptors. In this case the receptors are the archaeological monuments and architectural/cultural heritage sites in the immediate vicinity of the proposed development. Cumulative effects at the construction and operational stages are considered.

The proposed development site for the Effluent Balancing and Resource Recovery System is located in the southwest portion of an existing biopharmaceutical facility, WuXi Biologics Dundalk. The proposed development will see the proposed development Effluent Balancing and Resource Recovery System located to the west of the existing WuXi Biologics biopharmaceutical facility. The construction phase of the proposed development will have a direct impact on the subsurface archaeological features highlighted by the test trenching carried out in 2023, as well as additional potential subsurface archaeology which was not picked up through testing. The rich archaeological potential of this area was demonstrated through the results of previous excavations, in particular the excavations carried under Licence No. 19E0060 (CH030). Hence, the evidence suggests that there is a strong potential of subsurface archaeology being impacted during the construction phase. However, given the subsurface nature of potential archaeology, the potential to excavate this site through the construction phase will provide data to the archaeological community from the potential subsurface sites. The potential to gain knowledge outweighs the negative impact. Furthermore, the implementation of mitigation measures for the proposed development will ensure that the cumulative effect is neutral and not significant.

Subject to the implementation of the appropriate archaeological mitigation measures during the construction phase of the development, no residual cumulative impacts on archaeological, architectural and cultural heritage are predicted.

14.3.10 Material Assets

Due to the nature and scale of the proposed development, no cumulative impacts are anticipated during the construction or operational phases of the proposed development associated with built services. There will be no likely significant effects regarding built services due to cumulative effects.

Based on the scale and nature of the proposed development and given that a RWMP will be prepared and implemented for the construction phase, no cumulative effects are anticipated during the construction or operational phases of the proposed development associated with waste generation. There will be no likely significant effects associated with waste management and / or generation.

14.4 Summary

No likely significant effects have been identified as a result of potential cumulative effects between effects identified in the technical chapters of the EIAR and other committed developments.

Furthermore, in most cases such interactions are unlikely to occur.

No significant cumulative effects are likely to arise from the proposed development.

15. Interactions

15.1 Introduction

This chapter describes interactions between effects on different environmental factors. All potential interactions have been addressed as required throughout the EIAR. During the scoping, baseline assessment and impact assessment stages of this report, contributors (as set out in Chapter 1 of the EIAR) have liaised with each other where relevant to ensure that all such potential interactions have been assessed. A detailed description of the proposed development is presented in Chapter 2 – Project Description.

15.2 Summary of Interactions

The interactions between each of the topics as discussed within Chapter 4 to Chapter 13 of this EIAR have been considered in order to determine the potential direct and indirect environmental impacts, via various pathways, which could arise as a result of the proposed residential development. This section of the EIAR has been prepared in accordance with EPA 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022) which states the following;

> 'Some topics could be placed under more than one heading, for example where hydrogeology is a relevant topic it may be relevant under the heading of 'Aquatic Ecology' as well as under 'Water' or 'Ground Water.' Another example would be amenity which may be relevant under 'Population and Human Health' and 'Landscape'. The requirement for the EIAR to consider 'Interactions' addresses this issue by ensuring that effects are cross-referenced between topics, thus reducing the need to duplicate coverage of such topics.'

A summary matrix showing significant interaction and interdependencies between environmental attributes specifically in relation to the proposed development is presented in Table 15-1. Each environmental topic considered within this EIAR is further discussed below, in Section 15.3 (Population and Human Health) to Section 15.12 (Material Assets).

Table 15-1 – Summary Interactions Matrix

	Chapter 4 - Population & Human Health		Chapter 5 - Biodiversity		Chapter 6 - Landscape and Visual		Chapter 7 - Air Quality, Odour and Climate		Chapter 8 - Noise & Vibration		Chapter 9 - Traffic		Chapter 10 - Land, Soils & Geology		Chapter 11 - Water		Chapter 12 - Cultural Heritage		Chapter 13 - Material Assets	
	Con.	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*	*Con.*	*Op.*
Chapter 4 - Population & Human Health			✗	✗	✗	✗	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✗	✗	✗	✗
Chapter 5 - Biodiversity	✗	✗			✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗
Chapter 6 - Landscape & Visual	✗	✗	✓	✓			✗	✗	✗	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗
Chapter 7 - Air Quality	✓	✓	✓	✓	✗	✗			✗	✗	✓	✓	✓	✓	✗	✗	✗	✗	✓	✓
Chapter 8 - Noise & Vibration	✓	✓	✓	✓	✗	✗	✗	✗			✓	✓	✗	✗	✗	✗	✗	✗	✗	✗
Chapter 9 - Traffic	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓			✗	✗	✗	✗	✗	✗	✗	✗

	Chapter 4 - Population & Human Health		Chapter 5 - Biodiversity		Chapter 6 - Landscape and Visual		Chapter 7 - Air Quality, Odour and Climate		Chapter 8 - Noise & Vibration		Chapter 9 - Traffic		Chapter 10 - Land, Soils & Geology		Chapter 11 - Water		Chapter 12 - Cultural Heritage		Chapter 13 - Material Assets	
Chapter 10 - Land, Soils & Geology	✓	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗			✓	✓	✗	✗	✓	✓
Chapter 11 - Water	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓			✗	✗	✓	✓
Chapter 12 - Cultural Heritage	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗			✗	✗
Chapter 13 - Material Assets	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✓	✓	✓	✓	✗	✗		

15.3 Population and Human Health

Population and human health attributes interact with other environmental attributes as outlined in Chapter 4 of this EIAR and summarised as follows:

- **Air Quality, Odour and Climate Change** - Potential impacts on the receiving air quality and odour environment could also result in associated human health impacts. However, the mitigation measures referenced in Chapter 4 – Population and Human Health, and those relevant in Chapter 7 – Air Quality, once in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Traffic related air emissions have the potential to effect air quality which can affect human health. As the operational phase air dispersion modelling has shown, emissions of air pollutants are significantly below the ambient air quality standards which are based on the protection of human health. The mitigation measures referred to in Chapter 4 – Population and Human Health, and those relevant in Chapter 7 – Air Quality, Odour and Climate Change, once in place, will result in no potential for impact when these topics do interact.

- **Noise & Vibration** - Potential impacts on the receiving noise and vibration environment could also result in associated human health impacts. However, the mitigation measures referred to in Chapter 4 – Population and Human Health, and those relevant in Chapter 9 – Noise and Vibration, once in place, will result in no potential for impact when these topics do interact.

- **Land, Soils & Geology** - Potential impacts on the receiving land, soils and geology environment could also result in associated human health impacts. However, the mitigation measures referenced in Chapter 4 – Population and Human Health, and those relevant in Chapter 11 – Land, Soils and Geology, once in place, will result in no potential for impact when these topics do interact.

- **Water** - Potential impacts on the receiving water environment could also result in associated human health impacts. However, the mitigation measures described in Chapter 4 – Population and Human Health, and those relevant in Chapter 11 – Water, once in place, will result in no potential for impact when these topics do interact.

