Environmental Impact Assessment Report – Volume 2

Proposed Development
SDCC Ref. SD21A/0186
at DB8,
Plot 100,
Profile Park,
Nangor Road,
Clondalkin,
Dublin 22

On behalf of
Equinix (Ireland) Ltd

April 2023

Brock McClure
PLANNING & DEVELOPMENT CONSULTANTS

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1. Introduction

1.1 Requirement for an EIAR

This Environmental Impact Assessment Report (EIAR) is submitted in conjunction with and in addition to the cover letter prepared by Brock McClure Consultants, 63 York Road, Dun Laoghaire, Co. Dublin in response to the Clarification for Further Information by South Dublin County Council. This EIAR relates to Item no. 3 of the Clarification for Further Information which is inserted below.

The requirement for an EIA for certain types and scales of development is listed in Annex I and Annex II of the of the EU Directive 2011/92/EU and amended by directive 2014/52/EU and is transposed into Section 5 (Part 1 and 2) of the *Planning and Development* Regulations 2001 as amended.

The EU Directive on EIA lists projects for which an EIA is mandatory (Annex I) and projects for which an EIA may be required (Annex II) EU member states can select to apply thresholds for Annex II projects or examine projects on a case by case basis to assess when an EIA is required. In Ireland a combination of both has been applied. Annex I and II of the EU Directive on EIA have been transposed to schedule 5 of *the Planning and Development Regulations 2001* as amended.

The planning authority has requested that an EIAR should be carried out for the proposed development for the reasons and considerations set out in Item no. 3 that of the Clarification for Further Information which is inserted below.

> 3. Clarification of Item No. 8
>
> *"The Planning Authority do not agree with the EIA screening assessment provided. Having regard to the nature of the proposed modifications to power the data centre by gas instead of electricity, the number of similar exiting and permitted data centres close to the proposed development and the potential impact on Material Assets, it is considered that the proposal is likely to result in significant effects on the environment. The need for environmental impact assessment cannot, therefore, be excluded at preliminary examination.*
> *The applicant is requested to undertake an Environmental Impact Assessment of the proposed development. "*

The guidelines state that where a project of a specified type does not meet or exceed the applicable threshold then the likelihood of the project having significant effects on the environment needs to be considered. The cumulation with other existing and/or approved projects has therefore met the criteria specified in Annex III 1(b) of the amended Directive 2014/52/EU and therefore triggered the need for an EIAR which is as follows:

Annex III *(CRITERIA TO DETERMINE WHETHER THE PROJECTS LISTED IN ANNEX II SHOULD BE SUBJECT TO AN ENVIRONMENTAL IMPACT ASSESSMENT)*

1(b) "The characteristics of projects must be considered, with particular regard to: cumulation with other existing and/or approved projects;"

This EIAR describes the findings of the EIA process to the Planning Authority to help determine a decision on the proposed development. As mentioned below the Overall Project will be assessed as part of this EIAR in addition to the proposed development. It also informs the relevant statutory consultees, interested parties and the public about the likely effects that the Proposed Development and Overall Project will have on the environment.

1.1.1 Content of the Environmental Impact Assessment

This EIA report has been prepared in accordance with the most relevant law including:

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

- Planning and Development Regulations 2001 (as amended)

This EIA report has also been prepared in accordance with the most relevant guidance including:

- Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018).
- Guidance on preparation of the Environmental Impact Assessment Report (European Union, 2017)
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)
- Advice Notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003)
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Pursuant to EIA Directive, (Article (5) 1 of Directive 2014/52/EU), this EIAR specifically contains:

- A description of the project comprising information on the site, design, size and other relevant features of the project;
- A description of the likely significant effects of the project on the environment;
- A description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and if possible, offset likely significant adverse effects on the environment;
- A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.
- A description of 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 effected or the use of natural resources;
- A non-technical summary of the information referred to in points (a) to (d); and
- Any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project.

1.2 Scope of the EIAR

A systematic approach in accordance with the Guidelines on the Information to be contained in EIARs (2022), Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (2018) and other EIA Guidance documents were used to ensure that all relevant aspects of the development are accurately and fully described.

The EIA directive also requires that the description of the site, design, size or scale of the development considers all relevant phases of the existence of the project from its construction through its existence and operation (and where applicable its restoration or decommissioning).

This EIAR document fully reflects the key environmental factors of the proposed development which were recognised from the scoping carried out by the design team we refer to the Environmental Impact Assessment Screening Reports prepared by Malone O'Regan for the Proposed OSPG development and the Permitted Data Centre Development which are included in appendix 1.1 of this EIAR. The level of detail required will vary considerably according to the sensitivity of the existing environment and the potential of the project for significant effects.

1.2.1 Assessment of the Proposed Development and Overall Project

There is one permitted development and one proposed development on the subject site which is regarded as one project in EIA terms. Therefore, as the proposed development consists of modifications to the permitted data centre development on the subject site this EIAR will assess the impact which the proposed development and the overall project may have on the environment. We refer to chapter 2 for a full description of the development and overall project that are assessed as part of this EIAR which are summarised below.

This EIAR assesses the following:

1. The Proposed Development which consists of modifications to the permitted data centre SDCC Ref. SD21A/0186 and development of an On Site Power Generation - SDCC Ref. SDA22/0156
2. The Overall Project which consists of the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to this application as per application SDCC Ref. SDA22/0156

We refer to Section 2.3.1 and 2.3.2 for a full description of the developments outlined above.

For the purpose of this report we would like to define the following terms that are referred to in this EIAR:

- When the "Permitted Development" is referred to it refers to the Data Centre development - SDCC Ref. SD21A/0186.

- When the "Proposed Development" is referred to it refers to: Modifications to the permitted data centre and development of the On Site Power Generation plant - SDCC Ref. SD22A/0156

- When the "Overall Project" is referred to it refers to the Granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and the proposed amendments to this application as per application SDCC Ref. SD22A/0156.

1.3 Format and Structure of the Environmental Impact Assessment Report

This report has been laid out using the "grouped format" structure, the EIA Report examines each environmental aspect in a separate chapter.

The EIAR is presented in 3 no. Volumes as follows:

- Volume 1 – Non-Technical Summary
- Volume 2 – Environmental Impact Assessment Report
- Volume 3 – Appendices to Environmental Impact Assessment Report

Each specialist chapter generally covers the following for the construction and operational phases of the Proposed Development and Overall Project:

- Assessment Methodology;
- Receiving Environment;
- Characteristics of the Proposed Development;
- Characteristics of the Overall Project;
- Potential effect of the Proposed Development;
- Potential effect of the Overall Project;
- Remedial and Mitigation Measures;
    - Proposed Development
    - Overall Project
- Residual effects of the Proposed Development;
- Residual effects of the Overall Project;
- Monitoring or Reinstatement;
- Cumulative Impacts of the Proposed Development; and
- Cumulative Impacts of the Overall Project;

A Non-Technical Summary of the findings of the EIA Report is provided as a separate document in Volume 1. Chapter 19 considers the potential cumulative impact of the proposed development and overall project with any future development (as far as practically possible) on the site and the cumulative impacts with developments in the locality (including planned and permitted developments). Chapter 20 of this report shows where Interactions have been identified and how they have been addressed.

1.4 EIAR Project Team

Brock McClure Consultants is a town planning consultancy established in 2012 and partnered by Laura Brock and Suzanne McClure. Laura Brock and Suzanne McClure have 20 years of experience in all aspects of planning consultancy in both the public and private sector and a proven track record in the industry with a wide range of projects spanning across both statutory and strategic planning fields.

A high-calibre team of urban planners has extensive experience in a broad range of project types including residential, mixed use, industrial and commercial developments. Brock McClure Planning Consultants provides specific advice on development proposals, exempted development provisions and aspects of planning law but has also experience in all other aspects of planning (retail assessment, site characterisation assessment, monitoring, planning appraisals, environmental assessment and among many more).

Digital Dimensions was established in 2000 by John Healy and Jim Manning. We are one of Ireland's leading Architectural Visualisation companies with 20+ years of experience covering a wide range of solutions in the areas of Architectural Visualisation, Daylight and Sunlight assessment and Digital Media.

We have skilled staff with expertise in the areas of Architecture, 3D visualisation, Visual / Photoshop Artist and Video production / Editor and VR environment development. We have over 10 years of experience in Daylight and Sunlight assessment and passive design strategies. We currently have a staff of 11 and 2 Directors.

RKD is an architecture practice providing rigorously tested and superbly crafted work for clients seeking well-considered and brilliantly executed design.

Tracing our roots back to 1913 and the original foundation of our architectural practice in Dublin, today RKD is an international design firm of 225 creative professionals driven by design thinking. From office locations in Dublin, Cork, Waterford, Belgium, Sweden, Italy, and Poland, our expert teams support a diverse range of clients developing built environment projects from commercial offices and interiors to residential schemes, and from universities and healthcare buildings to data centres and mission-critical facilities.

Design connects and unifies our multi-sector approach. Our skilled team of experienced professionals collaborates to deliver projects which range in terms of type and complexity. Our approach to every project is informed by design principles relating to simplicity, sustainability, efficiency, aesthetics, and innovation..

Founded in 2004, RED is a company of Tractebel and provides technical expertise to deliver market leading building services infrastructure engineering solutions. Our mission is to help global clients accelerate their sustainable transformation with outcomes such as zero carbon leading to a genuinely sustainable future.

RED applies its market leading technical expertise to enable the world's digital infrastructure and develop the built environment whilst also helping clients realise ambitious plans for zero carbon built environments. We cover the entire life cycle of any building project, with our broad capability offering saving our clients time, money and effort. Our approach is centred around listening to our clients and interacting energetically with our fellow project stakeholders. We add value with our people, client service ethos, global delivery strategy, technical ability and attitude.

Malone O'Regan is a multidisciplinary Environmental Consultancy with over the past 20 years' experience. Our in-house team of experts has provided a comprehensive range of Environmental Impact Assessment Services to both public and private sector clients over a range of projects throughout Ireland. Malone O 'Regan's Ecology team comprises a team of ecological specialist that has undertaken ecological surveys and assessments in support of a wide range of project throughout Ireland.

Pinnacle

Pinnacle is a leading provider of construction consulting services with a comprehensive background in Structural and Civil Engineering.

They have a proven record of delivering engineering services to many of the top national house builders, retail developers and public authorities.

Pinnacle's areas of expertise include structural and civil engineering, feasibility studies, building information modelling (BIM), engineering masterplanning, flood management, infrastructure design, pre-development engineering and transportation & highways.

Pinnacle work across a number of sectors, including retail, data centres, logistics, residential, logistics and energy.

AWN Consulting is a multidisciplinary engineering consultancy offering specialist design advice in respect of all aspects of environmental acoustics.

AWN Consulting offers a comprehensive package in respect of ambient air monitoring, air dispersion modelling and the development of cost-effective site-specific remedial measures. AWN Consulting's air quality team comprises 5 suitably qualified scientists with a total of over 40 years spent working in the area, making it one of the largest and most experienced group of its type in Ireland, uniquely positioned to undertake a wide variety of projects.

AWN Consulting offers a comprehensive package in respect of environmental noise monitoring, prediction of noise levels and the development of cost-effective noise control programmes along with specification of site-specific remedial measures. AWN Consulting's acoustics team comprises 16 suitably qualified engineers with a total of over 180 years spent working in the area, making it the largest and most experienced group of its type in Ireland, uniquely positioned to undertake a wide variety of projects.

Neil O'Flanagan

Neil is a licensed archaeologist and cultural heritage consultant with experience of working on large scale projects in Ireland, Australia and the UK. Since 2013 he has been the archaeological consultant to the development of the Microsoft Campus, County Dublin. Other notable projects include the survey and excavations in Kirwans Lane, Galway, the survey of Cammell Laird shipyard, Birkenhead, and the survey and monitoring of the redevelopment of the Pigeon House Fort & Harbour, Dublin.

B Fluid

B-Fluid is an experienced CFD Specialist with a demonstrated history of working in the design and civil engineering industry to assess fluid flows through numerical techniques. B-Fluid has carried out various wind modelling assessment for buildings complex in Ireland and UK such as Spencer Place, Elephant Park, Apollo and House, Central Bank and Irish Whiskey Museum.

Pinnacle is a leading provider of construction consulting services with a comprehensive background in Structural and Civil Engineering.

1.4.1 Contributors to the EIAR

An Environmental Impact Assessment Report must be prepared by competent experts. The applicant, Equinex Limited, approached Brock McClure Planning and Development Consultants to direct and co-ordinate the preparation of the EIAR. A team of qualified experts has prepared each individual chapter of the report.

Table 1.1 below provides a summary and overview of how this EIAR is structured together with an acknowledgment of specialist consultant's input in the preparation of same.

Pursuant to Schedule 6, Part 1 and Part 2 of the 2001 Regulations, the following environmental elements have been grouped and assessed within this EIAR:

Table 1.1 Structure of EIAR

Chapter No.	Content	Consultant	Lead Consultant
1.	Introduction	Brock McClure	Suzanne McClure
2.	Site Context and Description of the Development	Brock McClure	Suzanne McClure
3.	Consideration of Alternatives	Brock McClure + RED + RKD	Suzanne McClure
4.	Population and Human Health	Brock McClure	Suzanne McClure
5.	Biodiversity	Malone O'Regan	Sarah de Courcy
6.	Land & Soil, Geology & Hydrology	Delta Simons	Dan Web
7.	Water	Pinnacle	Shaun O'Reilly
8.	Noise and Vibration	AWN	Mike Sims
9.	Air Quality	AWN	Edward Porter
10.	Wind and Microclimate	B-Fluid	Dr. Cristina Paduano, Dr. Patrick Okolo and Dr. Arman Safdari
11.	Landscape and Visual Impact Assessment	RKD	Marta Babiarz
12.	Traffic and Transport	Pinnacle	Ronan Kearns

13.	Waste Management	AWN	Chonaill Bradley
14.	Material Assets – Utilities	RED	Neil Clarke
15.	Cultural Heritage (Archaeological)	Neil O'Flanagan	Neil O'Flanagan
16.	Cultural Heritage (Architectural)	Neil O'Flanagan	Neil O'Flanagan
17.	Daylight and Sunlight	RKD and Digital Dimensions	John Healy
18.	Climate	AWN	Edward Porter
19.	Cumulative Impacts	Brock McClure + Design Team	Suzanne McClure
20.	Interactions	Brock McClure	Suzanne McClure
21.	Summary of Mitigation Measures	Brock McClure	Suzanne McClure

1.4.1 List of competent persons - Contributors to the EIAR

This section provides a brief narrative on the competent persons responsible for preparing each chapter of the EIAR which includes details on their qualifications and experience in their relevant field.

The Irish planning regulations expressly state that the EIAR must include:

> "a list of the experts who contributed to the preparation of the report, identifying for each such expert— (i) the part or parts of the report which he or she is responsible for or to which he or she contributed, (ii) his or her competence and experience, including relevant qualifications, if any, in relation to such parts, and (iii) such additional information in relation to his or her expertise that the person or persons preparing the EIAR consider demonstrates the expert's competence in the preparation of the report and ensures its completeness and quality."

A list of the competent persons who carried out each chapter of this EIAR are set out below.

Chapter No.	Content	Lead Consultant	Competence and experience
1.	Introduction	Suzanne McClure	Chapters 1,2,3 and 4 were prepared by Suzanne McClure who is a founding partner of Brock McClure Consultants. With over 15 years planning experience in both the public and private sector, Suzanne has worked on a wide range of projects spanning across both statutory and strategic planning fields. Suzanne began her career in Local Government before moving to a Town Planning Consultancy in 2003. Suzanne's varied background allows her to bring commercial acumen and practical advice to all facets of the planning and development process. Suzanne has extensive experience in leading multi- disciplinary teams in the preparation of planning applications for large scale developments. She also has significant experience in the preparation of Environmental Impact Statements. Suzanne is a Corporate Member of the Irish Planning Institute and Royal Town Planning Institute.
2.	Site Context and Description of the Development	Suzanne McClure	
3.	Consideration of Alternatives	Suzanne McClure	
4.	Population and Human Health	Suzanne McClure	
5.	Biodiversity	Sarah de Courcy	This Chapter of the EIAR was Prepared by Sarah de Courcy, Ba (Mod), who is a Consultant Ecologist with Malone O'Regan Environmental. The chapter was reviewed and approved by Dyfrig Hubble MSc, BSc (Hon) who is an Associate Director and lead Ecology Division lead at Malone O'Regan Environmental and is a full member with the Chartered Institute

			of Ecology and Environmental Management (CIEEM) and has over 17 years experience in undertaking and preparing ecological assessments for a range of project types throughout Ireland and the UK.
6.	Land & Soil, Geology & Hydrology	Mike Gennaro and Harry White	Mike Gennaro is an Associate Director for Delta-Simons Limited and heads up the contaminated land team in their Gateshead office. An Environmental Consultant with a BSc in Geology and an MSc in Environmental Sciences, he has more than 20 years' multidisciplinary experience in the UK contaminated land and waste management industries. Mike has extensive project expertise, having worked on numerous brownfield re-development schemes, and has designed, implemented and managed numerous geo-environmental appraisals of brownfield sites for planning, Part 2A and environmental liability purposes. During this time, he has managed, or provided technical input into, the preparation of a number of Environmental Impact Assessment Reports for residential, commercial and industrial developments. Harry Whittle is a Principal Consultant with seven years' experience in geo-environmental consultancy, who joined Delta-Simons in 2016 after completing a BSc in Geology. During his time at Delta-Simons, Harry has been involved with a range of projects including several brownfield redevelopments that have included the preparation of Environmental Statement chapters.
7.	Water	Shaun O'Reilly	The water chapter has been prepared by Shaun O'Reilly, Senior Associate With Pinnacle Consulting Engineers, qualified as a Pr Tech Civ Eng., with 40yrs experience in civil infrastructural projects, mainly in residential, commercial, retail, industrial and data centre sectors, both in Ireland and abroad.
8.	Noise and Vibration	Mike Sims	Mike Simms (Principal Acoustic Consultant) holds a BE and MEngSc in Mechanical Engineering, and is a member of the Institute of Acoustics (MIOA) and of the Institution of Engineering and Technology (MIET). Mike has worked in the field of acoustics for over 20 years. He has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, wind energy, industrial, commercial and residential.
9.	Air Quality	Edward Porter	The air quality and climate chapters have been written by ***Dr.*** *Edward Porter* who is Director with responsibility for Air Quality & Climate with AWN Consulting. He holds a BSc(Hons) from the University of Sussex (Department of Chemistry), has completed a PhD in Environmental Chemistry (Air Quality) in UCD where he graduated in 1997 and is a Full Member of the Royal Society of Chemistry (C Chem MRSC). He specialises in the fields of air quality, climate, EIA and air dispersion modelling.
10.	Wind and Microclimate	Dr. Cristina Paduano, Dr. Patrick Okolo and Dr. Arman Safdari	This Chapter of the EIAR was prepared by the following authors: Dr. Cristina Paduano is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environment and the construction industry with over 18 years of experience. She holds a PhD in Mechanical Engineering