15.4 Biodiversity

Biodiversity attributes interact with other environmental attributes as outlined in Chapter 5 of this EIAR and summarised as follows:

- **Water** – Potential impacts on the receiving hydrology and hydrogeology environment could also result in associated biodiversity impacts. However, the mitigation measures described in Chapter 5 – Biodiversity, and those relevant in Chapter 11 – Water, once in place, will result in no potential for impact when these topics do interact.

- **Landscape** – Potential impacts on the receiving landscape and visual environment could also result in associated biodiversity impacts. However, the mitigation measures described in Chapter 5 - Biodiversity, and those relevant in Chapter 6 – Landscape and Visual, once in place, will result in no potential for impact when these topics do interact.

- **Air Quality** – Potential impacts on the receiving air quality environment could also result in associated biodiversity impacts. However the Air Quality assessment has shown that the emissions generated from the development are very limited and do not have potential to generate a significant adverse impact on the local ecosystems including birdlife and wildlife. Furthermore, the mitigation measures described in Chapter 5 - Biodiversity, and those relevant in Chapter 7 – Air Quality, once in place, will result in no potential for impact when these topics do interact.

- **Noise & Vibration** – Potential impacts on the receiving noise and vibration environment could also result in associated biodiversity impacts. However, the mitigation measures described in Chapter 5 - Biodiversity, and those relevant in Chapter 8 – Noise and Vibration, once in place, will result in no potential for impact when these topics do interact.

15.5 Landscape and Visual

The potential for interactions with Biodiversity will be limited for the areas of the land to be improved with wildflower mix as part of the site layout plans and mitigation which will have some net biodiversity gains through the provision of pollinator friendly species. Much of the Site falls with species poor grassland, which will be altered to accommodate the works and subsequently reseeded. There are no established mature trees within the Site nor does the proposed development affects any just outside of the Site boundaries through suitable mitigation measures. Please refer to Chapter 5 Biodiversity.

The potential for interaction with Traffic & Transport will be indirect adverse effects upon the landscape character as a result of the movement of traffic during the construction phase and to a lesser extent during the operational phase. Similarly, there will be localised adverse to Neutral effects on the visual amenity as result of changes to existing traffic levels within the immediate surroundings, again being greatest during the construction phase while less prevalent during the operational phase. Please refer to Chapter 9 Traffic.

The potential interaction with Land and Soils will occur during the earthworks of the construction phase with movement of soils through the site and the temporary and permanent stockpiling of soils as a result of ground clearance and excavation altering the existing topographical levels and character of the Site. The purpose of this works is to lower the built structures within their immediate setting which along with the newly created grassed berms aims to help screen the Proposed Development from the nearest visual receptors as part of the mitigation measures. Please refer to Chapter 10 Land, Soils and Geology.

15.6 Air Quality

The impact of air quality on human beings living in the area of the proposed development has been addressed above for the construction and operational phase of the project. Refer to Chapter 7. The impact assessment shows that the air quality effects that will be experienced by human beings in the vicinity of the project are all within the prescribed criteria. This interaction is described as neutral for the operational phase and is quantified as Not Significant.

This assessment has shown that the emissions generated from the development are very limited and do not have potential to generate a significant adverse impact on the local ecosystems including birdlife and wildlife. Air Quality in the area is good as shown in Section 7.3 and the Air Quality Standards will not be exceeded as a result of the project thereby ensuring that no significant adverse impact on ecosystems arises. This interaction is described as neutral and quantified as Not Significant.

15.7 Noise and Vibration

15.7.1 Population and Human Health

The impact assessment of noise and vibration has concluded that additional noise associated with the Proposed Development will not have any significant negative impacts. Mitigation and monitoring measures will be incorporated to further reduce the potential for noise generation from the Proposed Development.

15.7.1.1 Construction Noise & Human Health

In terms of the noise exposure of construction workers, the Safety, Health and Welfare at Work (General Application) Regulations 2007 (Statutory Instrument No. 299 of 2007) provides guidance in terms of allowable workplace noise exposure levels for employees. The Regulations specify two noise Action Levels at which the employer is legally obliged to reduce the risk of exposure to noise. The appointed contractor will be required to comply with the Regulations and provide appropriate noise exposure mitigation measures where necessary.

The noise exposure level to off-site receptors during the construction phase will be below the lower Action Level and therefore the risk of noise exposure resulting in hearing damage to off-site receptors is not significant.

In terms of construction noise emissions to nearby off-site receptors, provided that noise emissions are controlled to comply with the recommended significance thresholds, as outlined in previous sections, and considering the short-term nature of the works, the potential health effects associated with construction noise is negative, minor, short term.

15.7.1.2 Operational Noise and Human Health

The operational phase outward noise emissions will be controlled to comply with the recommended EPA and World Health Organisation (WHO) Guidelines, the potential health effects associated with operational phase of the proposed development noise emissions are neutral, not significant and permanent.

15.7.2 Biodiversity

The Noise and Vibration effects of the proposed development will cause some disturbance to the local fauna during the Construction Phase of the proposed development; however, the proposed mitigation measures will reduce this disturbance.

15.7.3 Traffic

There is the potential for traffic related noise to impact residents during the Construction and Operational Phase of the proposed development; however, due to the implementation of the proposed mitigation measures, there will be no significant impact.

15.8 Traffic

All interactions with traffic during both Construction and Operational Phases have been identified in the relevant Chapters and where appropriate, mitigation measures have been applied. The following provides a summary of the identified interactions:-

- **Air Quality and Climate** - During the construction stage, on-site construction works will contribute to a temporary decrease in air quality. In the development operational stage traffic generation associated with the development will contribute to increased traffic volumes on the surrounding network which in turn will decrease air quality. Further details in relation to direct impacts are addressed in Chapter 7 – Air Quality.

- **Noise and Vibration** - During the construction stage, development of the Site will result in a short-term increase of construction traffic. Further details in relation to direct impacts and mitigation are addressed in Chapter 8 – Noise and Vibration.

15.9 Land, Soils and Geology

Potential human health risks associated with quality impacts to soils arising from the proposed development during the Construction Phase have been identified as follows;

  - Potential risk to receptors (i.e., construction workers) through direct contact, ingestion or inhalation with any soils which may potentially contain hydrocarbon concentrations from Site activities (potential minor leaks and spills of fuels, oils and paint). However, this risk will be addressed by implementation of the mitigation measures outlined fully in Chapter 10 – Land, Soils and Geology.

  - Taking account of the baseline environmental setting and the proposed mitigation measures during the Construction Phase, minimal human health risks associated with exposure to contaminants (via. direct contact, ingestion or inhalation) resulting from the proposed development are anticipated.

- **Air Quality, Odour and Climate** - Potential impacts on the receiving Land, Soils and Geology environment could also impact on air quality conditions present. However, the mitigation measures described in Chapter 10 – Land, Soils & Geology, and those relevant in Chapter 7 - Air Quality, once in place, will result in no potential for impact when these topics do interact.

- **Water** - Potential impacts on the receiving land, soils and geology environment could also impact on hydrology and hydrogeology conditions present. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 10 – Land, Soils & Geology, once in place, will result in no potential for impact when these topics do interact.

- **Material Assets –** Resource and waste minimisation and management play a key role in minimising Land Soils and geology impacts. Mitigation measures described in Chapter 7 – Air Quality, and those relevant in Chapter 13 – Material Assets, once in place, will result in no potential for impact when these topics do interact.

15.10 Water

Water attributes interact with other environmental attributes are summarised as follows: -

Population & Human Health - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on human health. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 4 – Population and Human Health, once in place, will result in no potential for impact when these topics do interact.

Biodiversity - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on biodiversity conditions present, due to indirect connectivity. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 5 – Biodiversity will ensure that this will not occur.

Land, Soils & Geology - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on land, soils, and geology conditions present. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 10 – Land, Soils and Geology will ensure that this will not occur.

Material Assets - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on receiving material assets (utilities / waste) conditions present. However, the mitigation measures described in Chapter 11 – Water, and those relevant in Chapter 13 – Material Assets will ensure that this will not occur.

15.11 Cultural Heritage

This section will assess how the cultural heritage interacts with other environmental attributes. The attribute of particular relevance is landscape setting and visual amenity. None of the archaeology within the vicinity of the proposed development have above ground surviving elements. The closest site to the proposed development is the enclosure (CH003) of which the southern side was excavated in 2019. The northern side is still extant but does not survive above ground. Sites which have no above ground surviving elements are not currently visual amenities and so are not considered in terms of an amenity impact. The archaeological and architectural heritage sites that do survive above ground are located at such a distance that the proposed development will not have visual impact on the sites. In can therefore be concluded that here will be no significant visual impact on the amenity associated with any CH features from the proposed development.

15.12 Material Assets

Traffic is one of the environmental attributes typically assessed under Material Assets. For the purposes of this EIAR a full Traffic Impact Assessment has been undertaken and is presented in Chapter 9 – Traffic, along with all relevant mitigation measures.

Material Assets attributes interact with other environmental attributes as outlined in Chapter 13 of this EIAR and summarised as follows: -

- **Land, Soils and Geology** – Potential impacts could arise from waste soils / materials generated during the proposed development. However, taking account of the mitigation measures described in Chapter 13 – Material Assets, and those relevant in Chapter 10 – Land, Soils and Geology, once in place, there will be some likely residual effect albeit slight.

- **Water** – Potential impacts from the development may affect the existing foul water network and existing surface water supply network during construction of the proposed development. This impact is considered unlikely, but, if occurred, would be temporary and moderately adverse. Mitigation measures described in Chapter 13 – Material Assets and Chapter 11 – Water, once in place, will result in no potential for impact when these topics do interact.

- **Air Quality, Odour and Climate –** Resource and waste minimisation and management play a key role in minimising climate related impacts. Mitigation measures described in Chapter 13 – Material Assets, and those relevant in Chapter 7 – air quality, once in place, will result in no potential for impact when these topics do interact.

16. Schedule of Environmental Commitments

All mitigation and monitoring commitments detailed within this EIAR have been included in a separate compendium and are presented in Table 16-1 and 16-2 below. Together these tables form the Schedule of Environmental Commitments which will be implemented as required during the construction and operational phases of the proposed development at Dublin Airport. In addition, the following reinstatement commitments must be fully implemented upon completion of the construction phase:

- The temporary construction compound is to be removed upon completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings;
- All construction waste and / or scrapped building materials are to be removed from the Site on completion of the construction phase;
- Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase; and,
- Any remaining liquids are to be removed from Site and disposed of at an appropriately licenced waste facility.

All of the mitigation and monitoring commitments detailed below have been incorporated into the Outline Construction Environmental Management Plan (CEMP) submitted as part of this planning application; this is a live document which will be further added to in the Detailed CEMP prepared by the Contractor and will include any future additional mitigation measures as may be required.