			from Trinity College Dublin, with M.Eng and B.Eng in Aerospace Engineering. Dr. Patrick Okolo is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for the urban environment and in wind tunnel measurements for the aerospace industry. He holds a PhD in Aeroacoustics from Trinity College Dublin, a M.Sc. and B.Sc. in Mechanical Engineering. Dr. Arman Safdari is a CFD Modelling Engineer who specialises in computational fluid dynamics applications. He is an expert in airflow modelling, heat and mass transfer and multi-phase flow simulations. He holds a PhD in Mechanical Engineering from Pusan National University, a M.Sc. and B.Sc. in Mechanical Engineering.
11.	Landscape and Visual Impact Assessment	Marta Babiarz	This Chapter of the EIAR was written by Marta Babiarz MSc. Arch., an architect with over 15 years experience working for RKD Architects and a member of RIAI. It has been written basen on photomontages prepared by Jim Manning, Dip Arch Tech, the owner of Digital Dimensions, who has over 20 years of experience in architectural visualisaitons and digital media. The chapter is also referring to the landscape design, prepared by John Ward, Corporate (Full) Member of the ILI ISA and Certified Arborist, Principal Director of Murray & Associates Landscape Architecture.
12.	Traffic and Transport	Ronan Kearns	This chapter of the EIAR was written by Ronan Kearns, BA, BAI, MSc, MBA, CEng MIEI, Chartered Engineer. Ronan is a Chartered Engineer with 19 years' post graduate experience. Projects worked on include roads, drainage and civil infrastructure design and project management for residential, retail, data centres and commercial developments from feasibility through to construction. Since graduating,Ronan has worked in civil engineering primarily focused on development planning, design and management. Ronan has led numerous planning applications and infrastructure designs for a variety of developments. These developments include multi-hall data centres in South Dublin County Council and Fingal County Council.
13.	Waste Management	Clonaill Bradley	Chonaill Bradley (Bsc ENV AssocCIWM) of AWN Consulting. Chonaill Bradley is a Principal Environmental Consultant in the Environment Team at AWN. He holds a BSc in Environmental Science from Griffith University, Australia. He is an Associate Member of the Institute of Waste Management (AssocCIWM). Chonaill has over seven years' experience in the environmental consultancy sector and specialises in waste management
14.	Material Assets – Utilities	Jeff Millward and Neil Clarke	This Chapter of the EIAR was written by Jeff Millward MSc., who is an Associate Electrical Engineer with RED Engineering, Building Services Consulting Engineers. The chapter was reviewed by Neil Clarke MIET, BEng, who is a Regional Director with RED Engineering, and has extensive experience of leading large scale MEP projects in the EMEA Region.
15.	Cultural Heritage	Neil O'Flanagan	This chapter of the EIAR was written by Neil O'Flanagan MA, Msc, PhD, who is an historian, specialising is built history, and is also a licensed archaeologist, with a wide range of experience spanning thirty years of

	(Archaeological)		excavating archaeological remains from prehistory to the modern era. Neil O'Flanagan has similar extensive experience in compiling environmental assessments for both brownfield, and greenfield developments for a variety of project types.
16.	Cultural Heritage (Architectural)	Neil O'Flanagan	This chapter of the EIAR was written by Neil O'Flanagan MA, Msc, PhD, who is an historian, specialising is built history, and is also a licensed archaeologist, with a wide range of experience spanning thirty years of excavating archaeological remains from prehistory to the modern era. Neil O'Flanagan has similar extensive experience in compiling environmental assessments for both brownfield, and greenfield developments for a variety of project types.
17.	Daylight and Sunlight	John Healy	John Healy Dip Arch Tech, MSc Environmental Design of Buildings, PG Dip Digital Media John has worked in the area of Architecture for over 30 years as an Architectural Technologist. He has specialised in Daylight and Sunlight assessments for over 10 years following completion of a MSc in Environmental Design of Buildings at Cardiff University in 2010.
18.	Climate	Edward Porter	The air quality and climate chapters have been written by Dr. Edward Porter who is Director with responsibility for Air Quality & Climate with AWN Consulting. He holds a BSc(Hons) from the University of Sussex (Department of Chemistry), has completed a PhD in Environmental Chemistry (Air Quality) in UCD where he graduated in 1997 and is a Full Member of the Royal Society of Chemistry (C Chem MRSC). He specialises in the fields of air quality, climate, EIA and air dispersion modelling.
19.	Cumulative Impacts	Suzanne McClure	Chapters 19,20 and 21 was prepared by Suzanne McClure who is a founding partner of Brock McClure Consultants. With over 15 years planning experience in both the public and private sector, Suzanne has worked on a wide range of projects spanning across both statutory and strategic planning fields. Suzanne began her career in Local Government before moving to a Town Planning Consultancy in 2003. Suzanne's varied background allows her to bring commercial acumen and practical advice to all facets of the planning and development process. Suzanne has extensive experience in leading multi- disciplinary teams in the preparation of planning applications for large scale developments. She also has significant experience in the preparation of Environmental Impact Statements. Suzanne is a Corporate Member of the Irish Planning Institute and Royal Town Planning Institute.
20.	Interactions	Suzanne McClure	
21.	Summary of Mitigation Measures	Suzanne McClure	

1.5 Description of Effects

Each EIA chapter assesses the direct, indirect, cumulative and residual impact of the proposed development for both the construction and operational stage.

The identified quality, significance and duration of the effects for each aspect is based on terminology set out in the EPA's Guidance on the Information to be contained in Environmental Impact Assessment Reports 2022 table 3.4, presented on table 1.2 below:

Quality of Effects	**Positive** – A change which improves the quality of the environment
	Neutral - No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative – A change which reduces the quality of the environment
Describing the Significance of Effects	**Imperceptible** – An effect capable of measurement but without significant consequences.
	Not Significant – An effect which causes notable 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 character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment
	Profound Effects – An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects	**Extent** – Describe the size of the area, the number of sites and the proportion of a population affected by an effect
	Context – Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

Describing the Probability of Effects	**Likely Effects** – The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely Effects – The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Describing the Duration and Frequency of Effects	**Momentary Effects** – Effects lasting from seconds to minutes
	Brief Effects – Effects lasting less than a day
	Temporary Effects – Effects lasting less than a year
	Short Term Effects – Effects lasting one to seven years
	Medium Term Effects – Effects lasting from 7 to 15 years
	Long Term Effects – Effects lasting from 15 to 60 years
	Permanent Effects – Effects lasting over 60 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).
	Indirect Effects (a.k.a Secondary or Off Site Effects) – Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
	Cumulative Effects – The addition of many minor or insignificant effects on other projects, to create larger, more significant effects

Describing the Types of Effects	**'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
	Indeterminable Effects – When the full consequences of a change in the environment cannot be described
	Irreversible Effects – When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	Residual Effects – The degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic Effects – Where the resultant effect is greater significance than the sum of its constituents (e.g combination of SOx and NOx to produce smog).

1.6 Forecasting Methods and Difficulties in Compiling the Specified Information

Forecasting methods and evidence used to identify and assess the significant effects of the environment for each environmental aspect are set out in each chapter.

Any issues or significant difficulties that were encountered during the assessment of individual factors are noted within the relevant chapters.

2. Description of the Proposed Development and Site Context

2.1 Introduction

This chapter provides a description of the subject site, Proposed Development and Overall Project for the purposes of identifying and assessing the potential environmental impacts and likely environmental effects of the developments in the technical assessments carried out in this EIAR report.

Article 5(1) sets out what Developers must include as a minimum in the EIA Report. Annex IV, referenced in Article 5(1)(f), expands on these requirements. In short, this includes the following:

"A description of the Project: this is an introduction to the Project, and includes a description of the location of the Project, the characteristics of the construction, and the operational phases of the Project, as well as estimates of the expected residues, emissions, and waste produced during the construction and operation phases (Article 5(1)(a) and Annex IV point 1)"

We refer to Section 1.4.1 of this EIAR for details on the competent persons who prepared this chapter of the EIAR.

A systematic approach in accordance with the Guidelines on the Information to be contained in EIARs (2022), Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (2018) and Guidance on the preparation of the environmental impact assessment report (Directive 2011/92/EU as amended by 2014/52/EU) 2017 were used to ensure that all relevant aspects of the developments are accurately and fully described. The objective is to provide a description of the proposed development in sufficient detail, which when taken together with the description of the receiving environment provided, will allow an independent reader without acquired technical environmental knowledge, to understand the significant impacts likely to arise from the proposed development.

In accordance with the Guidelines on the Information to be contained in EIARs (2022), Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (2018) and other EIA Guidance documents. Article 5(3)(a) of Directive 2011/92/EU, as amended by Directive 2014/52/EU requires that *'the developer shall ensure that the environmental impact assessment report is prepared by competent experts'*. We refer to section 1.5 in Chapter 1 of this EIAR that sets out the authors that carried out each Chapter of this EIAR.

2.1.1 Planning Context

This section will provide an overview of the planning context for the proposed development.

We refer to the cover letter submitted with this EIAR that has addressed the Planning Context associated with the development subject of this EIAR in terms of National, Regional and Local Policy. In addition, the Cover Letter details how the proposal conforms with the objectives of the South Dublin County Development Plan 2022-2028 in the Clarification of Item No. 1.

Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy (2018)

The proposed development complies with the **Role of Data Centres in Ireland's Enterprise Strategy** as follows:

The Government has released relevant Statements that contribute to the Strategic Policy Framework in Ireland and confirm the Government's desire for a plan-led approach to data centres.

The Government has a preference for data centre developments associated with strong economic activity and employment that make efficient use of the electricity grid, using available capacity and alleviating constraints. Where a connection can be facilitated, we note that Applicants should engage with system operators to understand capacity availability that is in line with CRU Direction 21/124.

The Government notes that Data Centres require specific policy focus as they are at the centre of the transformational changes that will impact Ireland's businesses, economy, and society to ensure that our digital and low carbon opportunities are coherent and aligned. The Government notes that digital infrastructure is the backbone of Ireland's knowledge economy and recognises that the next decade will be transformational, as digital solutions can unlock decarbonisation and that the right balance is achieved. Ireland aims to progress the digitalisation of our economy alongside its decarbonisation and seeks to be a global leader in providing data services.

The statement released in 2022 sets out the principles for sustainable Data Centre Development in relation to Government policy seeking to enable the 'twin transitions' of digitalisation and decarbonisation of our economy and society.

This statement notes that Data Centres are core digital infrastructure that play an ***"indispensable role in our economy and society that provide the foundation for all online aspects of our social and working lives."***

The principles set out in this statement aim to ensure that data centre infrastructure can be accommodated and contributes positively to our climate and digital ambitions. As mentioned previously, the Government has a strong preference with Data Centre developments that are associated with strong economic activity and employment; make efficient use of our electricity grid and deliver renewable energy in Ireland.

It outlines that Data Centres are central to the digital economy and note their contribution to enterprise and regional policy objectives and are strategically important element of Ireland's future economic prospects. The statement acknowledges that data centres pose considerable challenges to the future planning and operation of Ireland's power system, in terms of renewable energy policy/objectives, generation adequacy including maintaining local and regional security of electricity supply, community acceptance and electricity customer costs. Government intends to take steps to mitigate these so that Ireland optimises the benefits that these strategically important investments bring.

Highlighted throughout this statement the Government have a preference for data centre developments that can demonstrate a clear pathway to decarbonise and ultimately provide net zero data services. The extract below provides more detail in relation to decarbonising data centres.

"There may be options to develop sustainable off-grid power solutions in constrained or other areas – while maintaining the objective to connect to the national grid and enable the regional electricity system in the medium term."

Therefore new data centre connections that are required to have on-site generation (and/or battery storage) that is sufficient to meet their own demand, should aim to assist in the full decarbonisation of the power system, this generation should also be capable of running on renewably sourced fuels including gas or hydrogen when supplies become more readily available.

The Government is of the understanding that DC operators will contribute to the net zero carbon and 100% renewable energy goals. The Government's intention is to harness this ambition where possible and to facilitate co-location, or co-investment through Corporate Power Purchase Agreements CPPAs (as outlined in Section 1.0 above), or alternatively in renewable energy, energy storage, 'energy parks' or other efficient and sustainable energy infrastructure.

Project Ireland – National Planning Framework (2040)

The proposed development complies with the **National Planning Framework** as follows:

The National Planning Framework (NPF) is the Government's high-level strategic plan for shaping the future growth and development of our country out to the year 2040.

The NPF sets out that the Eastern and Midland part of Ireland will, by 2040, be a Region of around 2.85 million people, at least half a million more than today.

Compliance with Key National Policy Objectives

The following National Policy Objectives are considered to apply to the site.

National Policy Objective 55- *"Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050."*

National Policy Objective 64- *"Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions."*

Under the National Strategic Outcome 5 – A Strong Economy Supported by Enterprise, Innovation and Skills, Ireland is being prompted as a suitable international destination for ICT infrastructure.

"Ireland is very attractive in terms of international digital connectivity, climatic factors and current and future renewable energy sources for the development of international digital infrastructures, such as data centres. This sector underpins Ireland's international position as a location for ICT and creates added benefits in relation to establishing a threshold of demand for sustained development of renewable energy sources. There is also greater scope to recycle waste heat from data centres for productive use, which may be off-site."

It is our considered view that the current proposal together with development permitted to date complies with and exceeds the vision of the National Planning Framework on the following basis:

- The proposal makes the most efficient use of the site. The multi-storey nature of the proposal creates a compact and efficient development that utilises existing site services and road infrastructure.
- The overall project is appropriately located in South West Dublin with excellent connectivity to the N4, N7 and M50. Public transport services operate in the area with several bus services stopping to the east of the site on the R134 (Castle Grange Stop c.750m/10 min walk distant) and Clondalkin/Fonthill Rail Stop c.3.4km distant.
- The proposal will contribute to the emerging digital infrastructure of the area that helps to support a strong Irish economy through its enterprise, skills and innovation sectors.
- The proposal will continue to maintain high quality international connectivity, that Ireland is quickly becoming renowned for.
- Renewable technologies include use of photovoltaic panels, heat pumps and provision of waste heat building to facilitate future connection to a district heating system.

Having considered the above, it is submitted that the current proposal will deliver on key objectives contained within the NPF.

Regional Spatial and Economic Strategy

The proposed development complies with the **Regional Spatial and Economic Strategy** as follows:

The Regional Spatial and Economic Strategy for Eastern and Midland Regional Assembly (RSES) provides a:

- *Spatial Strategy - To manage future growth and ensure the creation of healthy and attractive places to live, work, study, visit and invest in.*
- *Economic Strategy - That builds on our strengths to sustain a strong economy and support the creation of quality jobs that ensure a good living standard for all.*
- *Metropolitan Strategy - To ensure a supply of strategic development areas for the sustainable growth and continued success and competitiveness of the Dublin Metropolitan Area.*
- *Investment Framework - To prioritise the delivery of key enabling infrastructure and services by government and state agencies.*
- *Climate Action Strategy - To accelerate climate action, ensure a clean and healthy environment and to promote sustainable transport and strategic green infrastructure.*

One of the Guiding Principles for Investment Prioritisation in Placemaking for Enterprise Development is to ***"Align to national strategy and approach for data centres – right location for use and energy demand."***

RPO 8.25 of the RSES states that Local Authorities shall:

- *Support and facilitate delivery of the National Broadband Plan.*

- *Facilitate enhanced international fibre communications links, including full interconnection between the fibre networks in Northern Ireland and the Republic of Ireland.*

- *Promote and facilitate the sustainable development of a high-quality ICT network throughout the Region in order to achieve balanced social and economic development, whilst protecting the amenities of urban and rural areas.*
- *Support the national objective to promote Ireland as a sustainable international destination for ICT infrastructures such as **data centres** and associated economic activities at appropriate locations.*

- *Promote Dublin as a demonstrator of 5G information and communication technology.*

Section 12 of the Planning and Development Act 2000, as amended, sets out the statutory provisions and obligations relevant to the making of a new Development Plan. This section of the Act expressly requires that Planning Authorities, in preparing their Development Plan ensure that the Development Plan does not conflict with any of the National Policy Objectives of the NPF, Regional Policy Objectives of the RSES, or the provisions of Government Policy.

Section 12(18) states the following:

> *"In this section 'statutory obligations' includes, in relation to a local authority, the obligation to ensure that the development plan is consistent with —*
>
> *the national and regional development objectives specified in — the National Planning Framework, and (ii) the regional spatial and economic strategy, and specific planning policy requirements specified in guidelines under subsection (1) of section 28."*

Climate Action Plan 2023

The Climate Action Plan 2021, is superseded by the Climate Action Plan 2023, as such this policy document is reviewed hereunder. The proposed development complies with the **Climate Action Plan 2023** as follows:

As importantly, rapid delivery of flexible gas generation is needed at scale and in a timeframe to replace emissions from coal and oil generation before the second carbon budget period.