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
1	Chapter 4 – Population and Human Health	The Proposed Development will have minor adverse effects during the construction and operation phases on population and human health as stated above in Table 4-3 and Table 4-4. However, mitigation measures as presented within the relevant technical chapters (Chapter 7 - Air Quality; Chapter 8 – Noise and Vibration; Chapter 10 – Land, Soils and Geology; and Chapter 11 – Water) and Chapter 16 - Schedule of Commitments, will be implemented as part of the proposed development.		
2	Chapter 5 – Biodiversity	**Mitigation of habitat loss/damage during construction** Boundary treelines are to be retained on-site. WuXi Biologics land boundaries (treelines) will be protected from any accidental damage during construction by means of exclusion through use of fencing around delineated works areas. No excavated materials will be stockpiled within 10m of treelines. Construction and construction related activities (including the deposition of excavated soil) shall not take place outside of the red line boundary of the proposed development site. Following the inclusion of the aforementioned mitigation measures the effects to retained habitats; treelines will be imperceptible. As noted above, there will be a permanent loss of ca. 0.8 hectares of grassland habitat. The design of the proposed development includes for areas of wildflower planting around the internal roadway leading to the treatment plant (Refer to Site Layout Drawing 1011-000121-FGCL-XX-XX-DR-C-1005B submitted with this application). The wildflower planting includes species attractive to pollinators and as such the planting will attract feeding invertebrates, including moths, butterflies and bees. The mixtures of flowering plants will encourage a diversity of insects which in turn could help to sustain birds, bats and other wildlife. Following the establishment of the wildflower planting the loss of 0.8heactares of grassland is mitigated to a slight adverse effect over the long term at a local site level.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
2	Chapter 5 – Biodiversity	**Invasive species prevention** No legally restricted invasive species, such as Japanese knotweed, were found within the proposed development site. Strict bio-security protocols will be implemented during the construction phase so as to ensure no imported materials potentially contaminated with invasive plant species are brought to the development site. All imported soil materials will be visually inspected by the Contractor/Contractors Environmental Manager/Contractors Ecologist for signs of invasive plant contamination (such as root fragments, rhizome material) prior to arrival on site. The Contractors Environmental Manager/Contractors Ecologist will develop biosecurity mitigation / control measures that are required to be implemented in liaison with the Site Manager. Such measures include, but are not limited to the following: • The contractor will be obliged to prepare a method statement which shall include the following biosecurity measures (non-exhaustive list); – If preconstruction surveys identify invasive species within the proposed development site, including access routes, no works will commence until a management plan is drawn up by a relevant specialist; – Before arriving on site, all vehicles and machinery will be thoroughly cleaned via. a high pressure steam clean with water temperatures of at least 60°C where possible. If a steam clean is not feasible then a normal power hose shall be used. All vehicles and machinery will be visually inspected after being washed to ensure all material and debris has been removed; – All equipment (including footwear) will be visually inspected, while entering and exiting the site, for evidence of attached plant or animal material and mud or debris should they come into contact with water or soils. Should material be attached, it will be removed as appropriate;		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
2	Chapter 5 – Biodiversity	– Cleaning should not be undertaken on the site or near watercourses but at locations which have appropriate facilities such as garages or where a specially designed and drained area is provided on site with discharge through settlement ponds; and, – The contractor will be obliged to sign a form detailing the cleaning that has been carried out and the date on which it was conducted. Given the inclusion of the biosecurity measures no adverse effects are anticipated from invasive plant species. **Faunal species mitigation** The following mitigation measures will be implemented during the construction phase of the proposed development; • Any large excavations will be created with sloping sides to ensure terrestrial mammals do not get trapped in excavated areas. Any smaller excavations will be covered outside of working hours to ensure mammals do not get trapped. • Non-essential lighting (non-security/safety) will be kept to a minimum. Construction phase lighting (e.g. site compound lighting) will be switched off during night-time hours during spring and summer months so that forging and/or commuting bats are not negatively affected by construction phase lighting. Given there will be a direct loss of foraging habitat associated with the construction of the proposed development in the form of grassland areas, overall effects to faunal species will be permanent slight adverse at a local site level.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
2	Chapter 5 - Biodiversity	During the operational phase all the emissions from the Effluent Balancing and Resource Recovery System are limited to sludge, treated waters and odours. The sludge derived from the treatment process will be dried and transported off site to a licenced waste facility. The treated waters that remain from the treatment process will be discharged from the development site to the local sewer network for treatment at Dundalk WwTP which has the capacity to accommodate the loads. Once the treatment process is operational reducing the risk of overloading the WwTP is considered a positive effect on receiving coastal waters over the long term. Proposed and existing surface water drainage infrastructure will ensure surface water run-off from the development site is treated prior to discharge to the local public sewer where it is then subject to further treatment at Dundalk WwTP. Effects to the receiving coastal waters from surface water run-off from the development site are therefore considered to be imperceptible over the long term.		
3	Chapter 6 – Landscape and Visual	The site works will be undertaken in accordance with a Construction Environmental Management Plan (CEMP), of which a number of minimum site management controls are provided in the CEMP as outlined in Chapter 2 of this EIAR. Any clearance of any vegetation will be carried out in accordance with the CEMP and under supervision of the clerk of works ecologist. The existing hedgerows and trees adjoining the Site boundaries and the extent of their root protection areas (RPAs) within the site boundary will be protected by installation of temporary herras type fencing in accordance with BS5837:2012: Trees in Relation to Construction. Any necessary trimming back of trees or excavating/other site works close to these trees and their RPAs during the proposed site works will be supervised by an appointed arborist.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
3	Chapter 6 – Landscape and Visual	The proposed development works will include excavating large areas of ground with the resulting disturbed soil and rock being retained on site and reused elsewhere for the Site's screening berms and soft landscape areas. Where required any temporary storage of soil on site will be carried out in accordance with the CEMP. Visual impacts will be mitigated through the appropriate site management measures and good work practices to ensure the Site is kept tidy and free of rubbish, dust is kept to a minimum, and that public access along the road network is kept free to minimise disruption to local residences and road users. Access will also be provided via the temporary internal haulage route within the site to minimise disturbance to the local road network. Works will be carried at agreed hours with the council. Any lighting will be directional towards the works area so to minimise light spillage. Site hoarding will be appropriately scaled, finished and maintained for the period of construction. Similarly, other structures including the site compound, scaffolding and security fencing will be temporary in nature and contained with the extent of the works area. The temporary compound area will be cleared of all machinery, structures and materials with the grounds levelled, cultivated and reseeded so to reinstate back to grassland.		
		The proposed planting measures include a wildflower area to the main embankment on the plant road and rough pasture grass mixes across the on the new berm and any other areas of disturbed grounds within the Site. A landscape contractor will maintain these landscaped areas to ensure the new vegetation cover across these earthworks quickly become established to help prevent any potential soil erosion or dust and improve their visual appearance and their integration into the immediate landscape. The boundary trees will be maintained by pruning back whenever required. All newly landscaped areas across the proposed development will be incorporated into the overall landscape maintenance scheme of the wider WuXi Biologics lands.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
3	Chapter 6 – Landscape and Visual	All access to the proposed development and activity will be undertaken within agreed working hours agreed with Louth County Council. The Site's lighting scheme has been designed so to prevent unnecessary light spillage and the use of sensor lighting to ensure lighting is permanently turned on. Other relevant design measures include keeping noise and vibration from operating plant equipment will be maintained at a low dB rating and effluent balancing and resource recovery plant has a dedicated odour treatment facility and low dust emission. All of which will ensure the operating plant doesn't cause any potential nuisance for local receptors and within the receiving landscape.		
4	Chapter 7 – Air Quality and Climate	A Dust Management Plan will be formulated for the construction phase for as construction activities are likely to generate some dust emissions. The principal objective of the Plan is to ensure that dust emissions do not cause significant nuisance at receptors in the vicinity of the site. The most important features of the Dust Management Plan are summarised as follows: • A designated Site Agent will be assigned overall responsibility for Dust Management; • The design of the site and Construction programme considers dust impact management and chooses design approaches to minimise dust emissions; • An effective training programme for site personnel will be implemented for the duration of the Construction Programme; • A strategy for ensuring effective communication with the local community will be developed and implemented; • A programme of dust minimisation and control measures will be implemented and regularly reviewed; and, • A monitoring programme will be implemented. The design of the construction programme and the location and layout of the construction compound and the storage of materials will be carefully planned to ensure that air quality impacts are minimised. The following is a summary of the main mitigation features for the proposed development and the specific mitigation		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
4	Chapter 7 – Air Quality and Climate	measures which will be employed in order to minimise emissions from the activity and the associated impacts of such emissions: • Activities with potential for significant emissions will wherever possible be located at a position as far as possible removed from the nearest residential and commercial receptors; • The areas on site which vehicles will be travelling on will generally be hard-surfaced or compressed ground thus significantly reducing the potential for dust emissions from the vehicles; • The construction compound area will have hard standing areas to minimise dust generation from wind-blow. • In order to minimise the potential for wind-generated emissions from material storage bays, these bays will be oriented away from the dominant wind direction to minimise the effects of wind on release of dust and particulate. • The relatively coarse particle size (30 – 75µm) associated with the activity means that the particles will generally be deposited close to the emission source and will not travel significant distances away from the site. • Fixed and mobile water sprays will be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather. • A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management. • A dust deposition monitoring programme will be implemented as outlined in section 7.14 at the site boundaries for the duration of the construction phase in order to verify the continued compliance with relevant standards and limits. **Proposed Mitigation Measures** **Character of potential impact** | **Mitigation measure** Construction Phase		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures		Construction Phase	Operational Phase
4	Chapter 7 – Air Quality and Climate	Dust deposition	A Dust Management Plan will be formulated for the construction phase of the project. A monitoring programme will be implemented Roadways will be hard-standing wherever possible to minimise dust emissions The construction compound area will have hard standing areas to minimise dust generation from wind-blow Fixed and mobile water sprays will be used to control dust emissions A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management Activities with potential for significant emissions will be located as far as possible from the nearest residential and commercial receptors where possible		
		Operational Phase			
		Odour	Odour control system will treat emissions and ensure that odour effects are within the required performance level to ensure that no adverse impact arises.		
5	Chapter 8 – Noise and Vibration	With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2'. Whilst construction noise and vibration impacts are calculated to be within the criteria set out in Section 8.2.1.1 in this document, the contractor will ensure that all necessary noise and vibration control measures will be used, in order to ensure impacts to nearby residential noise			

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5	Chapter 8 – Noise and Vibration	sensitive locations are not significant. The following mitigation measures are required during the construction of the proposed development:
		
		• Limiting the hours of construction to the following:
		  ○ Monday to Friday 07.00 – 19.00
		  ○ Saturday 07.00 – 13.00
		
		In exceptional circumstances, and subject to agreement with LCC, extended hours of operation may be applied for. In such instances an assessment of potential noise impacts shall be carried out in advance of works taking place, and submitted to LCC, as part of the extended hours request.
		
		• Continual monitoring of noise and vibration throughout construction at western site boundary closest to the receptors (i.e. Location N3), for the duration of the proposed development.
		
		The noise monitoring equipment shall meet the following minimum specification (or similar approved):
		
		○ Logging of hourly noise (LAeq & LAFMax) and vibration (PPV) samples;
		○ E-mail alert on threshold exceedance;
		○ E-mail alert on low battery and low memory;
		○ Remote access to measured data.
		○ Data shall be reported on a monthly basis to Wuxi Biologics.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
5	Chapter 8 – Noise and Vibration	• A 2.4m high site hoarding should be erected around the construction area • Maintaining site access roads to mitigate the potential for noise from lorries • Selection of plant with low inherent potential for generation of noise and/ or vibration • Situate any noisy plant as far away from sensitive properties as is reasonably practicable and the use of vibration isolated support structures where necessary • Establishing channels of communication between WuXi, the contractor, Local Authority and residents • Appointing a site representative responsible for matters relating to noise and vibration.		
		The cumulative predicted noise levels during the operational phase of the development are compliant with the limits set out in the licensed issued by the EPA under Industrial Emissions Licence P1122-01. However, the licence also states that during night-time hours there should be no clearly tonal component or impulsive component in the noise emission from the activity audible at any noise sensitive location. Based on the preliminary plant information provided at this stage, the following plant items have been identified as having potential tonal components, at source, using the EPA NG4 objective tonal (1/3 Octave) identification method: • Screens - Progressive Stair Screen • Balance Tanks - Jet Mixers • Lamellas & Mixers • Sludge Transfer Pumps		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
5	Chapter 8 – Noise and Vibration	• Dewatering Feed pumps • Off-Spec Tanks - Jet Mixers • Blowers, • Membrane Skids • Cake Pumps • Dewatering Units (Screw presses). These plant items may require additional review and potential additional noise mitigation measures, which will be designed and implemented (where required) at detailed design stage i.e. once final plant item selection have been made. Mitigation measures will be implemented, where required, in order to ensure that the IEL Licence requirements (i.e. for tonal noise emissions to not be clearly audible at NSL's) is achieved. Analysis of the 1/3 octave predicted noise levels based on the current plant selection, shows that no audible tones are anticipated at noise sensitive receptors. However, this analysis should be repeated once the plant items and suppliers have been finalised.		
6	Chapter 9 – Traffic	The following measures will be adopted around the perimeter of the project for security and protection purposes: • All site access will be well lit, clean, robust level hard-standings, well signed and controlled by experienced gatemen. Doors and gates will be closed at all times when not providing access. • The traffic management team will be clean and well presented at all times. The contractor's detailed Construction Traffic Management Plan will address the following key issues:		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
6	Chapter 9 - Traffic	• Maintaining free traffic flow along the local road networks. • Ensuring all footpaths and road surfaces are always free from debris. • Ensuring the efficient free flow of operatives entering and exiting the proposed development site. • Managing the distribution flow of materials within the site and debris removal to maintain the required levels of productivity whilst achieving the high-quality standards expected. • Plant and operative segregation during all stages of the proposed development. • Robust traffic management principles and practices will need to be enforced to ensure construction traffic does not create congestion and cause inconvenience to the adjacent tenants and the public. • Protection to the public for the duration of the project construction phase on all elevations. All deliveries will be through regional roads, M1 and N52. The contractor will develop a detailed Logistics Plan to identify the delivery schedule requirements for every delivery. It is anticipated that the contractor will operate a "Just in Time" delivery philosophy to minimise materials stored on site and reduce congestion in and around the works compound		
7	Chapter 10 – Land, Soils and Geology	The excavation of material will be minimised as much as possible to reduce the impact on soils and geology. The total volume of soil requiring excavation for the proposed development is expected to be ca. 34,407m^3. All excavated soil will be retained on site with a haul length of ca. 200m from the excavation pit to the south of the site and will be used for landscaping purposes. It is therefore anticipated that there will be no waste soils generated which will require offsite removal. In the unlikely event that soil material is unsuitable for use/ excess soil is generated, all waste soils (including made ground) will be appropriately sampled and tested prior to offsite removal, and classified in accordance with the EPA Guidance Document *'Waste Classification, List of Waste & Determining if Waste is Hazardous*		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
7	Chapter 10 – Land, Soils and Geology	*or Non-Hazardous'* (2015). It will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation. Excavated bedrock / waste rock (ca. 5,545 m^3) will be stockpiled within the red line boundary and removed for offsite disposal to a suitably licenced / permitted waste facility, and will be appropriately sampled and tested prior to offsite removal. This material will be classified in accordance with the EPA Guidance Document *'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* (2015). It will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation. It will be the Contractors responsibility to ensure that a project specific Detailed Resource and Waste Management Plan (developed in accordance with relevant 2021 EPA Guidance) is fully implemented onsite for the duration of the project. Further mitigation measures for the prevention of soil / bedrock contamination during construction are proposed below. The Contractor will be responsible for ensuring these measures are fully implemented. Mitigation measures outlined in Chapter 11 - Water are also applicable to the protection of soils and geology during the construction phase: • Earthworks / piling plant and vehicles delivering construction materials to Site will be confined to predetermined haul routes around the Site for each phase of the proposed development; • The need for vehicle wheel wash facilities will be assessed by the Contractor depending on the phasing of works and onsite activity and will be installed as needed, near any Site entrances and		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
7	Chapter 10 – Land, Soils and Geology	road sweeping implemented as necessary to maintain the road network in the immediate vicinity of the Site; • Dust suppression measures (e.g., dampening down) will be implemented as necessary during dry periods; • All excavated materials will be stored away from the excavations / immediate works area, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3m; • A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site; • The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the proposed development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in Chapter 11 – Water; and, • Specifically, regarding pollution control measures, the following will be adhered to; ▫ Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice. All materials will be sufficiently bunded ▫ Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling;		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
7	Chapter 10 – Land, Soils and Geology	▫ Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the proposed development and properly disposed of; ▫ The contractor will have a dedicated area within the compound for refuelling plant or any other equipment that is bunded and has the necessary spill kit equipment and adsorbents available as and when required in line with any statutory IEPA & H&S legislations. ▫ The Environmental Manager will ensure that adequate supplies are available and replaced when used. Used spill kits, adsorbents will be stored in labelled containers awaiting disposal to a licenced waste disposal facility. ▫ All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area; ▫ All machinery will be serviced before being mobilised to Site; ▫ Refuelling will be completed in a controlled manner using drip trays at all times; ▫ Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water; ▫ Ancillary equipment such as hoses and pipes will be contained within the bund; ▫ Taps, nozzles, or valves will be fitted with a lock system; ▫ Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage;		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