The key measures to ensure security of electricity supply and reduce emissions are:

- *The CRU and EirGrid will ensure an adequate level of conventional dispatchable generation capacity and deliver at least 2 GW of new flexible gas-fired generation.*
- *Expand the gas network to accommodate 2 GW of new gas-fired generation.*
- *Deliver at least three new transmission grid connections or interconnectors to Northern Ireland, Great Britain, and the EU.*
- *The CRU and EirGrid will, as a priority, deliver the competitive market arrangements for zero carbon system services, to an accelerated timetable, ensuring that reserve requirements are fully provided by zero-carbon technology by the end of 2023 and procurement of reserve services from carbon sources phased out by end 2027.*
- *EirGrid and ESB Networks will undertake an in-depth analysis of local, regional, and system level flexibility requirements, identifying opportunities and internal changes required to facilitate demand flexibility and provide flexibility to support the system operation and local network congestion management.*
- *EirGrid will monitor and reduce emissions resulting from its non-market actions, procuring appropriate system services, and constructing necessary infrastructure to relieve network constraints as required in line with regulatory arrangements.*
- *ESB Networks will, under approved regulatory arrangements and in coordination with EirGrid, introduce local flexibility market arrangements, designed to incentivise investment in commercial storage facilities at scale, providing local network capacity for low-carbon technologies.*
- *Develop a policy framework for electricity storage based on electricity system needs.*
- *Fuel switching from more carbon intensive oil and coal to lower carbon natural gas has been one of the drivers for the reduction in this area.*

The gas powered OSPG is considered a suitable transition fuel as alternative and renewable fuel sources are being developed to power the national grid.

We note that the OSPG plant equipment has been designed to accommodate flexible fuel, should new technology be introduced in the future.

SDCC Climate Change Action Plan 2019-2024

The proposed development complies with the **SDCC Climate Change Action Plan 2019-2024** as follows:

The Climate Change Action Plan seeks to improve energy efficiency, reduce greenhouse gas emissions and make Dublin a climate resilient region.

The on-site power generator will operate using natural gas. Gas is seen as a medium term solution and will bridge the power source gap between conventional heavy fuels that have traditionally been used for electricity generation and renewable generation – hydrogen or biomethane.

The OSPG and gas supply is envisaged to cease upon successful connection to the grid. At this point, at this point , it is understood the national grid will be powered by 80% renewable sources by 2030.

The emissions arising from the OSPG will be significantly lowered as a result.

The permitted and proposed development include the provision of a waste heat recovery building. Should a district heating system be developed in the area, waste heat arising from the data centre can be used to power the data centre and/or be used in homes and businesses in the wider area to fulfil heating requirements.

<u>South Dublin County Council Development Plan 2022-2028</u>

We refer to the Cover Letter submitted with this EIAR which has addressed the objectives and requirements of the South Dublin County Development Plan 2022-2028 in relation to Space Extensive Developments, Data Centre Developments, Energy Efficiency in addition to other relevant objectives that relate to the development.

The subject site is zoned EE *"to provide for enterprise and employment related uses"*, we note that the Final Ministerial Direction was made on 18 November 2022, whereby data centre reverted to an 'open for consideration' use under the EE zoning.

Figure 2.1 - Subject site on the Zoning Map from the South Dublin County Development Plan 2022-2028

Proposed Development - Modifications to the permitted data centre and development of an On Site Power Generation plant - Ref. SDA22/0156

The description of the Proposed Development is described in this chapter in terms of those environmental topics that will form the basis of the impact assessment process and the characteristics of the proposed development which could potentially affect human beings, soil, water, climate, air, flora, fauna, landscape, archaeology, architectural, cultural heritage and sunlight and daylight. Chapter 20 specifically addresses interactions between all environmental factors in this regard.

The EIA directive also requires that the description of the site, design, size or scale of the development considers all relevant phases of the existence of the project from its construction through its existence and operation (and where applicable its restoration or decommissioning).

This EIAR document fully reflects the key environmental factors of the proposed development which were recognised from the scoping carried out by the design team which was carried out in January 2023. These Environmental factors include Human Health, Biodiversity, Land, Soil, Geology, Hydrogeology, Water, Noise, Vibration, Air Quality, Wind, Microclimate, Landscape, Visual Impact, Traffic, Transport, Archaeology, Architectural, Sunlight, Daylight and Climate. Due to the location of the Overall Project being in an industrial location the level of detail required will vary considerably according to the sensitivity of the existing environment and the potential of the project for significant effects.

Overall Project - permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to this application as per application SDCC Ref. SDA22/0156

The description of the Overall Project is described in this chapter in terms of those environmental topics that will form the basis of the impact assessment process and the characteristics of the Overall Project which could potentially affect human beings, soil, water, climate, air, flora, fauna, landscape, archaeology, architectural, cultural heritage and sunlight and daylight. Chapter 20 specifically addresses interactions between all environmental factors in this regard.

The EIA directive also requires that the description of the site, design, size or scale of the development considers all relevant phases of the existence of the project from its construction through its existence and operation (and where applicable its restoration or decommissioning).

This EIAR document fully reflects the key environmental factors of the Overall Project which were recognised from the scoping carried out by the design team which was carried out in January 2023. These Environmental factors include Human Health, Biodiversity, Land, Soil, Geology, Hydrogeology, Water, Noise, Vibration, Air Quality, Wind, Microclimate, Landscape, Visual Impact, Traffic, Transport, Archaeology, Architectural, Sunlight, Daylight and Climate.

2.2 Subject Site Characteristics

Proposed Development and the Overall Project

The Proposed Development and Overall Project are located on the subject site which is located in Profile Park in Clondalkin, Dublin 22 on a site area of c.2.65ha.

The site is located on a corner at the entrance to Profile Park Business Park immediately bounded to the north by the Nangor Road and to the west by Profile Business Park access road, known as Falcon Avenue. The site is located within the administrative area of South Dublin County Council.

The Business Park is situated 2km west of Clondalkin village on the outskirts of Dublin City (10km south west of the city centre), approximately 16 km south of Dublin International Airport. The Business Park lies between the M4 and M7 and is proximate to the M50.

The nearest residential dwelling is located adjacent to the Circle K Filling Station approx. c.55m from the sites northern boundary. Two detached units to the west of the site are either vacant/derelict and or planned for demolition. There are some residential areas to the east at Oldcastle Drive, including traveller accommodation c.600m distant. Casement Aerodrome is located c.800m south of the subject site. The site is approximately 5km west of the M50. There is a Quality Bus Corridor QBC route on the Nangor Road and Profile Park provides feeder bus services to connecting public transport options including LUAS.

The site is free from development and is characterised by the hedgerow and ditch separating the site from Grange Castle Golf Club lands to the east and south, which will be retained and reinforced as part of the proposal. The site is largely greenfield in nature with some hardcore and bare ground visible in some areas. The ground levels within the site area appear flat however with a gradual fall from north to south. The existing site levels differ by approx. 2m between the levels along the north boundary (75.5 O.D.) and levels along the existing dry ditch along the south boundary (73.24-73.5 O.D.).

The site has been used in the past for agricultural use (before the Profile Business Park has been built in 2006).

An ESB wayleave and SDCC Watermain wayleave are located to the north and west of the site running parallel with Falcon Avenue and Nangor Road. No above ground structures are proposed at these locations.

Access to the site is provided to the west from Falcon Avenue with a secondary (unused) entrance located further south on the estate road. A splayed entrance is provided to the north on Nangor

Road. Access via this northern entrance is prohibited due to the presence of a high metal railing surrounding the northern site perimeter.

The R134 Nangor Road has a single carriageway which provides a fully segregated two-way cycle lane facility. The Dublin bus 68/a runs at regular intervals along the R134.

The R134 Nagor Road connects to the R120 to the west and R136 to the west. The R136 is a dual carriageway with a speed limit of 80km/h that connects to the N4 to the north and the N7 to the south. The R136 accommodates a bus lane and comprises of a shared cycle path on both sides of the motorway.

The closest Luas stop to the site is the City West Campus Luas Tram stop which is approx. 4km southeast of the subject site. The closest railway station is Clondalkin Fonthill which is approx. 3km to the north east of the site which provides commuter services to and from Dublin City.

The site has the benefit of permission for a data centre under Application Ref. SD21A/0186.

Figure 2.2 - Aerial Photo of Site outlined in Red

Profile Park is located on the outskirts of Dublin City, the Park is easily accessible from the major arterial roads in the City.

The site has formed part of the Profile Park Business Park since its establishment in the year c.2006 which is a 100 acre (40.5 Ha) fully enclosed, private business park. The surrounding land uses comprise of similar large industrial, manufacturing and data storage buildings that are similar to the permitted and proposed development that this EIAR relates to. Existing tenants within Profile Park and the surrounding business and enterprise parks include Google, Microsoft, Digital Realty Trust, Telecity and others. Immediately adjacent to Profile Park is the Castlebaggot 110 / 220 kV substation which provides electrical transmission connectivity to the national electricity transmission grid system. Figure 2.2 illustrates the surrounding land uses in Profile Park.

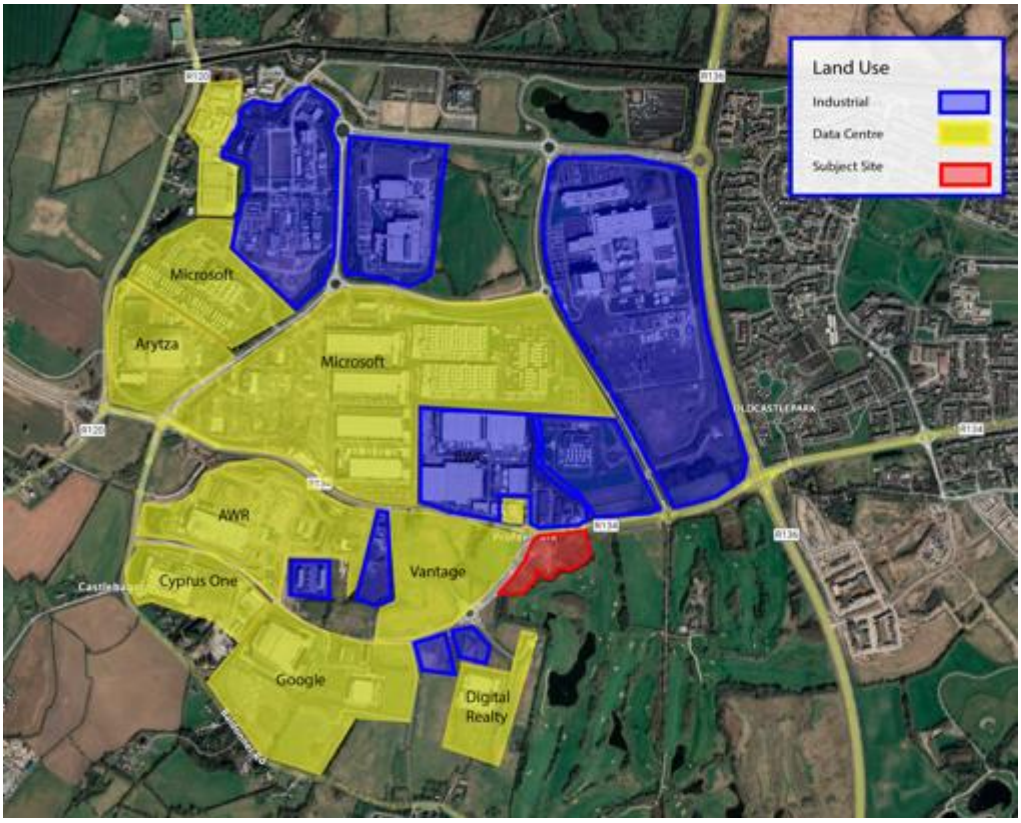

Figure 2.3 - Surrounding Land Use in Profile Park

2.3 Description of the Characteristics of the Proposed Development and Overall Project

There is one permitted development and one proposed development on the subject site, therefore, as the proposed development consists of modifications to the permitted data centre development on the subject site this EIAR will assess the impact which the proposed development and the overall project may have on the environment.

This section of the EIAR describes the 2no. projects/developments that are subject of this EIAR which are summarised below.

1. The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 below for a full description of the proposed development.

2. The Overall Project which includes the permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendment application under SDA22/0156. We refer to section 2.3.2 below for a full description of the Overall Project.

Permitted Development - Data Centre DB8 - Ref. SDA21/0186

For the purpose of this EIAR we have described the permitted development that forms part of the Overall Project and the Proposed Development.

For the purpose of this EIAR we note the permitted development is described in accordance with the plans, particulars and specifications lodged with the application, and as amended by Further Information received on the 10th of December 2021 and Clarification of Further Information received on the 25th of February 2022.

Equinix have been granted permission for the development of a Data Centre which is identified in figure 2.3 below. The overall height of the building is c.21m combined with a setback from the northern site boundary by c.33m.

Figure 2.4 - Proposed Site Layout under Ref. SD21A/0186

The permitted Data Centre Development consists of the following:

- Construction of a 3 storey (part 4 storey) data centre known as 'DB8' to include data halls, electrical/plant rooms including internal generators, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level;
- The total gross floor area excluding hot air plenums is c.9,601sq.m and the overall height of the data centre ranges from c.16m to c.20m to roof parapet level and up to c.24.48m including roof top plant, flues which include a wire mesh cladding to rear of the front (north facing plenums) and lift overrun;
- Provision of 5 no. external generators, 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8 data centre building on the subject site ;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a water sprinkler pump room (c.23sqm), 2 sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm); total floor area of ancillary structures and plant (c.303sqm);
- 64 car parking spaces, 5 motorcycle spaces, bicycle shelter serving 14 spaces, smoke shelter, provision of a delivery yard and loading bays,
- PV panels that have an output of 0.04MV,
- Internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue;
- Additional tree planting to the northern boundary for enhanced amenity and screening purposes,
- Sustainable Urban Drainage Systems were proposed including the following SuDs We refer to the Landscape Masterplan (DB080-MA-LS-XX-DR-L-PLNT-1050) for more information;
    - Perimeter landscaping;
    - Bioretention Tree Pits;
    - Flow Control Devices;
    - Interceptors;
    - Permeable Paving;
    - Permeable Gravel Areas;
    - Green Roofs (combined area of 132sqm.);
    - Rain Water Harvesting (Office Building Area);
    - Swale 1;
    - Swale 2; and
    - Attenuation Pond

- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing;
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site;
- The area to the southwest of the site (temporary meadow) was reserved for a future data centre, subject of a separate application to South Dublin County Council on a site bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue. This application was accompanied by a Natura Impact Statement.

2.3.1 Proposed Development - Modifications to the permitted data centre and development of On Site Power Generation - Ref. SDA22/0156

This section describes the proposed development that is subject to this EIAR.

Equinix intends to seek permission for the proposed development which consists of Modifications to the permitted data centre granted under SDCC Ref. SD21A/0186 and the development of an OSPG and associated works. The OSPG plant is proposed in the area to the south west of the permitted data centre that was previously reserved for a future data centre application. For the purpose of this EIAR, we note there were no amendments made at further information stage to the design of the OSPG. The site layout is illustrated in the Figure below.

Figure 2.5 – Proposed Development illustrating OSPG Compound (southwest of the overall site)

The proposed OSPG and modifications to the permitted Data Centre development under Ref. SD21A/0186 consists of the following:

- Reconfiguration, alterations and amendments to the previously permitted scheme and data centre building under Ref. SD21A/0186 which include the following:
  - Omission of third floor level in the office block (removal of approx. 366sq.m of GFA the omission of the third floor has reduced the entire building to a 3 storey development.)
  - Alterations to the floor levels: floor levels within the admin area of the Data Centre have been changed in order to provide consistency throughout the building. One storey of the admin block has been omitted and floor to floor height changed to 5.3m in line with heights in the data halls. We refer to figure 2.5 below for an extract of this drawing that illustrates the alterations to floor levels.
  - parapet height increase of front of house to c.16.8m,
  - Increase of single storey Loading Dock GFA by approx. 60sqm
  - provision of storage at second floor level in lieu of relocated internal generators to the external generator yard and associated elevational alterations.
  - Extension of loading dock at ground floor level by c.60sqm in area with minor height increase to c.5.3m.
  - Alterations to the permitted generator plant yard to the north of the data centre to include removal of 4 no. internal generators and plant rooms spaces from 2nd floor and provision of same within the Generator Yard – Overall increase of number of external gens from 5 no. to 9 no. and increase of number of external

electrical plant rooms from 4 no. to 8 no. All previously permitted free standing fuel tanks are now removed. This also includes increase of the yard size, rearrangement of the yard layout. Overall increase of external electrical plant rooms GFA is 49.66sqm.

- Removal of 3 no. air plenums to the front (north) elevation and provision of screening to generator flues in lieu of omitted plenums.
- Alterations at roof level to include removal of 2m high gantry screening.
- Reconfiguration of plant within the permitted chiller plant yard to the south of the data centre.
- Removal of 1 no. sprinkler/water tank and removal of stairs and door to the side of the waste compound.
- Reconfiguration of car parking and motorcycle spaces and removal of 1 no. accessible spaces to 64 no. total number of car parking spaces .

- The proposal also includes provision of on-site gas power generation compound OSPG (c.2,604sqm in area) in the area which was previously reserved for a future data centre development under Ref. SD21A/0186 located to the south west of the now permitted data centre under Ref. SD21A/0186.
  - The OSPG compound comprises:
    - 7 no. modular plant rooms (totalling c.180sqm in area),
    - 10 no. gas fired generators and associated flues c.14.7m high,
    - gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and
    - 2 no. vehicular access points including general and emergency access.
- All associated site development works, services provision, drainage works, access, landscaping and boundary treatment works.
- No buildings are proposed above the existing ESB and SDCC wayleaves to the west and north of the site.
- The overall Gross Floor Area of the development is reduced by c.44sqm to c.9,795sqm from previously permitted under SDCC Reg. Ref. SD21a/0186.
- This application under SD22A/0186 was accompanied by a Natura Impact Statement.

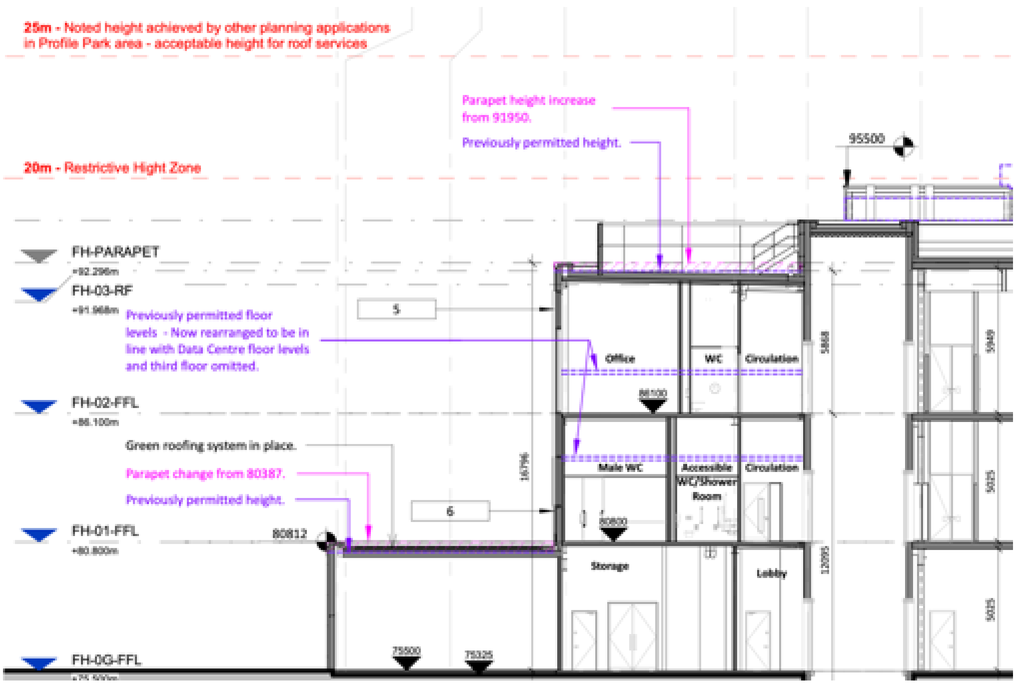

Figure 2.6 – Extract from Section AA in drawing no. DB081 -RKD -ZZ -ZZ -DR -A -ZZZZ -3200 that illustrates the alterations to floor levels proposed under SDCC Ref. SDA22/0156.

2.3.2 Overall Project - permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to this application as per application SDCC Ref. SDA22/0156

This section describes the Overall Project which includes the 2 no. developments that are summarized below:

1. The permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and;
2. The proposed development under SDCC Ref. SD22A/0156 consisting of an OSPG and modifications to the permitted Data Centre development under Ref. SD21A/0186.

The 2 no. developments which form the Overall Project are described in full below:

Permitted Development - Data Centre DB8 - Ref. SDA21/0186

Equinix have been granted permission for the development of a Data Centre which is identified in figure 2.3 below. The overall height of the building is c.21m combined with a setback from the northern site boundary by c.33m.

For the purpose of this EIAR we note the permitted development is described in accordance with the plans, particulars and specifications lodged with the application, and as amended by Further Information received on the 10th of December 2021 and Clarification of Further Information received on the 25th of February 2022.

The permitted Data Centre Development consists of the following:

- Construction of a 3 storey (part 4 storey) data centre known as 'DB8' to include data halls, electrical/plant rooms including internal generators, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level;
- The total gross floor area excluding hot air plenums, is c.9,601sq.m and the overall height of the data centre ranges from c.16m to c.20m to roof parapet level and up to c.24.48m including roof top plant, flues which include a wire mesh cladding to rear of the front (north facing plenums) and lift overrun;
- Provision of 5 no. external generators, 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8 data centre building on the subject site ;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a water sprinkler pump room (c.23sqm), 2 sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm); total floor area of ancillary structures and plant (c.303sqm);
- 64 car parking spaces, 5 motorcycle spaces, bicycle shelter serving 14 spaces, smoke shelter, provision of a delivery yard and loading bays,
- PV panels that have an output of 0.04MV,
- Internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue;
- Additional tree planting to the northern boundary for enhanced amenity and screening purposes,
- Sustainable Urban Drainage Systems were proposed including the following SuDs We refer to the Landscape Masterplan (DB080-MA-LS-XX-DR-L-PLNT-1050) for more information;
    - Perimeter landscaping;
    - Bioretention Tree Pits;
    - Flow Control Devices;
    - Interceptors;
    - Permeable Paving;

- Permeable Gravel Areas;
- Green Roofs (combined area of 132sqm.);
- Rain Water Harvesting (Office Building Area);
- Swale 1;
- Swale 2; and
- Attenuation Pond

- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing;
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site;

The area to the southwest of the site (temporary meadow) was reserved for a future data centre, subject of a separate application to South Dublin County Council on a site bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue. This application was accompanied by a Natura Impact Statement.

<u>Proposed Development - Modifications to the permitted data centre and development of On Site Power Generation - Ref. SDA22/0156</u>

Equinix intends to seek permission for the proposed development which consists of Modifications to the permitted data centre granted under SDCC Ref. SD21A/0186 and the development of an OSPG and associated works. The OSPG plant is proposed in the area to the south west of the permitted data centre that was previously reserved for a future data centre application. The plan to provide this future data centre is no longer considered and has now been abandoned due to the requirement to provide on-site power generation as there is no availability of power in the Eirgrid networ. For the purpose of this EIAR, we note there were no amendments made at further information stage to the design of the OSPG. The site layout is illustrated in the Figure below.

Figure 2.7 – Proposed Development illustrating OSPG Compound (southwest of the overall site)

The proposed OSPG and modifications to the permitted Data Centre development under Ref. SD21A/0186 consists of the following:

- Reconfiguration, alterations and amendments to the previously permitted scheme and data centre building under Ref. SD21A/0186 which include the following:
    - Omission of third floor level in the office block (removal of approx. 366sq.m of GFA the omission of the third floor has reduced the entire building to a 3 storey development.)
    - Alterations to the floor levels: floor levels within the admin area of the Data Centre have been changed in order to provide consistency throughout the building. One storey of the admin block has been omitted and floor to floor height changed to 5.3m in line with heights in the data halls. We refer to figure 2.5 below for an extract of this drawing that illustrates the alterations to floor levels.
    - parapet height increase of front of house to c.16.8m,
    - Increase of single storey Loading Dock GFA by approx. 60sqm
    - provision of storage at second floor level in lieu of relocated internal generators to the external generator yard and associated elevational alterations.
    - Extension of loading dock at ground floor level by c.60sqm in area with minor height increase to c.5.3m.
    - Alterations to the permitted generator plant yard to the north of the data centre to include removal of 4 no. internal generators and plant rooms spaces from 2nd floor and provision of same within the Generator Yard – Overall increase of number of external gens from 5 no. to 9 no. and increase of number of external electrical plant rooms from 4 no. to 8 no. All previously permitted free standing fuel tanks are now removed. This also includes increase of the yard size, rearrangement of the yard layout. Overall increase of external electrical plant rooms GFA is 49.66sqm.
    - Removal of 3 no. air plenums to the front (north) elevation and provision of screening to generator flues in lieu of omitted plenums.
    - Alterations at roof level to include removal of 2m high gantry screening.
    - Reconfiguration of plant within the permitted chiller plant yard to the south of the data centre.
    - Removal of 1 no. sprinkler/water tank and removal of stairs and door to the side of the waste compound.
    - Reconfiguration of car parking and motorcycle spaces and removal of 1 no. accessible spaces to 64 no. total number of car parking spaces .

- The proposal also includes provision of on-site gas power generation compound OSPG (c.2,604sqm in area) in the area which was previously reserved for a future data centre development under Ref. SD21A/0186 located to the south west of the now permitted data centre under Ref. SD21A/0186.
    - The OSPG compound comprises:
        - 7 no. modular plant rooms (totalling c.180sqm in area),
        - 10 no. gas fired generators and associated flues c.14.7m high,
        - gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and
        - 2 no. vehicular access points including general and emergency access.
- All associated site development works, services provision, drainage works, access, landscaping and boundary treatment works.
- No buildings are proposed above the existing ESB and SDCC wayleaves to the west and north of the site.
- The overall Gross Floor Area of the development is reduced by c.44sqm to c.9,795sqm from previously permitted under SDCC Reg. Ref. SD21a/0186.
- The application was accompanied by a Natura Impact Statement which is appended in this EIAR.

2.4 Overall Project Data Centre Facility and Onsite Power Generation OSPG

The permitted data centre development will provide information storage capacity for individuals and businesses. The location of the facility in Ireland allows for the data halls to be free cooled using outside air-cooling systems without the need for excessive mechanical cooling. Air handling units will be direct evaporative (adiabatic) cooling type also known as wet-bulb cooling is termed direct because there is a direct interaction between water and air utilised within the system. Water is directly evaporated into a stream of heated air to facilitate its cooling. This is the most widely employed adiabatic cooling technique worldwide. The data halls are arranged over three storeys and will be equipped with server cages and dedicated mechanical plant rooms.

The provision of on-site gas power generation compound (c.2,604sqm in area) in the area previously reserved for a future data centre will power to the permitted data centre outlined above. The compound comprises 7 no. modular plant rooms (totalling c.180sqm in area), 10 no. gas fired generators and associated flues c.14.7m high, gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and 2 no. vehicular access points including general and emergency access.

2.5 Development Inputs

2.5.1 Power Supply

Construction Phase Proposed Development and Overall Project

During construction, contractors will require power for onsite accommodation, and construction equipment /plant. The power requirements will be relatively minor. A temporary low voltage connection to the grid will be made subject to relevant applications and approvals.

Operational Phase

Proposed Development – OSPG

The Proposed OSPG Development will be powered by gas.

In addition, the back-up generators diesel fuel storage has been reduced. The permitted development had a diesel storage capacity of 450,000litres and the proposed development now has a reduced storage capacity of 135,000 litres. The permitted development stored diesel in stand alone double walled tanks with bunded concrete areas and hard standing and associated fill and spill control systems. The proposed development now utilises belly tanks within the generator modular enclosures.

In addition to the OSPG, the following items from the proposed development relate to power supply:

- Alterations to the permitted generator plant yard to the north of the data centre to include removal of 4 no. internal generators and plant rooms spaces from 2nd floor and provision of same within the Generator Yard – Overall increase of number of external gens from 5 no. to 9 no. and increase of number of external electrical plant rooms from 4 no. to 8 no. We note there is therefore no change in the number of overall generators located on site at 9 no. total generators
- All previously permitted free standing fuel tanks are now removed.

The OSPG plant will generate 11kV power and will serve the development through an internal private MV distribution network. In the event of a loss of power from the OSPG, the 9 no. standby diesel-powered back-up generators which have a combined storage capacity of 135,000 liters which will be activated to ensure continuity of supply to customers. The standby generators will be activated to provide power on a short term basis until such time that the OSPG is restored to normal operating conditions. Each generator has a small, integral diesel fuel storage tank which provides fuel in such situations and is also used for testing the generators for short periods of time on a monthly basis.

The key issue is that whilst the proposal to power the permitted data centre by electricity was previously permitted, Equinix have not received a commercial or technical offer to supply permanent power to the site and has been verbally confirmed by ESB that power to the site is likely to be available in 6-8 years.

The power from the proposed OSPG will distribute underground via a private 11kv cabling network to the permitted data centre under SDCC Ref. SD21A/0186. The power plant will be supplied by energy provided by Gas Networks Ireland, as confirmed by their signed connection agreement (November 2021) which is attached in appendix 14 of this EIAR. The purpose of the plant is to generate power until such time that ESB/ EirGrid can make a formal technical and commercial proposal to supply power to the site in 6-8 years.

The medium and long-term options for the OSPG are provided below.

1. Medium Term Option: Decommission the OSPG plant

   In the next 6-8 years, the grid will be upgraded by ESBN and they may decide that there is sufficient capacity in the network to serve and support this development. In this instance, OSPG plant may no longer be required.

2. Medium Term Option: Retain the OSPG with a grid connection after 6-8 years of full operation

   ESBN could request that the plant is retained on a permanent basis and operate on the terms and requirements of the CRU in order to support the security of the new de-carbonised national grid. In this case, the Consumer would have a “flex” agreement with ESBN and would be required to operate the OSPG on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels. As the OSPG hours of operation are currently unknown for this option, the hours of operation have been estimated based on an existing/similar OSPG development that is currently in a flex agreement which operates for 500 hours of the year.

3. Long Term Option: Retain the OSPG with no grid connection

   If the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre, the proposed OSPG would remain operational for the long term (+15 years). This scenario has been assessed in the Climate Chapter of the accompanying EIAR.

The above scenarios have been assessed in each chapter of the EIAR, where relevant.

The plant is compatible and can be operated using HydrNatural Gas mix or pure Hydrogen, in line with the GNI Plan. It is also equipped with Battery Energy Storage System (BESS) that can be used mainly for frequency regulation and spinning reserves as well as peak saving. The system will integrate two BESS units, 2MW/1MWh each, with these two units responsible for ensuring the stability of the network in terms of voltage and frequency, within the limits established by Equinix. These BESS redundant units are vital for the stabilization of the grid specially during fast demand of load.

The power plant generators are reciprocating machines which are designed to run on natural gas or any blended Natural Gas/Hydrogen mix supplied by the network. Ultimately, the power plant can operate on 100% Hydrogen which is in line with GNI future development plans.

GNI have confirmed that the permitted development will received a 45MW Connection @400mbar. This low pressure gas supply will be served through two streams at the following rated pressures and incoming service routes are shown in the following GNI network plans.

Stream A:

- Outline set pressure = 400mbar
- Relief set pressure =592mbar
- Slamshut set pressure = 643mbar

Stream B:

- Outlet set pressure =360mbar
- Relief set pressure =592mbar
- Slamshut set pressure = 693mbar

Overall Project– Data Centre and OSPG

The Overall Project includes the permitted development as outlined in section 2.3.2. and the proposed OSPG development However, the permitted development is now to be powered by the proposed OSPG in the form of Gas as mentioned below. Therefore, the Proposed Power supply strategies outlined in the Permitted Data Centre which include connection to the National Grid and standby emergency generators have been superseded by the Proposed Development's Power Supply Strategies.

In addition, the back-up generators diesel fuel storage has been reduced. The permitted development had a diesel storage capacity of 450,000litres and the proposed development now has a reduced storage capacity of 135,000 litres. The permitted development stored diesel in stand alone double walled tanks with bunded concrete areas and hard standing and associated fill and spill control systems. The proposed development now utilises belly tanks within the generator modular enclosures.

We note the following from the proposed development that relate to power supply:

- Alterations to the permitted generator plant yard to the north of the data centre to include removal of 4 no. internal generators and plant rooms spaces from 2nd floor and provision of same within the Generator Yard – Overall increase of number of external gens from 5 no. to 9 no. and increase of number of external electrical plant rooms from 4 no. to 8 no. We note there is therefore no change in the number of overall generators located on site at 9 no. total generators.
- All previously permitted free standing fuel tanks are now removed.

The intention of Equinix is to connect to the Grid at some stage in the future.

In the absence of a grid connection the proposal is to utilise On Site Power generation (OSPG) with energy supplied via the Gas Networks Ireland grid.

The OSPG plant will generate 11kV power and will serve the development through an internal private MV distribution network. In the event of a loss of power from the OSPG, the 9 no. standby diesel-powered back-up generators will be activated to ensure continuity of supply to customers. The standby generators that will be activated to provide power on a short term basis until such time that the OSPG is restored to normal operating conditions. Each generator has a small, integral diesel fuel storage tanks with a total storage capacity of 135,000 litres which provides fuel in such situations and is also used for testing the generators for short periods of time on a monthly basis.

The proposed OSPG will serve the permitted data centre under SDCC Ref. SD21A/0186. The power plant will be supplied by energy provided by Gas Networks Ireland, as confirmed by their signed connection agreement (November 2021) which is attached in appendix 14 of this EIAR. The purpose of the plant is to generate power until such time that ESB/ EirGrid can make a formal technical and commercial proposal to supply power to the site. As soon as ESB/EirGrid are in a position to advise how the project will be supplied, it will determine how the plant will be utilized in the future.

The medium and long term options for the OSPG plant are inserted below:

1. Medium Term option: Decommission the OSPG plant – In the next 6-8 years the grid will be upgraded by ESBN and they may decide that there is sufficient capacity in the network to serve and support this development and an OSPG plant is no longer required.

2. Medium Term option: Retain the OSPG with a grid connection after 6-8 years of full operation – ESBN could request that the plant is retained on a permanent basis and operate on the terms and requirements of the CRU in order to support the security of the new de-carbonised national grid. In this case, the Client would have a "flex" agreement with ESBN and would be required to operate the OSPG on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels. As the OSPG hours of operation is currently unknown for this option. The hours of operation have been estimated based on an existing/similar OSPG development that is currently in a flex agreement which operates for 500 hours of the year.

3. Long Term option: Retain the OSPG with no grid connection - If the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre the proposed OSPG would remain operational for the long term (+15 years). This scenario has been assessed in the Climate Chapter of this EIAR

These scenarios have been assessed in the Climate Chapter of this EIAR.