7	Chapter 10 – Land, Soils and Geology	▫ Drip-trays will be used for fixed or mobile plant such as pumps and generators to retain oil leaks and spills; ▫ Only designated trained operators will be authorised to refuel plant on Site; ▫ Procedures and contingency plans will be set up to deal with emergency accidents or spills. All subcontractors will be provided with training on spillages as part of their site induction training; ▫ An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment; ▫ Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-Site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of soils and bedrock becoming contaminated through Site activity; and, ▫ The highest standards of Site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the Site to ensure that they are operating safely and effectively. • In the highly unlikely event that ground contamination is encountered beneath the site during the construction works, all works will cease. Advice will be sought from an experienced contaminated land specialist and a phased environmental risk assessment (specifically to assess any associated potential environmental and/ or human health risks) will be undertaken in accordance with relevant EPA guidance 'Guidance On The Management Of Contaminated Land And		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
7	Chapter 10 – Land, Soils and Geology	Groundwater At EPA Licensed Sites' (EPA, 2013) and UK Environment Agency Guidance 'Land contamination risk management (LCRM)' (UK EA, 2021). The above mitigation measures will be incorporated (as required) during Detailed Design Stage and form part of the Construction Environmental Management Plan (CEMP) which will be implemented during the Construction Stage. The Outline CEMP submitted as part of this application may be altered, if necessary, in light of conditions which may be imposed on the planning permission.		
		Based on the findings of this assessment no mitigation measures associated with the operational phase of the project are required. Standard measures / monitoring requirements will be adhered to during the operational phase		
8	Chapter 11 – Water	With regard to groundwater quality effects the following mitigation measures are proposed. The Contractor will be responsible for ensuring these measures are fully implemented: • The construction management of the site will take account of the recommendations of the Construction Industry Research and Information Association (CIRIA) guidelines '*Control of water pollution from construction sites. Guidance for consultants and contractors (C532)'* and *'Groundwater control: design and practice (second edition) (C750)'* and CIRIA 2015 '*Environmental good practice on site guide (fourth edition) (C741)'* to minimise as far as possible the risk of pollution. • All of the mitigation measures (for the protection of soils and geology) listed in Chapter 10 will be implemented onsite during the construction phase. • The Contractor will be responsible for ensuring that the existing drainage network, onsite attenuation pond and any onsite groundwater monitoring wells will be suitably protected (via. the use of physical barriers and / or the implementation a Site-specific water run-off management plan as required).		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
8	Chapter 11 – Water	• In order to prevent any potential surface water / groundwater impacts via. release of hydrocarbon / chemical contaminants the following standard measures will be implemented: ○ Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice; All material will be adequately bunded. ○ The contractor will have a dedicated area within the compound for refuelling plant or any other equipment that is bunded and has the necessary spill kit equipment available as and when required in line with any statutory IEPA & H&S legislations. ○ Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling; • A response procedure will be put in place to deal with any accidental pollution events. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the proposed development and properly disposed of in accordance with all relevant waste management legislation; ○ All site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area. Tanks containing diesel or any fuel will be double skinned. ○ Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the site. This will minimise the risk of groundwater becoming contaminated through site activity. Contractors will be made aware of spill control procedures during their site induction training.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
8	Chapter 11 – Water	○ All oil stored on site for construction vehicles will be kept in a locked and bunded area; ○ Generators, pumps and similar plant will be placed on drip-trays to prevent contamination; ○ All temporary construction fuel tanks will also be located in a suitably bunded area and all tanks will be double skinned. Relevant Material Safety Data Sheets along with oil absorbent materials will be kept on site in close proximity to any fuel storage tanks or bowsers during proposed site development works; and, ○ All fuel / oil deliveries to on-site oil storage tanks will be supervised, and records will be kept of delivery dates and volumes. • In order to prevent any potential groundwater impacts via. release of cementitious materials the following measures will be implemented where poured concrete is being used on site; ○ The production, transport and placement of all cementitious materials will be strictly planned and supervised. Site batching/production of concrete will not be carried out onsite and therefore these aspects will not pose a risk to the waterbodies or sensitive receptors present, namely any exposed groundwater, the onsite attenuation pond or onsite groundwater monitoring wells; ○ Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that all joints between panels achieve a close fit or that they are sealed; ○ Any spillages will be cleaned up and disposed of correctly; ○ Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening;		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
8	Chapter 11 – Water	○ Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete; ○ Mixer washings and excess concrete will not be discharged directly into the drainage network, or any drainage ditches, surface water bodies, exposed groundwater, the onsite attenuation pond or onsite groundwater monitoring wells; and, ○ Surplus concrete will be returned to batch plant after completion of a pour. • Foul drainage from site offices and site compound will be directed to the existing wastewater network via a new foul drainage facility. This discharges to the public sewer and ultimately to Dundalk WwTP. Alternatively, it will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations. • In the unlikely event that ground contamination is encountered beneath the site during the construction works, all works will cease. Advice will be sought from an experienced contaminated land specialist and a phased environmental risk assessment (specifically to assess any associated potential environmental and/ or human health risks) will be undertaken in accordance with relevant EPA guidance '*Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites'* (EPA, 2013) and UK Environment Agency Guidance *'Land contamination risk management (LCRM)*' (UK EA, 2024). • In the event that dewatering works are required during the construction phase, a temporary works design including key details such as estimated volumes of water, onsite water treatment required, disposal arrangements and permit /licence requirements as well as water quality monitoring requirements will be prepared by the Contractor and agreed with WuXi in advance of commencement of dewatering works. The above mitigation measures will form part of the Outline CEMP submitted as part of this planning application, and which will be further developed by the Contractor within the project-specific Detailed CEMP which will be in operation during the construction phase.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
8	Chapter 11 – Water	With regard to groundwater quality effects the following mitigation measures are proposed; • Any minor volumes of fuel, oil or chemicals required during routine maintenance works will be brought to and from site by the maintenance contractor. While temporarily onsite all chemicals will be kept in secure and bunded areas, with relevant Material Safety Data Sheets available onsite. Any fuel / oil tanks temporarily stored on site will be located in a suitably bunded area and all tanks will be double skinned, with oil / chemical absorbent materials held onsite in close proximity to the tanks. Relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented; • In the unlikely event of a fuel / oil or chemical spill / leak during routine maintenance works, emergency spill response measures will be implemented with the aim of limiting the volume spilled and recovering as much of the lost product as possible (relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented); and, • A maintenance programme for the proposed surface water drainage system should be implemented. The Contractor, in consultation with the Client and the design team, will be responsible for ensuring that these measures are fully implemented.		
9	Chapter 12 – Archaeology	The mitigation strategies outlined in this section detail the techniques to be adopted in order to ameliorate the impacts that the proposed development may have on features of archaeological, architectural and/or cultural heritage within the study area during both the construction and operational phases of the development. The residual impacts that will remain once these mitigation measures have been implemented as identified in Section 12.7. The following mitigation measures proposed are subject to approval by the Louth County Council, the National Monuments Service of the Department of Housing, Local Government and Heritage. The current policy of the Minister for Housing, Local Government and Heritage is that preservation *in situ* of archaeological material is the preferred option. Where this cannot be achieved then a programme of full		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