The plant is compatible and can be operated using HydrNatural Gas mix or pure Hydrogen, in line with the GNI Plan. It is also equipped with Battery Energy Storage System (BESS) that can be used mainly for frequency regulation and spinning reserves as well as peak saving. The system will integrate two BESS units, 2MW/1MWh each, with these two units responsible for ensuring the stability of the network in terms of voltage and frequency, within the limits established by Equinix. These BESS redundant units are vital for the stabilization of the grid specially during fast demand of load.

The power plant generators are reciprocating machines which are designed to run on natural gas or any blended Natural Gas/Hydrogen mix supplied by the network. Ultimately, the power plant can operate on 100% Hydrogen which is in line with GNI future development plans.

GNI have confirmed that the permitted development will received a 45MW Connection @400mbar. This low pressure gas supply will be served through two streams at the following rated pressures and incoming service routes are shown in the following GNI network plans.

Stream A:

- Outline set pressure = 400mbar
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- Slamshut set pressure = 643mbar

Stream B:

- Outlet set pressure =360mbar
- Relief set pressure =592mbar
- Slamshut set pressure = 693mbar

During the operational phase the data centre, IT hardware require a consistent electrical supply to operate. Once completed is likely to require a maximum of 10MW to operate.

2.5.2 Associated Infrastructure

Water Supply

Overall Project and Proposed Development

On the 13 January 20231, Irish Water issued a letter in response to a pre-connection enquiry, which confirmed that a Water Connection and Waste Water Connection are both feasible, without infrastructure upgrade by Irish Water which is inserted in appendix 7.

It is intended to serve the Overall Project via connection off the 150mm Ø network, as located in Falcon Avenue.

Hydrants will be installed in accordance with the Requirements of the Building Regulations and in accordance with the recommendations contained in the Technical Guidance Documents, Section B – Fire Safety, dated 2006.

Water demand for the development has been based on Irish Water's criteria = 0.113 litres/second.

Avg. Demand = 0.141 litres/second

Peak Demand = 0.705 litres/second

Water meters, sluice valves and hydrants, in line with Irish Water requirements and specifications, will be installed at the connections onto the aforementioned existing water mains, as required.

We refer to Chapter 7 of this EIAR for more information relating to Water infrastructure associated with the proposed development and overall project.

Foul Water

Overall Project and Proposed Development

South Dublin County Council record drawings have identified 3 No. 150mm / 225mm Ø spur connections, located adjacent to the western boundary of the property & Profile Park. These spur connections were left out to facilitate development of these lands. These spur connections are joined into the reticulation network for Profile Park.

As confirmed by Irish Water, the existing foul sewer reticulation network has adequate capacity to cater for the proposed effluent discharge from the subject site.

It is proposed to discharge foul water from the Overall Project, via a 225mm Ø gravity foul sewer outfall, laid from a discharge manhole at the end of a 100mm Ø pumped main and discharge into the existing 225mm Ø spur connection laid across Falcon Avenue, which is connected to the existing foul sewer network laid along the western edge of Falcon Avenue. We refer to drawing no. DB080-PIN-00-ZZ-DR-C-PLAN-1205 for more information.

Based on Irish Water's Code of Practice of 150ltr/hd/day, the peak wastewater flow will not be in excess of circa 0.66l/s.

The proposed network connects into the Profile Park reticulation network.

All on-site foul sewers have been designed to be a minimum 225mm Ø diameter pipes, with gradients designed to achieve self-cleansing velocities.

Fibre Connection

Telecommunications including fibre required during the construction phase will be provided via a mobile connection or temporary connection to the nearby telephone network.

There are telecommunication lines in existence for telephone and broadband services in the area. A fibre optic cable distribution network will be installed with a separate incoming fibre infrastructure and provided to each building via underground fibre ducts.

There are existing underground carrier ducts adjacent to the site that will be utilised for the development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

2.6 Construction/Operational Staff

The Overall Project has the potential for a positive impact with regards to increased job opportunities and improved accessibility to jobs during construction and operation in the South Dublin area. The permitted and proposed developments will be constructed at the same time.

<u>Proposed Development – OSPG</u>

<u>Construction Phase</u>

Subject to approval from the Planning Authority the permitted and proposed developments will be constructed at the same time. It is likely to employ c. 100 – 120 no. construction workers during construction phase which is estimated to last up to 16-18 months.

<u>Operational Phase</u>

The OSPG will be operated and maintained by 1 no. plant manager with 2 no. specialists to be on call duty during the night shift. In addition there will be a remote operation team that will be available 24/7 to manage the OSPG facility if required.

<u>Overall Project – Data Centre and OSPG</u>

<u>Construction Phase</u>

As mentioned previously the permitted and proposed developments will be constructed at the same time. During construction it is estimated to employ c. 100 – 120 no. construction workers during construction phase which is estimated to last up to 16-18 months.

<u>Operational Phase</u>

It is estimated that up to 14 full time staff will be employed during the operational phase of the Overall Project to manage the data centre. Staff will be employed on a shift basis over a 24 hour period, seven days a week. There will also be 4-6 contractors working on site.

The OSPG will be operated and maintained by 1 no. plant manager with 2 no. specialists to be on call duty during the night shift. In addition there will be a remote operation team that will be available 24/7 to manage the OSPG facility if required.

2.7 Development Outputs

Air Quality

<u>Construction Phase - Proposed Development</u>

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on- site or using effective control measures quickly before the potential for nuisance occurs.

We refer to section 9.6.1 of the Air Quality Chapter which outlines the mitigation measures that will be implemented in order to avoid dust nuisance occurring under unfavourable Meteorological conditions.

<u>Construction Phase - Overall Project</u>

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on- site or using effective control measures quickly before the potential for nuisance occurs.

We refer to section 9.6.1 of the Air Quality Chapter which outlines the mitigation measures that will be implemented in order to avoid dust nuisance occurring under unfavourable Meteorogical conditions.

<u>Operational Phase</u>

<u>Proposed Development – OSPG</u>

The stack heights of the gas engines at 14m above local ground level have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations). No additional mitigation measures are proposed for the operational phase of the development. The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. We refer to section 9.7.3 for more information.

<u>Overall Project – Data Centre and OSPG</u>

The stack heights of the gas engines of the OSPG at 14m above local ground level and back-up generators at a stack height of 20m above local ground level have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations). No additional mitigation measures are proposed for the operational phase of the Overall Project.

The Proposed Scenario in the Air Quality Chapter comprises the gas engine emission points associated with the proposed development running on gas for the full year in addition to the operation of the backup generators operating for 72 hours per year which involves the emergency operation of 7 of the 8 generators (the remaining generator serving as a "catcher" generator). The scenario also included weekly testing of all 8 generators. The process emissions used for the Proposed Scenario are outlined in Table 9.2 of this EIAR.

The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. We refer to Chapter 9 for more information.

Surface Water

<u>Overall Project and Proposed Development</u>

The Proposed OSPG Development will be connected to the SuDs facility for the Overall Project to provide attenuation in compliance with the requirements of the Greater Dublin Area Strategic Drainage Study (GDSDS).

No additional attenuation storage elements are required for the proposed OSPG development as they have already been incorporated into the drainage system and attenuation pond permitted under parent permission SDCC Ref. SD21A/0186.

The topographical survey as carried out has identified a dry open ditch which forms the southern boundary of the site adjacent to Grange Castle Golf Club. This ditch network runs in an westerly direction. This ditch network is then drained via a tributary into the Camac River.

The aforementioned open ditch network has been identified as having capacity to accommodate the proposed discharge from the subject site.

Petrol interceptors will be located in parking areas to capture any potential oil/petrol spillages that have the potential to contaminate watercourses.

The Overall Project will provide attenuation for the increase in hard standing areas with Sustainable Drainage Systems (SuDs). The run-off for the Overall Project will be accommodated within the attenuation pond, which provides for a total volume of circa $756m^3$ which was permitted under the parent permission SDCC Ref. SD21A/0186.

The scheme includes the following SuDs as identified in the proposed landscape masterplan drawing no. DB080-MA-LS-XX-DR-L-PLNT-1050 prepared by Murray and Associates under SDCC Ref. SD22A/0156.

- Perimeter landscaping;
- Bioretention Tree Pits;
- Flow Control Devices;
- Interceptors;
- Permeable Paving;
- Permeable Gravel Areas;
- Green Roofs (Bin Storage/ Loading Dock Roof Area);
- Rain Water Harvesting (Office Building Area);
- Swales
- Attenuation Pond/ Wetland (1no.)

We refer to the water quality mitigation measures outlined in chapter 7 of this EIAR for more details on the risk management procedures and mitigation measures that are outlined in relation to other development outputs that may impact surface water that may occur during the construction and operation phase of the development.

All construction equipment will be checked by an on site engineer to ensure they are mechanically sound, to avoid leaks of oil, fuel grease and hydraulic fluids.

We refer to Chaper 7 for more information on how the Overall Project will deal with the Surface Water Drainage.

Flood Risk Assessment

We refer to the Flood Risk Assessment prepared by Pinnacle attached as in appendix 7 to this EIAR and Chapter 7 for more information.

In summary the findings of this report state that the subject site is located in Flood Zone C which is characterised as having a low flood risk and therefore the development is classified as appropriate.

The Overall Project does not pose any flooding issues to the subject site, surrounding area or properties located downstream as it will be positively drained and surface water will be contained within the SuD measures outlined above and will be manged in a sustainable manner.

SuDS measures have been incorporated as outlined above. Furthermore, a Hydrobrake mechanism has been installed to restrict the outflow into the existing network accordingly. Water quality is maintained as the outflow passes through approved Petrol / Oil Interceptor. For more details on the SuDS measures proposed We refer to Chapter 7 prepared by Pinnacle Engineers for more information.

2.8 Design and Development Rationale

We refer to Chapter 3 of this EIAR which outlines the Alternatives considered by the design team as part of the design process.

The design and development rationale for the proposed OSPG development was required as a connection agreement was not forthcoming or agreed with ESB to supply power to the permitted development. ESB expect that a power supply will be provided in 6-8 years time therefore the OSPG will act as the permanent source of power until a permanent power supply is installed.

The design of the permitted data centre was discussed amongst the design team prior to lodgement of the application. The alternative designs and layouts for the permitted data centre development were considered throughout the design process and are outlined as appropriate in Chapter 3 of this EIAR.

2.9 Characteristics of the Construction and Operational Phase

Pursuant to Section 2(a)(i) of S.I No 600 of 2001, a description of the physical characteristics of the proposed development and land use requirements during the construction and operation phases is provided in this report which include:

> *(c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;*
>
> *(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, and soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases"*

We refer to the updated Construction Environmental Management Plan prepared by Malone O'Reegan for the Proposed Development and Permitted Development in Appendix 11 which outlines the mitigation measures to be implemented during the construction phase in addition to the mitigation measures set out in each chapter of this EIAR.

In order to reduce impacts on the soils and geology environment a number of mitigation measures will be adopted as part of the construction works on site. These mitigation measures are identified in the Chapter 13 Waste Management for the Construction and Operational phases of the Overall Project in addition a specific Resource Waste Management Plan has been prepared which will be implemented in full and form part of mitigation strategy for the overall site.

Mitigation Measures

<u>Proposed Development and Overall Project</u>

The mitigation measures associated with each environmental topic are referenced and outlined in each chapter in this EIAR.

Each of the Chapters included in this report provides an assessment of the potential impact of construction works on their individual environmental aspects and set out the relevant mitigation measures where appropriate relating to these environmental aspects.

We refer to the Construction Environmental Management Plan prepared by Malone O'Reegan for the Proposed Development and Permitted Development which outlines an assessment of the likely risks on site it outlines the procedures for monitoring the effectiveness of the environmental protection measures and for the circulation and distribution of information to all relevant personnel during the construction programme.

Spillages of suspension solids, oil and cement will be avoided through the mitigation measures outlined in the Construction Environmental Management Plan CEMP prepared by Malone O'Reegan Environmental Consultants which is inserted in appendix 11 of this EIAR. Table 5-4 of the CEMP outlines the aspect of construction, potential hazard, the magnitude, likelihood and risk management procedures or mitigation measures which include but are not limited to the following mitigation measures related to the aspect of construction outlined below:

Site Preparation Works and Establishment of Construction Services

Preparation of the site requires limited works with minimal site clearance, establishing entranceways and haul roads for vehicles, surveying and setting out, setting up the construction site with fencing, site compounds etc.

The site is currently greenfield with no existing buildings, with a 1.5m level change falling from North to South. Preparation of the site will require cut and fill works to create a plateau. The site is currently fenced off with established entranceways and space for setting out the site compound to the north eastern portion of the site which will be set back away from the Baldonnell Stream. It is estimated that estimated that c. 17,633 cu of excavated material will need to be removed off-site for the installation of new associated infrastructure outlined above which include, gas supply connection, foul water network, fibre connection water supply network and drainage infrastructure.

The site will provide office, portable sanitary facilities, equipment storage, parking etc for contractors for the duration of the works which is estimated to last 16-18 months subject to receipt of planning consent. The construction compound will be fenced off for health and safety reasons so that access is restricted to authorized personnel only. All areas under construction will be fenced for security and safety purposes and temporary lighting supplied as necessary.

Site Phasing

Proposed Development and Overall Project

Both the Proposed OSPG Development and Permitted Data Centre will be constructed at the same time subject to consent from the Planning Authority. It is envisaged that this will be completed in a single phase and will be completed within a timeframe of approximately 16-18 months.

The Overall Project consists of the permitted data centre and the proposed OSPG development. The proposed OSPG development is seeking permission for 10 years. There are numerous reasons why construction might not start directly after permission is granted and hence a likely range of when construction could start is presented below.

Overall Project - Construction timeline:

- Construction Start - Q3 2023
- Full Operation – Q2 2025

Overall Project - Construction timeline:

- Construction Start - Q3 2024
- Full Operation – Q2 2026

Construction Stages

Proposed Development and Overall Project

As mentioned previously the site will be stripped of the building rubble and pile ups currently present on site and then levelled for a plateau.

The construction stages will comprise of the following:

1. Site Preparation including removal of existing rubble and topsoil across the site;
2. construction compound/fencing, foundations
3. Excavation for rerouting and provision of services;
4. Pouring of concrete structural elements;
5. Blockwork rising walls;
6. Cast insitu ground floor slabs and rising elements;
7. Blockwork and brickwork rising elements;

8. Pre-cast floors stairs and balconies;
9. Aluminum windows and curtain walling;
10. Fit out of units and;
11. Roads, services and landscaping.

Construction Staff

Proposed Development and Overall Project

It is envisaged that the permitted and proposed developments will be constructed at the same time. During construction it is estimated to employ c. 100 – 120 no. construction workers during construction phase which is estimated to last up to 16-18 months. It is envisioned that journeys to and from the site will be shared journeys as a result of car pools which would result in approximately 60 – 80 arrivals and departures per day.

Construction Traffic

Proposed Development and Overall Project

Details on the Construction Traffic associated with the Proposed Development and Overall Project can be found in Chapter 12 Traffic and Transport in addition to the Construction Management Plan CMP which is included in appendix 12.

This section provides a brief outline of the mitigation measures for the traffic associated with the construction of the Proposed Development and Overall Project.

The Construction Management Plan incorporates a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.

The following mitigation measures will be put in place during the construction works:

- Provision of sufficient on-site parking and compounding to ensure no potential overflow of construction generated traffic onto the local network.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.
- A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Based on the most direct route to the M50 whilst avoiding as many schools as possible it is proposed the use the Profile Park Road, R134, R136 and N7 as the main haul route to/from the development to/from the M50.
- We refer to chapter 12 for more details on the haul routes that are identified and any construction traffic management requirements

The Outline Construction Management Plan envisions that 102 trips to/from during the construction phase will arrive/depart from the subject site.

Construction Hours

Construction work will be limited to the following hours:

- Monday to Friday 08:00 hours – 18:00 hours
- Saturday 08:00 hours – 14:00 hours
- Sundays and Public Holidays No noisy work on site

Construction Site Access and Parking

Parking of construction staff vehicles on the public road network will not be permitted.

All construction traffic will access the site via the already permitted access from Falcon Avenue (Road labelled Profile Park in figure 2.5). Car parking will be provided for all workers who travel to site using a car in or adjacent to the site compounds, as determined by the construction program.

This car park will be temporary in nature and will be created by laying of a temporary surface for vehicles.

Access to the development during the construction phase will be via access point no. 2 which is located on the southwest boundary of the subject site as identified in figure 2.5 below.

Figure 2.8 - Existing Access points to subject site

Construction Waste Management

Although there is no demolition required on the subject site there will be waste generated from the construction of the permitted and proposed development. This waste will be segregated on site into skips and other forms of receptacles. The appointed waste contractor will collect and transfer the recyclable wastes as the receptacles are filled. The non-recyclable waste will be transferred to landfill. Numerous waste contractors in the Eastern Midlands Region are licenced to carry out this operation.

It has been anticipated that up to 17,633 cu. m of soil will be exported off site in order to facilitate space for the associated infrastructure outlined previously. The site manager will investigate whether nearby construction sites may require fill material, to both minimise the costs of transport and to reuse as much material as possible. A site investigation has been carried out to determine the state of the soil/subsoil the results are presented in Appendix 6.2 to 6.3. We refer to Chapter 6 which states that no visual or olfactory evidence of potential gross contamination was observed in the soils during the investigation.

Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);

<u>Operational Phase</u>

The Operator will ensure on-Site segregation of all waste materials into appropriate categories, including (but not limited to):

- Packaging Waste
- General Non-Hazardous Waste
- Office/Canteen / Kitchen Waste
- Non-Haz and Haz WEEE
- Landscaping waste
- UV & Fluorescent Tubes
- Waste Oil
- (Wet) Batteries
- (Dry) Batteries.