9	Chapter 12 – Archaeology	archaeological excavation should be implemented to ensure the preservation by record of all affected archaeological material. The redline boundary of the proposed development crosses the Zone of Notification for three RMPS; a souterrain (CH001), an enclosure (CH003) and habitation site (CH004). In the case of CH001 and CH003, the recorded location for both RMPS place them within the redline boundary of the proposed development. However, archaeological investigations carried out by ACSU in 2019 (Licence No. 19E0060) indicates that these sites are located to the east of the proposed development (Murphy 2023,7). CH026 represents the entirety of the area within of the application boundary that has not been previously disturbed. Preceding archaeological test-trenching was undertaken by Donald Murphy of Archaeological Consultancy Services Unit Ltd (2023) at the request of the client to assess the archaeological potential of the site, following a preceding geophysical survey carried out in May 2021 under licence number 23R0044. The test trenching was conducted between the 31st July to 8th August 2023 (CH029: Licence no. 23E0452). Archaeological test trenching succeeded in identifying the remains of at least 31 individual features. These were dominated by pits and linear ditches. CH027 represents 'an area of archaeological concern' identified during the preceding geophysical survey (23R0044) which abuts the proposed development site. Part of this area has previously been subject to archaeological investigations in 2004, 2007, 2008, 2014 and 2019-2020. Monuments identified during these investigations included a prehistoric enclosure, burials/cremation pits of the Bronze Age and Iron Age and two early medieval enclosures with associated features, including souterrains, kilns, pits, posts, and field systems, as well as causeway/trackway were exposed and excavated. The following mitigation measures are recommended: 1. The preceding archaeological assessment identified the presence of archaeological remains within the redline boundary. Thirty-one features identified included 10 linear deposits, 15 pits identified in isolated locations, 2 possible postholes, a hearth, and a metalled surface. As preservation *in-situ* is not possible, it is recommended that all archaeological features impacted by the proposed		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
9	Chapter 12 – Archaeology	development are stripped of topsoil under archaeological supervision and preserved by record (archaeological excavation) in advance of construction. 2. A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site *in situ*, where possible. Where preservation *in situ* cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014. 3. The 'Area of Archaeological Concern' (CH027) identified in the preceding geophysical survey and located immediately adjacent to the proposed development site application boundary, should entirely excluded, fenced off, and protected from all development traffic or other potential impacts from the development for the duration of the construction phase. 4. The results of any archaeological test testing, surveys and/or excavation will be submitted in a report to the Local Authority, the Heritage and Planning Division, Department of Housing, Local Government and Heritage and the National Museum of Ireland. **Please note all recommendations are subject to the approval of the Louth County Council and the National Monuments Service, Department of Housing, Local Government and Heritage.**		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
10	Chapter 13 - Material Assets	**Built Services** The following mitigation measures will be implemented during the construction phase; • Prior to demotion and construction, Ground Penetrating Radar (GPR) surveys will be undertaken to accurately locate existing utilities along the boundaries of the site; • An Outline CEMP has been prepared to support this planning application. Prior to the commencement of construction works the appointed contractor will alter, if necessary, in light of conditions which may be imposed on the permission, the CEMP further. This CEMP will take account of all of the environmental considerations (including water, dust and noise nuisance control; soil / stockpile management; temporary groundwater management; appropriate Site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the CEMP submitted as part of this planning application; • Diversion, rerouting and relocation of the following services will take place prior to construction; existing watermains and hydrants, existing lighting ducts and light poles, and existing underground electrical cables. • The construction compounds will include adequate temporary welfare facilities including foul drainage and potable water supply; • All newly installed utilities/ services will be assessed, tested and certified as required prior to being fully commissioned; • Connections to the existing and proposed foul networks will be coordinated with the relevant utility provider. All works associated with the existing utilities for the proposed development will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, and Uisce Éireann), Health and Safety Authority and any additional site-specific requirements;		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
10	Chapter 13 - Material Assets	• A copy of all available existing, and as built utility plans will be maintained on Site during the construction of the proposed development. The underground power lines and foul and water mains within the existing Uisce Éireann services, located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase; and, • Local drainage will be surveyed and, where necessary, blocked off to prevent runoff of potentially contaminated surface water entering the surface water drainage system. A detailed Surface Water Management Plan will be included in the CEMP to be prepared by the Contractor, to deal with the treatment of surface water runoff prior to discharge to the site drainage system. **Waste Management** • All waste management procedures implemented onsite during the construction phase will be in accordance with the Outline CEMP submitted as part of this planning application, and a project specific RWMP to be prepared by the Contractor, in accordance with the '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*' (EPA 2021). The RWMP will take account of the relevant requirements of the Outline CEMP, the EIAR and any relevant planning conditions etc., and will be prepared by the Contractor in advance of the commencement of any construction or demolition works. • The contractor will supply all waste containers / skips, as required, for each of the identified waste streams. Waste will be segregated and removed to licensed facilities by licenced hauliers and all containers will be emptied before they are full to avoid overflowing. The contractor is to provide a waste forecast for waste types and quantities expected to be generated. • Good working practices and take back schemes will be used to reduce the amount of waste generated, as an initial step, with waste management routes for each waste stream to be recorded in the site Resource and Waste Management Plan. There is a target of 98% diversion of construction waste from landfill to be achieved with a minimum diversion of 90%. In order to reduce waste		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
10	Chapter 13 - Material Assets	generation as far as possible, off cuts, surplus materials and packaging is to be returned to suppliers for closed loop recycling, single used plastics are to be avoided where possible and all materials are to be stored correctly to avoid waste generation from damage and contamination of incorrectly stored materials. • All waste materials will be segregated onsite into the various waste streams, via. dedicated skips and storage areas. All waste will be removed from Site by one or more waste haulage contractor(s) who hold a current valid waste collection permit issued by the National Waste Collection Permit Office (NWCPO). All waste materials generated during the construction phase will be removed offsite to an appropriately permitted or licenced waste disposal / recovery facility. All waste removed offsite will be appropriately characterised (under the correct LoW / EWC code), transported and disposed of in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996 and 2001, as amended and all subsequent waste management regulations). All waste management and disposal / recovery records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (LCC, EPA) as required. • Scheduling and planning the delivery of materials will be carried out on an '*as needed*' basis to limit any surplus materials; • Materials will be ordered in sufficient dimensions so as to optimise the use of these materials onsite, and will be carefully handled and stored so as to limit the potential for any damage; • Where feasible, sub-contractors will be responsible for the provision of any materials they require onsite in order to help reduce any surplus waste; • All loaded trucks entering and exiting the Site will be appropriately secured and covered;		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