Non-Recyclable waste will be placed in a general skip if not suitable for reuse or recycling which will be examined by the Waste Manager. This skip will generally include wet waste (mixed food waste and food packaging), polystyrene, contaminated cardboard and contaminated plastic etc.

We refer the Planning Authority to Chapter 13 of this EIAR for more details on the Waste Management associated with the construction phase and operational phase of the Overall Project.

Construction Noise and Vibration

We refer the Planning Authority to Chapter 8 of this report that outlines the potential hazards, magnitude of noise and vibration during construction and operation phase of the proposed development and all risk management procedures and mitigation measures where necessary.

2.10 Seveso Site

The Overall Project will have 135,00litres of diesel which weighs 117,000kg = 117 tonnes and is below the Qualifying quantity (tonnes) for the application of the lower tier and upper tier requirements of DIRECTIVE 2012/18/EU (Seveso III). We refer to section 7.6 for more information.

2.11 Decommissioning

Proposed Development OSPG

The key issue is that whilst the proposal to power the permitted data centre by electricity was previously permitted, Equinix has not received a commercial or technical offer to supply permanent power to the site. It has been verbally confirmed by ESB that power to the site is likely to be available in 6-8 years.

Equinix will engage with Eirgrid to achieve a future connection for the grid to facilitate the delivery of renewable electricity via the electrical grid. The Equinix strategy is to utilise CPPAs. As such it is Equinix intent to continue to engage to achieve a grid connection form Eirgrid.

In the absence of a grid connection the proposal is to utilise On Site Power generation (OSPG) with energy supplied via the Gas Networks Ireland grid. The intent with the OSPG plant is that:

- The plant would be operational to bridge the gap in electrical utility availability i.e. be operational until electrical utility supply is available.
- The plant would act in a flex capacity to allow the DB8 demand to be removed from the grid if required by the utility provider.

Once the electrical utility is available and there is not a requirement for flex the intent is that the OSPG plant would be decommissioned. It is Equinix strategic target for Climate Neutral Data Centre and the electricity consumption at current operational data centres in Ireland to be matched 100% with renewable energy GOs through CPPAs so it is Equinix preferred solution to have a grid connection to help meet the company's global strategic targets.

The medium and long term options for the OSPG plant are inserted below:

1. Medium Term option: Decommission the OSPG plant – In the next 6-8 years the grid will be upgraded by ESBN and they may decide that there is sufficient capacity in the network to serve and support this development and an OSPG plant is no longer required.

2. Medium Term option: Retain the OSPG with a grid connection after 6-8 years of full operation – ESBN could request that the plant is retained on a permanent basis and operate on the terms and requirements of the CRU in order to support the security of the new de-carbonised national grid. In this case, the Client would have a "flex" agreement with ESBN and would be required to operate the OSPG on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels. As the OSPG hours of operation is currently unknown for this option. The hours of operation have been estimated based on an existing/similar OSPG development that is currently in a flex agreement which operates for 500 hours of the year.

3. Long Term option: Retain the OSPG with no grid connection - If the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre the proposed OSPG would remain operational for the long term (+15 years). This scenario has been assessed in the Climate Chapter of this EIAR

These scenarios have been assessed in the Climate Chapter of this EIAR.

Overall Project - Data Centre and OSPG

It is unlikely that the Data Centre will require decommissioning in the medium to long term future.

Regular maintenance and minor upgrade works will maintain the functional operation of the development over the medium to long term.

2.12 Sustainability

Permitted Data Centre

We note that the permitted data centre which is the main component of the Overall Project incorporates several energy efficiency measures to reduce carbon footprint including:

1. The proposal makes the most efficient use of the site. The multi-storey nature of the permitted data centre and proposed OSPG creates a compact and efficient development that utilises existing site services and road infrastructure.
2. Back-up diesel fuel is reduced. The permitted development had a diesel storage capacity of 450,000litres and the proposed development now has a reduced storage capacity of 135,000 litres. The permitted development stored diesel in stand alone double walled tanks with bunded concrete areas and hard standing and associated fill and spill control systems. The permitted development now utilizes belly tanks within the generator modular enclosures.
3. Supplementary power is provided by the pv roof panels. A Heat recovery building is also provided in the event future connection can be made to a district heating system in the area. The above measures seek to meet the Council's objectives at climate change adaptation.
4. The IT cooling system is a water-cooled system which cools water via free cooling air cooled chillers. From the chillers water is circulated into data hall fan arrays which distribute cooled recirculated air back into the data hall.

We refer to the Alternatives Chapter, Chapter 3 of this EIAR which outlines the renewable energy generation options that were explored for this project, however, they were discounted for the reasons that are outlined in Chapter 3.

Renewable Energy Generation CPPA

In order to comply with South Dublin County Council Development Plan Policy EDE7 Objective 2 relating to Corporate Purchase Power agreements, the procurement of CPPAs to match the electrical energy use in DB8 would ensure that the projects providing electricity would be operational once a grid connections is available.

As mentioned previously the Equinix shall use the OSPG until such a time that a connection can be made to the national electricity grid. In the interim period Equinix is reviewing the use of biofuels such as biomethane and GO's for the bridge period when operating the OSPG plant.

The CPPA process involves the corporate energy consumer entering a direct agreement with a renewable energy generator to supply energy to cover the Data Centre consumption and emissions offsetting at any stage of the project. This is in line with the Equinix strategy is to procure CPPAs to procure renewable electricity to power the proposed project.

Equinix will implement a CPPA with a renewable energy plant, that is in the development stage, to add renewable capacity in Ireland. The agreement will cover the Data Centre energy consumption and emissions offsetting on the basis of the development energy use ramp.

The type of data centre proposed and predicted energy demand has a gradual ramp in energy use over a 6 to 8 year period as the data halls are occupied and loaded by end users.

This allows a number of different energy project types to be utilised. However, the overall energy demand for this project, in terms of energy use will be provided from a CPPA. The renewable energy plant CPPA can be based on electricity production from renewables and/or e-fuel production to allow the CPPA to align with the building ramp energy use.

Equinix commits not to commence the operation of the data centre prior to the operation of the CPPA renewable energy plant.

Sustainable Design

The proposed and permitted buildings will be designed and constructed to meet the requirements of the Irish Building Regulations and current Technical Guidance Documents (TGD'S) that are listed below:

1. Technical Guidance Document A - Structure
2. Technical Guidance Document B - Fire Safety
3. Technical Guidance Document B - Fire Safety - Volume 2 Dwelling Houses
4. Technical Guidance Document C - Site Preparation and Resistance to Moisture
5. Technical Guidance Document D - Materials and Workmanship
6. Technical Guidance Document E - Sound
7. Technical Guidance Document F - Ventilation
8. Technical Guidance Document G - Hygiene
9. Technical Guidance Document H - Drainage and Waste Water Disposal
10. Technical Guidance Document J - Heat Producing Appliances
11. Technical Guidance Document L - Conservation of Fuel and Energy - Dwellings
12. Technical Guidance Document L - Conservation of Fuel and Energy - Buildings other than Dwellings
13. Technical Guidance Document M - Access and Use
14. Technical Guidance Document K - Stairways, Ladders, Ramps and Guards

The proposed data storage facility has been designed to consider the sustainable use of water and heat during its operational phase. During normal operation the data storage buildings will be air cooled which significantly reduces the requirement for water compared to mechanical chilling, or a fully water-cooled design.

2.13 Cumulative Impacts

We refer to Chapter 19 of this EIAR which assesses the construction and operational phase of the Proposed Development and Overall Project where the proposed development and overall project is assessed with neighbouring sites and developments.

3. Consideration of Alternatives

3.1 Introduction

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

"A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment."

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

(b) "a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects;"

Reasonable alternatives may include project design proposals, location, size and scale, which are relevant to the proposed development and its specific characteristics. The Regulations require that an indication of the main reasons for selecting the preferred option, including a comparison of the environmental effects to be presented in the EIAR.

This EIA report has also been prepared in accordance with the most relevant guidance including:

- Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018).
- Guidance on preparation of the Environmental Impact Assessment Report (European Union, 2017)
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)
- Advice Notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003)

The Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) states:

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

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

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

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

We refer to Section 1.4.1 of this EIAR for details on the competent persons who prepared this chapter of the EIAR.

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

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

- Alternative Locations
- Alternative Designs and Layouts
- Alternative Processes
- Alternative Technologies
- Alternative Size and Scale

Proposed Development – On Site Power Generation

It needs to be pointed out that the intention to provide a future building (Building 2), as shown on the masterplan drawing for the Permitted Scheme, has been abandoned due to the requirement to provide on-site power generation as there is no availability of power in the Eirgrid network.

The power generation compound has been proposed in the exact location of the former proposed Building 2. This location proved optimal due to:

- Visual screening of the compound and generator flues from Nangor Road as well as internally from various spots in Profile Business Park as demonstrated in Chapter 12
- Screened location from the residential buildings which assisted in limiting noise levels.
- Proximity to the data centre building for which the power will be generated.

The design of the permitted development was subject to a number of design alterations. Every effort was made, during the design evolution of the proposed development, to ensure that the development was sympathetic to the site conditions and contours, ecology and receiving environment.

Alternative Operational Scenarios

The key issue is that whilst the proposal to power the permitted data centre by electricity was previously permitted, Equinix has not received a commercial or technical offer to supply permanent power to the site. It has been verbally confirmed by ESB that power to the site is likely to be available in 6-8 years.

Equinix will engage with Eirgrid to achieve a future connection for the grid to facilitate the delivery of renewable electricity via the electrical grid. The Equinix strategy is to utilise CPPAs. As such it is Equinix intent to continue to engage to achieve a grid connection form Eirgrid.

In the absence of a grid connection the proposal is to utilise On Site Power generation (OSPG) with energy supplied via the Gas Networks Ireland grid. The intent with the OSPG plant is that:

- The plant would be operational to bridge the gap in electrical utility availability i.e. be operational until electrical utility supply is available.
- The plant would act in a flex capacity to allow the DB8 demand to be removed from the grid if required by the utility provider.

Once the electrical utility is available and there is not a requirement for flex the intent is that the OSPG plant would be decommissioned. It is Equinix strategic target for Climate Neutral Data Centre and the electricity consumption at current operational data centres in Ireland to be matched 100% with renewable energy GOs through CPPAs so it is Equinix preferred solution to have a grid connection to help meet the company's global strategic targets.

The medium and long-term options for the OSPG are provided below.

1. Medium Term Option: Decommission the OSPG plant

   In the next 6-8 years, the grid will be upgraded by ESBN and they may decide that there is sufficient capacity in the network to serve and support this development. In this instance, OSPG plant may no longer be required.

2. Medium Term Option: Retain the OSPG with a grid connection after 6-8 years of full operation

   ESBN could request that the plant is retained on a permanent basis and operate on the terms and requirements of the CRU in order to support the security of the new de-carbonised national grid. In this case, the Consumer would have a "flex" agreement with ESBN and would be required to operate the OSPG on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels. As the OSPG hours of operation are currently unknown for this option, the hours of operation have been estimated based on an existing/similar OSPG development that is currently in a flex agreement which operates for 500 hours of the year.

3. Long Term Option: Retain the OSPG with no grid connection

   If the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre, the proposed OSPG would remain operational for the long term (+15 years). This scenario has been assessed in the Climate Chapter of the accompanying EIAR.

3.2 Alternative Locations

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

We refer to the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022), which states "some locations have more inherent environmental sensitivities than others. Depending on the type of project and the range of alternatives that the developer can realistically consider, it may be possible to avoid such sites in favour of sites which have fewer constraints and more capacity to sustainably assimilate the project. It can be useful to ensure that a range of options, which may reasonably be available, are included in the evaluation."

Having regard to these various environmental and development considerations, Profile Park was considered the most appropriate location for the permitted data centre having regard to:

- Profile Park is marketed and promoted as Ireland's Data Centre Cluster;
- the co-locational benefits beside the existing DB2 Data Centre in Kilcarberry Business Park owned and operated by the Applicant Equinix;
- the gas connection to the national supply;
- excellent transport connections to the M50, N4 and N7; and
- largescale data centre requirements relating to site scale and size.

Proposed Development - OSPG

No Alternative sites or locations for the proposed OSPG development were considered by the Applicant for the following reasons:

- The Proposed Development includes amendments to an already permitted data centre development located on this site,
- The purpose of the the Proposed Development specifically the OSPG (On Site Power Generation Plant) is to power the permitted data centre development on site due to the change in project scope as there is now no connection agreement with Eirgrid to provide power from the grid to the permitted development. Therefore the proposed OSPG will provide power to the permitted development under SDCC Ref. SD21A/0186.
- The subject site has the space to accommodate the proposed OSPG to power the permitted development.
- The close proximity to the data centre, making the underground infrastructure most optimal.
- The Site is located in an area that is identified in South Dublin County Councils Development Plan as providing employment. The permitted development is dependent on the proposed OSPG in the absence of a formal connection agreement from EirGrid. This EIAR has presented 3 scenarios where the OSPG would be decommissioned until such a time that the grid is able to provide power to the site in 6-8 years, or retained on a flex agreement or retained for a longer period of time.
- There is no evidence of site contamination on the site making it suitable for development, we refer to chapter 6 of this EIAR for more details on the Land and Soil associated with the site.

Having regard to the site specific nature of the development, further consideration of alternative site locations are not considered essential in respect of the EIAR legislation and guidance.

There is a requirement to provide the OSPG On Site Power Generation as there is no availability of power in the Eirgrid network. Thus the proposed OSPG building is now located in the area what was envisaged for a future data centre application which is no longer possible due to the reasons set out above.

The power generation compound has been proposed in the exact location of the former proposed Building 2. There were no other location considered within the redline as this was the only space that could accommodate the proposed OSPG on the site. In addition this location proved optimal due to:

- Visual screening of the compound and generator flues from Nangor Road as well as internally from various spots in Profile Business Park as demonstrated in Chapter 12
- Screened location from the residential buildings which assisted in limiting noise levels.

The proposed development contributes towards the achievement of the Zoning Objective and Vision Statement for EE zoning and is in accordance with other relevant policies and objectives of the South Dublin County Development Plan 2022-2028 and the Ministerial Direction issued on the 18 November 2022 which overturned the ban in the SDCC Development Plan 2022 -2028 and directed SDCC to "reinstate data centre use class as an ‘open for consideration’ use class in the REGEN, Enterprise and Employment (EE) and Major Retail Centre (MRC) zoning objectives".

Having regard to the nature and design, it is considered that the proposed OSPG development is an effective and appropriate use for the site as it would power the permitted data centre on site which would be an effective and appropriate use for the site.

We refer to the Planning Application Report, prepared by Brock McClure Planning and Development Consultants, enclosed herewith. Which in summary notes the following in relation to the proposed development:

- The proposal makes the most efficient use of the site. The multi-storey nature of the permitted data centre and proposed OSPG creates a compact and efficient development that utilises existing site services and road infrastructure.
- The Overall Project is appropriately located in South West Dublin with excellent connectivity to the N4, N7 and M50. Public transport services operate in the area with several bus services stopping to the east of the site on the R134 (Castle Grange Stop c.750m/10 min walk distant) and Clondalkin/Fonthill Rail Stop c.3.4km distant.

- The proposal will contribute to the emerging digital infrastructure of the area that helps to support a strong Irish economy through its enterprise, skills and innovation sectors.
- The proposal will continue to maintain high quality international connectivity, that Ireland is quickly becoming renowned for.
- Renewable technologies include use of photovoltaic panels, heat pumps and provision of waste heat building to facilitate future connection to a district heating system.
- The proposed development (notably the OSPG Building and associated flues) accords with the height restrictions relating to Casement Aerodrome, having regard to precedent examples set by permitted developments in the wider Grange Castle Area.

3.3 Alternative Design and Layouts – For the Overall Project

At the outset of the Overall project, Equinix produced a brief which outlined the IT load capacity of the data centre (in this case 7.56 MW for Building 1 plus 4.32 for future Building 2) which directly translates to the size of the facility (the number of server racks that need to be incorporated).

The client attempts to standardize all their data centres, which is a huge benefit for operational reasons. The reference design, which has been developed a few years ago and forms the 'basis of design' for each project, identifies a few options for data halls arrangement which results in narrower or wider, shorter or longer building footprints. Such a modular approach allows the client to adjust to various shapes and sizes of subject sites.

The design team carried out a number of studies for the Overall Project of the subject site, called 'Test Fits'.

Each arrangement considered the environmental sensitivities associated with surrounding areas: the nearest residential development and noise impact on them, the visual impact of the proposal on the landscape, impact on the existing hedgerow, ditch and Baldonnel Stream.

Each of the options for the Overall Project considered followed the site constraints identified at due diligence stage of the project, which can be summarized as follows:

- Existing watermain and ESB wayleaves to the north and north-west, which force the setback of the development.
- Required 8m protection zone for the existing hedgerow along the dry ditch at east and south boundary.

3.3.1 Option 1

Option 1 consisted of the following key elements:

Two data centre buildings with a total floor area of 3006 m2 + 1772 m2 (plant).

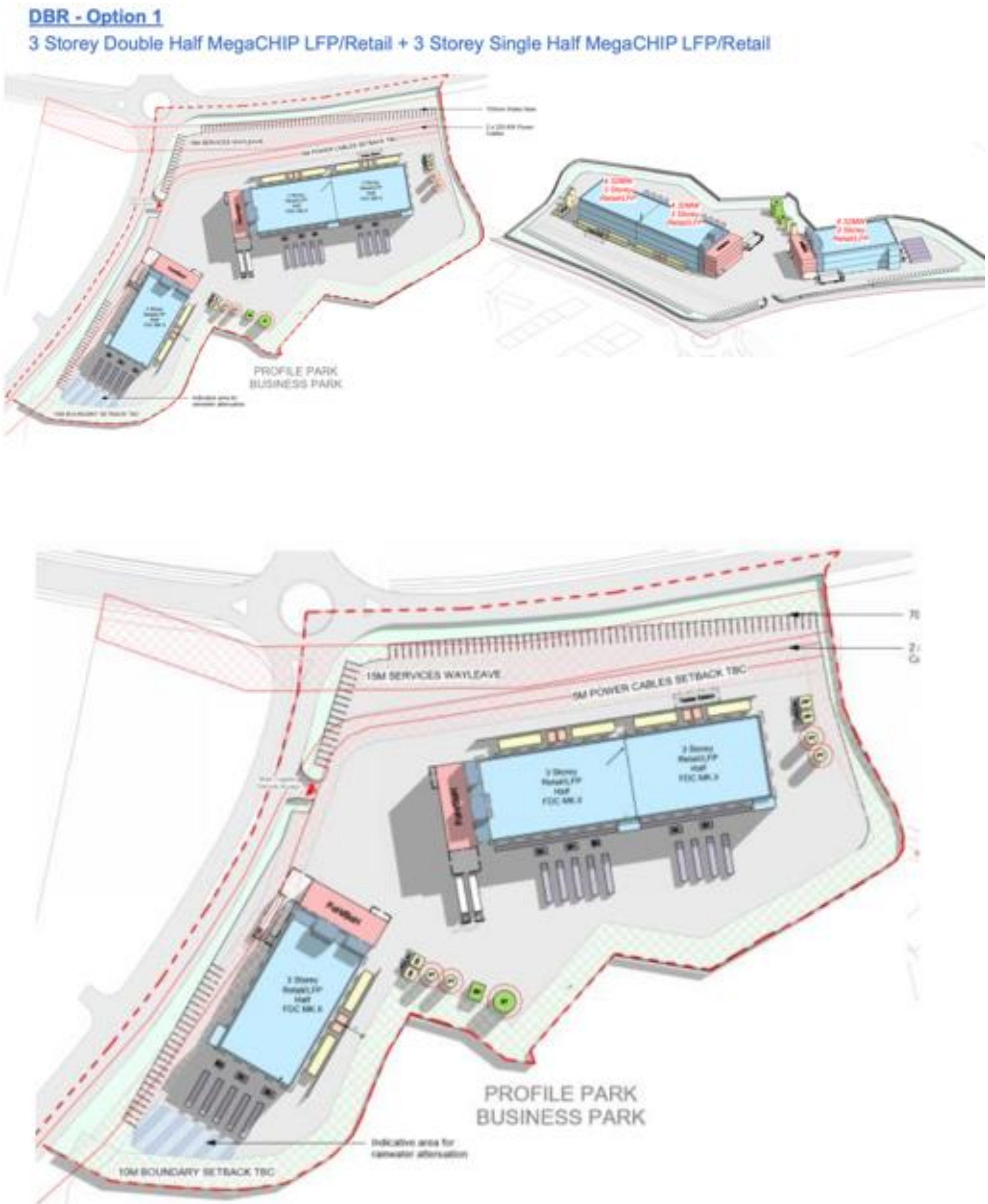


Figure 3.1 – Option 1 of test fit.

Option 1 considered Building 1 being a 3-storey tall, 'double' narrow footprint and Building 2 being a 3-storey tall 'single' footprint. Chiller yards were located to the south. The power generators were located to the north of Building 1 and to the southeast of Building 2. Ancillary plant rooms and water storage were located in the proximity of each building. The site entrance was located centrally between the two buildings and parking was split between the 2 locations adjacent to each building.

This option followed the client's intention to phase the development (larger Building 1 and smaller Building 2), however, scattered locations for ancillary plant space did not prove optimal for space utilization on site and the central site entrance proved problematic for vehicular circulation.

3.3.2 Option 2

Option 2 consisted of the following key elements:

One data centre building with a total floor area of 5711 m2.

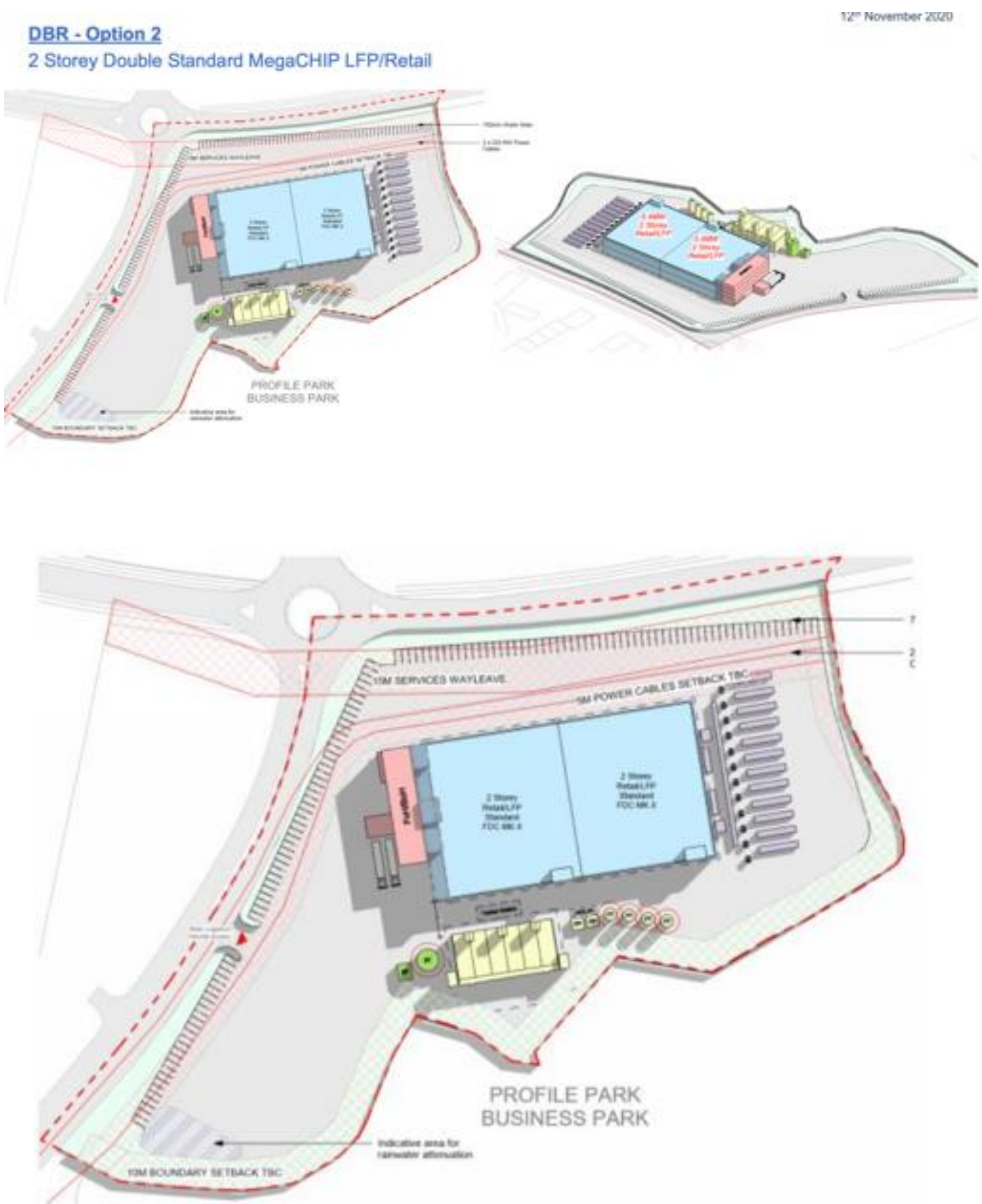


Figure 3.2 – Option 2 of test fit.

This option is considered one 2-storey building of an increased footprint, to house all required IT load for the site.

The increased width of the building forced the chiller yard to be moved to the east, which was not optimal from the perspective of the noise impact on the residential development further east.

All power generators were located at the rear of the building, in a compact arrangement.

This option did not allow the client to phase the project as well as was suboptimal in terms of vehicular circulation on site, the proximity of generators to the biodiversity zone along the hedge and suboptimal utilisation of the site area.

3.3.3 Option 3

Option 3 consisted of the following key elements:

Two data centre buildings with a total floor area of 5711 m2 + 1772 m2 (plant)

Figure 3.3– Option 3 of test fit.

Option 3 considered Building 1 to be single storey wider footprint building and Building 2 to be a 3-storey tall narrow building. The wider footprint of Building 1 caused the chillers yard as well as the generators to be located to the east of the B1 causing noise and potential visual issues. The combined location for all plant puts the vehicular traffic routes under pressure which in turn can result in an impact on the biodiversity protection zone along the boundary. Overall, building a single-storey structure on site does not prove optimal for the site that size and shape.

3.3.4 Option 4 – Chosen - Proposed development and the Permitted development

Option 4 consists of the proposed OSPG development and the permitted development and comprises of the following key elements.

One Data Centre Building with a total floor area of 3,206sq.m and on site power generation building 2,604sqm.

Figure 3.4 - Proposed Site Layout Option 4 (Source: RKD Drawing no. DB080-RKD-00-ZZ-DR-A-SITE-1035)

Option 4 is the chosen design as there is a requirement to provide on site power generation and comprises only Building 1 (permitted data centre, a multi-storey building with a footprint of 3,206sq.m) – similar to Option 1. The narrow footprint allows the site to breath, minimising visual impact and creating adequate space for generator yards and vehicular access around the site. Building 2 has been omitted thus providing space for on site power generation (now subject to current planning application). Fully landscaped biodiversity zone of 8m along the south and east boundaries has been provided including an attenuation pond and 2 swales.

Figure 3.5 - CGI of Proposed Data Centre from New Nangor Road R134 in Profile Park

Figure 3.6 - CGI of Proposed Data Centre from New Nangor Road R134 in Profile Park

Figure 3.7 - CGI of Proposed Data Centre from New Nangor Road R134 in Profile Park

3.3.4 Summary of the alternatives and the outcome

Site layout considerations and the requirement to provide on site power generation has resulted in the design team to identify the main factors which dictated the final site arrangement:

- Requirement to provide on site power generation,
- Building locations versus the location of the roads were set by the location of underground services (water main and ESB wayleaves).
- Wider footprint of the building proves suboptimal as it puts the plant in an exposed location and puts vehicular traffic on site under pressure. The narrow footprint is therefore preferred.
- Location of the plant on either side of the building rather than at the end utilizes the site better and is more optimal form the technical point of view (internal service routes).
- Location of plant equipment (chillers and generators) away from the biodiversity protection zone would assist in limiting its impact.
- Location of the entrance between the two buildings is not optimal. The entrance located at the southwest end of the site assists in creating a forecourt for arriving vehicles and allows rejection of the entry.
- Central location of the car parking at Building 1 proved better as the width of the site in its south-west 'leg' is limited.

We refer to Table 3.3 for a comparison of the alternatives for options 1,2,3 and 4 set out above.

3.5 Alternative Technologies

3.5.1 Permitted Development - Data Centre Technology

The global development of data centres has seen significant design and construction improvements relating to energy efficiency of buildings. Use of alternative technologies were explored as part of the process.

The environmental impact of the permitted development is minimised through energy saving technologies including: solar power/PV panels, low energy lighting, sensor lighting controls, heat recovery and variable speed pumps.

The internal office space, workshops and storage spaces require heating and cooling. Whilst cooling could be provided by the main chilled water system it is unable to generate sufficient heat to maintain ambient temperature during the winter cycle. Therefore, Airside heat recovery systems with air-to-air heat pumps shall be installed to provide heating and cooling to the office areas.

Energy efficient, Electrically Commutated (EC) Fans and motors shall be utilized for units up to 6kW in output and variable speed drives (VSD's) will be utilizedto control larger AC motors.. The effect of using these types of motors and control is minimum power consumption and 0-100% control possibilities for optimum energy consumption. Premium Efficiency motors will be specified on all equipment.

All other data storage engineering services installations have been considered in detail from an energy perspective.

With respect to Building Regulations, Technical Guidance Document (TGD) Part L notes that spaces with installed heat capacity of less than 10W/m^2 are exempt from meeting the requirements of the TGD Part L document. As such the data storage operational space is exempt from TGD Part L 2017. This effectively means that any space that requires no or little heating is exempt from meeting the requirements of TGD Part L.

The office space is fully air conditioned and will meet the requirements of the TGD Part L 2017. Building Energy Rating BER A3 or higher is targeted for the office areas with the utilization of high efficiency VRF Air Conditioning and roof mounted PV Panels to generate on site renewable electricity to be compliant with nZEB "Nearly Zero Energy Buildings requirements.

All the data centre's servers are housed in the data halls which are also known as "white space". When data centres were first introduced, the ambient temperature of the white space could be as low as 18^{o}C. Now, as technology and cooling strategies have developed, this temperature has increased to save energy and reduce carbon footprint. The ambient temperature of the white space will be maintained at 25 Degrees Celsius and free cooling is utilised whenever the external ambient temperature permits.

Air cooled chillers generate chilled water and this is piped to the white space where cool walls (effectively air conditioning units) distribute the cool air to the servers to maintain operational temeratiure limits.

For 7-9 months of the year when the external ambient temperature is below 15^{o}C, the air cooled chillers will operate in "free cooling" mode where the refrigeration component of the chillers are not required to run. This not only reduces the capital expenditure associated with the refrigeration systems but the associated electrical infrastructure to power them. The free cooling chillers helps reduce the operational carbon footprint as well as the embedded carbon of the data centre.

Equinix have developed and tested coolling solutons for data centres over many years of operaion and strive to reduce energy consumption across all their developments.

3.5.1.2 Data Centre Efficiency

Power usage effectiveness (PUE) is a ratio that describes how efficiently a computer data center uses energy and specifically, how much energy is used by the servers in the white space in comparison to the power required by the chillers and other building systems that support the white space.

PUE = Total facility energy/IT Equipment Energy

Equinix adhere to the Climate Neutral Data Centre Pact (CNDCP) which mandates that by January 1, 2025 new data centres operating at full capacity in cool climates will meet an annual PUE target of 1.3, and 1.4 for new data centres operating at full capacity in warm climates. This target takes into account all new and emerging technologies and the efficiencies achievable with all associated plant and equipment.

This data centre is in compliance with these targets and achieves a PUE of 1.27 at full load capacity.

Data centre operators and trade associations are committed to the European Green Deal, achieving the ambitious greenhouse gas reductions of the climate law, and leveraging technology and digitalization to achieve the goal of making Europe climate neutral by 2050.

To ensure data centres are an integral part of the sustainable future of Europe, data centre operators and trade associations agree to take the following actions to make data centres climate neutral by 2030. (Full details of the policy can be found in the following link, https://www.climateneutraldatacentre.net/wp-content/uploads/2021/06/CNDCP-Policy-Paper_FINAL.pdf)

- **Energy Efficiency**: Data centres and server rooms in Europe shall meet a high standard for energy efficiency, which will be demonstrated through aggressive power use effectiveness (PUE) targets.

- **Clean Energy:** Data centres will match their electricity supply through the purchase of clean energy.

- **Water**: Data centres at full capacity will meet a high standard for water conservation

- **Circular Economy:** The reuse, repair and recycling of servers, electrical equipment and other related electrical components is a priority for data centre operators.

- **Circular Energy System:** The reuse of data centre heat presents an opportunity for energy conservation that can fit specific circumstances. Data centre operators will explore possibilities to interconnect with district heating systems.

3.5.2 Proposed Development - On Site Power Generation Plant

3.5.2.1 Technology Types

Equinix considered a number of technologies as part of the selection/screening process to identify the most suitable for the application within the proposed development. These technologies were:

- Natural Gas Generators – reciprocating engine
- Natural Gas Generators – single cycle turbines
- Diesel Generators - reciprocating Engines
- Natural Gas Fuel Cells

3.5.2.2 Fuel Source

Whilst the use of on-site renewable energy was assessed for this project, it is the intent of the Client to provide a power plant solution that is ready to interface, operate and support Ireland's de-carbonised utilities when they start to come online from 2030 onwards.

By building an on-site power plant this in itself has the biggest impact in supporting the use of renewable energy. Once the project receives a utility power supply, and the OSPG is able to deliver power,this will directly allow the wider transmission electrical grid to take on more input power from wind and solar sources knowing that projects like this one, can self-support power during times when the sun and wind sources are not at full levels of production.

A high-level assessment was made of the following renewable sources of energy and fuel to serve the OSPG.

Solar & Wind

Due to the lack of spare land on the site it is not possible to generate substantial power from renewable sources of power such as PV and Wind. To appreciate the amount of space required the following two examples demonstrate this issue.

- **Solar -** Ireland's larget solar farm is located at the Lilly Facotry in Kinsale, Co Cork. The output of this plant is 5.6MW and occupies a land area of 16 Acres. The proposed development has a land area of 6.5 Acres and requires a power output of 10MW. It can be seen from this comparison that to supply the facility with solar power is not feasible as there is insufficient available land.

PV cells are installed on the project to provide power to the front of house office building in the data centre, which has been recognised and accepted in the planning approval received for the permitted data centre building.

Figure 3.8 – Solar Farm, Kinsale, Co. Cork

- **Wind –**Wind farms to supply a load of 10MW are typically located offshore where available space is less of a problem or on land in remote areas where wind patterns are favourable and space is available.

  If a single 2MW wind turbine is considered. The height of the centre of the fan blades sits at 80m from the ground and the rotor diameter is 116m. The maximum height limit on the site is restricted to 22m by SDCC due to the adjacent aerdrome and general planning restrictions, so therefore, even a single 2MW wind turbine cannot be located on this site, which would deem on site wind power genration unfeasible.