10	Chapter 13 - Material Assets	• Dust will be controlled at entry and exits to the Site using wheel washes (as required) and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Wheel / road sweeper washings will be contained and treated prior to discharge; and, • Secure lockable and controlled storage to be provided for the storage of chemicals and other hazardous materials, e.g., asbestos.		
		Built Services No mitigation measures are required during the operational phase. **Waste Management** • The proposed project involves the treatment of effluent from the WuXi Biologics facility (P1122-01). During the operational phase of the proposed development (following the proposed treatment) treated waters will be discharged to the local IDA pumping station, via SE-1 (as per the EPA Licence) which connects to Dundalk Wastewater Treatment Plant (WwTP) (Licence No: D0053-01). All Emission Limit Values in Schedule B.3 Emission to Sewer of the EPA licence P1122-01 will be adhered to during the operation phase. • The proposed design includes a separate stormwater network which will discharge to the existing WuXi stormwater network which includes silt traps, interceptors and attenuation to green field rates. The flows from the proposed development will be attenuated to the calculated QBar value. Outfall, from the WuXi Biologics facility drainage network, is via SW-1 which connects to local sewer and then Dundalk WwTP. No surface water is discharged to a watercourse, it is all contained within the existing drainage system. The proposed design includes a rainwater harvesting system which will feed the proposed WC's as well as washdown facilities for use of cleaning down the tanks etc. All Emission Limit Value in Schedule C.2.3 Monitoring of Storm Water Emission of the EPA licence P1122-01 will be adhered to during the operation phase.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase
10	Chapter 13 - Material Assets	• Sludge will be produced at a rate of ca. 5 tonnes per day. Sludge will be removed in sealed tankers by licenced hauliers and will be treated at a licenced waste facility. The sealed tankers will prevent release of odour emissions at any significant rate. The operation and disposal of the sludge will be in accordance with Urban Wastewater Treatment Directive 91/271/EEC and Waste Management Act 1996 as amended. The sludge cake will meet the Class A Bio Solids standards. • Waste management during the operational phase of the development will be undertaken by private waste contractors (in accordance with statutory waste management and environmental requirements, regional waste related policy, and best practice waste management guidance), and regulated by Louth County Council. Therefore, no further mitigation measures are required with regards to the transport and disposal or recovery of all waste streams which will be generated during the operational phase.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Monitoring Requirements	Construction Phase	Operational Phase
11	Chapter 6 – Landscape and Visual	All landscape works will be implemented in accordance with best practice and the landscape contract works to be supervised by a suitably qualified landscape architect. The monitoring during the construction and operational phase will include review and management of the planting cover along the screening berms and surrounding grounds so that the planting becomes fully established, while ensuring the berm's screening effectiveness, stability and helping prevent runoff or patches of exposed bare soil. This will include establishing a regular grass cutting regime occurring during the growing season. While the wildflower area on the main embankment will be managed to ensure the success of the wildflowers so they're not displaced by grasses or other weeds. All planting across the proposed development will be monitored by the appointed landscape contractor for an establishment period of 3 years or otherwise as agreed with Louth County Council. The works will include		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Monitoring Requirements	Construction Phase	Operational Phase
12	Chapter 6 – Landscape and Visual	mowing, pruning, watering and weeding. Any loss of planting to occur during this establishment period will be replaced with similar or approved alternative. Once established the planting will be maintained as part of the wider landscaping of the WuXi Biologics grounds.		
12	Chapter 7 – Air Quality and Climate	The Existing Wuxi Biologics Facility currently operates under an Industrial Emissions License (IED) (P1122-01)along with a Greenhouse Gas Permit, both of which are continually monitored by the EPA. The Industrial Emissions Directive 2010/75/EU is aimed at reducing emissions from industrial production processes and has been in force in Ireland since 6 January 2011 and was implemented from 23 April 2013 onwards. As a result, treated discharges from the proposed development are to comply with the standards as required under the existing Wuxi Biologics IED licence and associated Statutory and Regulatory limits including any agreements with other parties such as Uisce Éireann (UET). Dust deposition monitoring shall be undertaken monthly during the construction phase from a representative number of monitoring locations around the site boundary as follows: • The monitoring will be carried out using Bergerhoff dust deposition gauges; • The off-site analysis of the Bergerhoff jars will be undertaken at a suitably accredited laboratory and deposition will be expressed as mg/m^2/day. • The laboratory results will be compared against the Technical Instruction on Air Quality Control – TA Luft 2002 emission value for dust fall of 350 mg/m^2/day; and, • Where the results of dust monitoring are found to exceed the limit, the cause or source of the excessive dust will be identified, and any feasible measures to reduce the impact shall be taken.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Monitoring Requirements	Construction Phase	Operational Phase
12	Chapter 7 – Air Quality and Climate	Monitoring of the effectiveness of the odour control system is recommended on commissioning and at annual intervals. Monitoring should include monitoring of odour and hydrogen sulfide levels in the inlet to and outlet from the odour control system.		
13	Chapter 8 – Noise and Vibration	The appointed contractor will be required to monitor levels of noise during critical construction periods at nearby sensitive locations and/or proposed development boundary. WuXi Biologics will be required to continue to carry out annual noise compliance monitoring under the requirements of their EPA license in the developments operational phase.		
14	Chapter 9 – Traffic	No monitoring requirements are necessary for the proposed development.		
15	Chapter 10 – Land, Soils and Geology	A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site. Standard measures / monitoring requirements will be adhered to during the operational phase.		
16	Chapter 11 – Water	A comprehensive monitoring and supervisory regime including visual monitoring of all excavations and any exposed groundwater as required will be put in place by the Contractor. In the event that dewatering works are required during the construction phase, a temporary works design including key details such as estimated volumes of water, onsite water treatment required, disposal arrangements and permit /licence requirements as well as water quality monitoring requirements will be prepared by the Contractor and agreed with WuXi in advance of commencement of dewatering works. Standard measures / monitoring requirements will be adhered to during the operational phase. Regular checks and maintenance of the proposed surface water drainage system should be implemented.		

Item Ref.	Environmental Topic	Schedule of Environmental Commitments – Monitoring Requirements	Construction Phase	Operational Phase
17	Chapter 12 – Archaeology	A programme of archaeological monitoring should be undertaken in all areas where groundworks and ground reduction (including enabling works and landscaping) are to be carried out. This should be undertaken by a suitably qualified archaeologist under licence, as issued by the minister (DoHLGH under Section 26 of the National Monuments Acts (1994-2014). Should any additional archaeological material be encountered mechanical excavation will cease and a strategy will be proposed to the County Archaeologist and National Monuments Service to preserve the site in situ, where possible. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be proposed, to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2014.		
18	Chapter 13 – Material Assets	The Contractor will be responsible for maintaining waste records and documentation for the full duration of the construction phase. The Contractor will track and monitor all waste volumes transported offsite. All waste records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (UÉ, LCC, EPA) as required. All waste soils (including made ground) will be classified in accordance with the EPA Guidance Document 'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous' (2015). It will be the Contractors responsibility to ensure that representative soil samples are taken in advance of removal and disposal offsite. As noted previously, it will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation. WuXi Biologics will be required to continue to carry out monitoring under the requirements of the IED EPA license during the operational phase.		

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