SPECIFICATIONS

2 MW wind turbine specifications table

2 MW platform	2 MW – 116	2 MW – 127	2 MW – 132
Output (MW)	2.3 to 2.7	2.5 to 2.8	2.5 and 2.8
Rotor diameter (m)	116	127	132
Hub heights (m)	80, 90, 94	89, 114	94, 130, 150*
Frequency (Hz)	50, 60	60	50
Vavg (m/s)	8.0	8.0	6.5
Ve50 (m/s)	53.2	56.0	49.0
Cut-in (m/s)	3.0	3.0	3.0
IEC Wind Class	IIS/IIIS	IIS/IIIS	IEC S

Figure 3.9 – Specification for 2MW Wind Turbine – General Electric (GE)

The best use of solar and wind power is at a utility level. Eirgrid are continually de-carbonising the grid by adding more and more solar and wind power plants to support the national gird. So when EirGrid achieve the de-carbonisation goals for the power grid, as a consumer, Equinix will automatically benefit from using green utility power derived from renewable sources, once the project receives a permanent power supply. For further discsson, please refer to the following section, "Natural Gas and Renewable Fuel Sources".

Bio-diesel

Bio-diesel was considered for the project, but the volume to be stored on site is in excess of 1,000,000litres and there is not sufficient space to accommodate a fuel storage facility of this scale. Also, the re-fuelling process is problematic, and relies on multiple diesel powered tankers to deliver fuel 2-3 times every week.

This particular option is also heavily reliant on the fuel supply chain network and any shortages in stock or problems with delivery could cause the data centre to be without power for extended periods of time which would not be acceptable to the end users.

Natural Gas and Renewable Fuel Sources

Natural gas is seen as the transitional energy source that will lead the Gas and Electricity utility networks to a decarbonised status and will provide support to those utilities in the event insufficient power can be generated from solar and wind farms.

The use of renewable gas as a fuel source will increase as Gas Networks Ireland (GNI) de-carbonise their supply networks and incorporate Natural Gas/biomethane, Natural gas/hydrogen blends, 100% biomethane or 100% hydrogen.

Biomethane is a carbon-neutral renewable gas made from farm and food waste, and biomethane can seamlessly replace natural gas on the network today and help reduce agricultural emissions.

Hydrogen is a carbon free gas that can be made from renewable electricity and stored until needed. It can be blended with natural gas and biomethane or used in its purest form for zero carbon energy.

GNI have a de-carbonisation mandate (https://www.gasnetworks.ie/vision-2050/irelands-decarbonisation)and Equiniox will be able to take advantage of this once made available to consumers.

Figure 3.10 - Gas Networks Ireland Mandate

The OSPG that has been proposed is able to operate on these renewable fuels with little or no modification to the plant and equipment.

<u>Conclusion</u>

The best use of renewable energy is made at the utility level by utilising wind, solar and renewable gas/hydrogen. Whilst the use of on-site renewable energy was assessed for this project, it is the intent of the Client to provide a power plant solution that is ready to interface, operate and support Ireland's de-carbonised utilities when they start to come online from 2030 onwards.

By building an on-site power plant this has the biggest impact in supporting the use of renewable energy. Once the project receives a utility power supply, this will directly allow the wider transmission electrical grid to take on more input power from wind and solar sources knowing that projects like this one, can self-support the development during times when the sun and wind sources are not at full levels of production.

3.5.2.3 Parameters and Metrics

Each of the above technologies were considered in the context of the preferred operating parameters including:

- CRU Requirements
- Primarily fuel natural gas
- Future Electric power grid frequency at 50Hz
- Emissions compliant to EU regulations
- Proximity to the ESB electrical distribution and network
- Proximity to the Gas Network Ireland (GNI) gas transmission network
- Capital cost and operating cost

In addition, the following performance metrics were considered which included:

- Engineering, Procurement, Construction Expenditure
- Operating Expenditure
- Plot area

- Heat rate
- Start-up / loading times
- Minimum operating level
- Water usage
- Construction & commissioning times

3.5.2.4 Environmental Measures

Each of the technology options were considered initially in terms of its key environmental impacts under the following main operational parameters.

- Spatial requirements
- Atmospheric emissions
- Noise emissions
- Water supply
- Wastewater emissions

3.5.2.5 Option Selection – Alternative Designs considered for the OSPG

Option 1, natural gas engine generators, as the most suitable solution for this application. The table below details the issues and benefits with each option. The natural gas reciprocating engine is most suited to this development as

Table 3.2 - Option Selection and Summary of Assessment

Option	Description	Summary of Assessment
1	Natural Gas Generators, reciprocating engines	• Fuel efficiency is high and NOX and CO emissions are low compared to diesel alternatives • Fuel efficiency is much better compared to turbines • Manufacturers declared Efficiency is 45% compared to 29% for gas turbines • Smaller machine capacities (1MW) are available • Smaller plant foot print • Best suited to off grid power generation application • Hydrogen ready
2	Natural Gas Generators, Turbines (Single Cycle)	• Best performance is seen at higher loads of >30MW and is not efficient at low loads of <10MW which this project requires • Typical machine sizes are >3MW and this does not suit the small load build up for this project or provide the required resilience with a small number of machines. • Foot print required is larger than what is available on site • Start up times for turbines is extremely slow and the data centre requires quick start up times from the power plant. • Electrical efficiency of turbines is 29%, 16% lower than gas engines

		• Can be adapted and modified to run on Hydrogen and or enewable gas
3	Diesel Generators, reciprocating Engines	• High noise and emissions output • Selective Catalytic Reduction (SCR)and Urea treatment required to reduce exhaust gases • Low levels of efficiency and high rate of fuel consumption • Electrical efficiency is low at approximately 28%. • Extremely large volumes of fuel to be stored on site and re-fuelling with many tankers (powered by diesel fuel) required on a weekly basis • Conversion units for diesel engines to run on hydrogen/diesel mix is currently being developed, but not 100% hydrogen/e-fuel
4	Natural Gas Fuel Cells	• Insufficient space to accommodate the plant • High cost compared to reciprocating engines • Lack of proven track record for resilient operation and availability of service. • Hydrogen ready

3.6 Alternative Size and Scale

OSPG

The size of the proposed OSPG compound has been based on the 10 no. gas engines providing in total 10 MW (which is what is required for the permitted data centre), ancillary prefabricated structures being switch rooms and Battery Energy Storage System (BESS), as well as gas supplier metering skid and access road (sized for a small truck being able to deliver spare parts).

The available space on site, which was a location for the future data centre which has now been abandonded, proved ideal to house the OSPG compound, therefore no alternative scale solution has been investigated.

It has been considered whether the generator flues should be grouped or should they be arranged in individual stacks.

To assist with the visual impact it has been decided to group them. They have been arranged in 2 groups, 5 flues in each, which matches the potential phasing in deployment of the plant. We refer to the Landscape and Visual assessment Chapter for more information.

Alternatives to the modifications to the Permitted DC

<u>Loading Dock area increase</u>

During the design process it became evident that more space will be required within the loading dock area. It has been decided to extend the single storey part of the building to the north as this would have a lesser associated impact on surrounding spaces than the extension to the west. In case of extension to the west both the car parking area and permitted Waste Bin Store would have to be redesigned. Extension to the north affected only the paved area within the entrance plaza area at the building entrance.

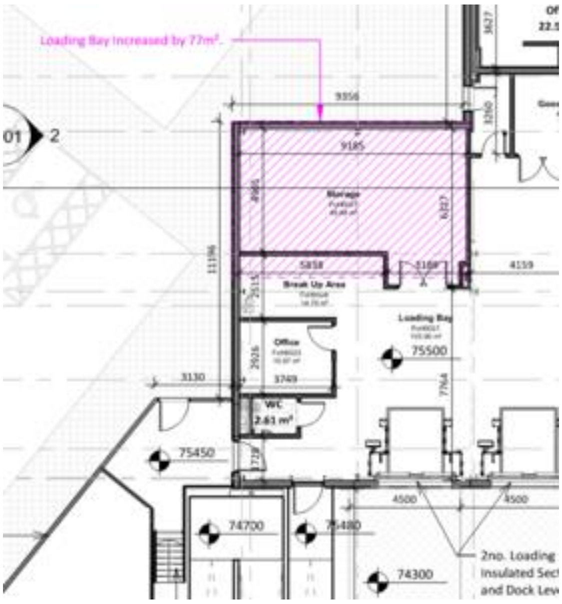


Figure 3.11 - Loading dock extension

<u>Removal of hot air plenums</u>

During the detail design development it has been advised by the building services designers that the 3 no. hot air plenums to the front (north) elevation will not be required. However from the architectural design point of view it was evident that 3 vertical elements on the facade have been beneficial in screening the generator flues and splitting the massing of the long north façade. It has therefore been decided to retain the 3 no. screens that would act as architectural treatment of the front façade. The design of the screens is similar to that of the front of the hot air plenums proposed earlier: light grey solid screens with metal mesh vertical strips as additional detail. Other colours of screening panels have been considered, however, light grey is consistent with the colour of the offices cladding and therefore has been selected.

Alterations to the permitted generator plant yard

The back-up generators diesel fuel storage has been reduced. The permitted development had a diesel storage capacity of 450,000litres and the proposed development now has a reduced storage capacity of 135,000 litres. The permitted development stored diesel in stand alone double walled tanks with bunded concrete areas and hard standing and associated fill and spill control systems. The proposed development now utilises belly tanks within the generator modular enclosures.

We note the following from the proposed development that relate to power supply:

- Alterations to the permitted generator plant yard to the north of the data centre to include removal of 4 no. internal generators and plant rooms spaces from 2nd floor and provision of same within the Generator Yard – Overall increase of number of external gens from 5 no. to 9 no. and increase of number of external electrical plant rooms from 4 no. to 8 no. We note there is therefore no change in the number of overall generators located on site at 9 no. total generators.
- All previously permitted free standing fuel tanks are now removed.

3.7 Alternate Construction and Decommissioning

Construction practices for On Site Power Generation Plants are well understood in the industry and standard construction practices will be employed in the construction of this plant. Similarly, decommissioning practices will follow standard practices and will be carried out in accordance with EPA requirements as set out in the IE Licence.

Decommissioning

Overall Project - Data Centre and OSPG

It is unlikely that the Data Centre will require decommissioning in the medium to long term future.

Regular maintenance and minor upgrade works will maintain the functional operation of the development over the medium to long term.

Proposed Development OSPG

The key issue is that whilst the proposal to power the permitted data centre by electricity was previously permitted, Equinix has not received a commercial or technical offer to supply permanent power to the site. It has been verbally confirmed by ESB that power to the site is likely to be available in 6-8 years.

Equinix will engage with Eirgrid to achieve a future connection for the grid to facilitate the delivery of renewable electricity via the electrical grid. The Equinix strategy is to utilise CPPAs. As such it is Equinix intent to continue to engage to achieve a grid connection form Eirgrid.

In the absence of a grid connection the proposal is to utilise On Site Power generation (OSPG) with energy supplied via the Gas Networks Ireland grid. The intent with the OSPG plant is that:

- The plant would be operational to bridge the gap in electrical utility availability i.e. be operational until electrical utility supply is available.
- The plant would act in a flex capacity to allow the DB8 demand to be removed from the grid if required by the utility provider.

Once the electrical utility is available and there is not a requirement for flex the intent is that the OSPG plant would be decommissioned. It is Equinix strategic target for Climate Neutral Data Centre and the electricity consumption at current operational data centres in Ireland to be matched 100% with renewable energy GOs through CPPAs so it is Equinix preferred solution to have a grid connection to help meet the company's global strategic targets.

The medium and long-term options for the OSPG are provided below.

1. Medium Term Option: Decommission the OSPG plant

   In the next 6-8 years, the grid will be upgraded by ESBN and they may decide that there is sufficient capacity in the network to serve and support this development. In this instance, OSPG plant may no longer be required.

2. Medium Term Option: Retain the OSPG with a grid connection after 6-8 years of full operation

   ESBN could request that the plant is retained on a permanent basis and operate on the terms and requirements of the CRU in order to support the security of the new de-carbonised national grid. In this case, the Consumer would have a "flex" agreement with ESBN and would be required to operate the OSPG on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels. As the OSPG hours of operation are currently unknown for this option, the hours of operation have been estimated based on an existing/similar OSPG development that is currently in a flex agreement which operates for 500 hours of the year.

3. Long Term Option: Retain the OSPG with no grid connection

If the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre, the proposed OSPG would remain operational for the long term (+15 years). This scenario has been assessed in the Climate Chapter of the accompanying EIAR.

3.8 Do – Nothing Alternative

As highlighted above the site is zoned for 'EE' with an objective to "To provide for enterprise and employment related uses". Consideration of an alternative location would equate to a 'do-nothing' alternative for the subject site. The lands would remain greenfield as the permitted data centre development on site would not be able to source power and would cease to function without the proposed development and would not maximise upon the development potential of the site, which would be contrary to the policy objectives of the County Plan which promotes enterprise and employment.

The County Development Plan allows for a proactive approach to data centres as per the above objectives.

Furthermore, developing a data centre at this location would also derive the benefits and maximise upon existing infrastructure, which is supported by the County Development Plan.

3.9 Conclusion

The proposed development was carefully designed, taking into consideration the site context and existing neighbouring commercial and residential properties to the north on New Nangor Road, the open space (Golf Club) to the west and the local environmental conditions including air quality, noise and vibration, visual impact and traffic considerations.

The development maximises the development potential of the site, adjoining an existing power station while improving natural screening through landscaping treatments along to site perimeter particularly along the northern, eastern and western boundaries.

Table 3.2 - Comparison Table of the Overall Project

	Option 1	Option 2	Option 3	Option 4 - Proposed
Data Halls	2 no buildings	1 no building	2 no buildings	1 no building
Storeys	3 storeys	2 storeys	1-3 storeys	1-3 storeys
Footprint (excl. plant)	3006 m2 + 1772 m2	5711 m2	5711 m2 + 1772 m2	3206 m2
Ratio	0.18	0.21	0.28	0.12

Buffer	8m min.	8m min.	8m min.	8m min.
Water				

Table 3.3 - Comparison of alternatives for options 1,2,3 and 4 the Overall Project

Environmental Factor	Option 1, 2, 3	Option 4 - Chosen
Biodiversity	The existing site is of low ecological value. Options 1,2 and 3 would not enhance the biodiversity on site. The developments would have resulted in a lower potential of small wildlife habitats as they do not include any ecological enhancement measures.	The Proposed Development has been designed to include an 8m landscape buffer from the drainage ditches to protect the hedgerow / treeline bordering the Site will be retained and protected from unnecessary damage. A landscape plan and ecological enhancement measures for the Proposed Development will be implemented as part of the works. This landscape plan which is included in appendix 11 of this EIAR includes wildflower and wetland habitats designed with pollinators in mind, tree and hedgerow planting and green roofs and trellises. Hibernacula and habitat piles will also be installed onsite.
Land, Soils Geology, Hydrogeology	The building design would result in a greater quantity of emergency generators diesel storage and therefore greater potential risk of an accidental discharge.	This layout represents a Sustainable Urban Drainage systems (SuDs) which is detailed in the proposed landscape masterplan which is included in appendix 11 of this EIAR in addition to the landscape design report . The berms and bunds will allow for reuse of soil and minimise and no need for off-site disposal of soil.
Hydrology	The Drainage ditches onsite are not considered to be of significant value. However, they do have the potential to support local biodiversity. In addition, these drainage ditches are connected to the	The Drainage ditches onsite are not considered to be of significant value. They do have the potential to support local biodiversity. In addition, these drainage ditches are connected to the

	Baldonnell Stream and subsequently the wider river network.	Baldonnell Stream and subsequently the wider river network. Therefore, in-line with policies NCBH2, NCBH5, and GI2 of the South Dublin County Development Plan water mitigation measures as outlined in Section 5.5 and Chapter 7: Water and a minimum 8m landscaping buffer will be implemented / maintained to prevent any impacts to the drainage ditch network and in turn, the water quality of the nearby Baldonnell Stream and wider river network.
Landscape and Visual Impacts	The proposed layouts for options 1,2 and 3 would have maximised the building footprint on the site and had a negative impact on the New Nangor Road and nearby residential properties.	The proposed layout provides for a reduction in the massing of buildings. The narrow footprint allows the site to breath, minimising visual impact and creating adequate space for generator yards and vehicular access around the site. Building 2 has been omitted thus providing space for on site power generation (now subject to current planning application). Fully landscaped biodiversity zone of 8m along the south and east boundaries has been provided including an attenuation pond and 2 swales. We refer to the landscape and visual impact chapter of this EIAR for more details.
Archaeology and Cultural Heritage	Archaeological geophysical survey has been completed for the development area. The development of these lands will require mitigation for underlying Archaeology.	Archaeological geophysical survey has been completed for the development area. The development of these lands will require mitigation for underlying Archaeology.
Air, Noise and Human Beings	This layout brought a larger number of noise and emission generating plant equipment	This layout provides a greater distance from residential properties relative to options 1,2 and 3 which reduces the

	into closer proximity to nearby residential receptors.	potential noise and air impacts.
Material Assets, Traffic and Waste	The larger data centre design would result in greater staff numbers and therefore the potential impacts on traffic and transportation would be greater.	The Overall and proposed development represents a reduced impact on local traffic, waste generation, water and energy usage.

4 Population and Human Health

4.1 Introduction

This chapter has been produced to assess the likely effects if any associated with Population and Human Health that may arise from the Overall Project.

In accordance with the Guidelines on the Information to be contained in Environmental Effect Assessment Reports (EPA 2022), Draft Advice Notes for Preparing Environmental Effect Statements (EPA 2015), Advice Notes on current practice in the preparation of Environmental Effect Statements (EPA, 2003) and European Commission Environmental Effect Assessment of Projects: Guidance on the preparation of the Environmental Effect Assessment Report (EU 2017). This chapter considers the "existence, activities and health of people", with respect to "topics which are manifested in the environment such as employment and housing areas, amenities, extended infrastructure or resource utilisation and associated emissions".

- Population and Demographics,
- Socioeconomics,
- Population Health,
- Natural resources,
- Tourism,
- Social Infrastructure,

Human beings and their well-being are a central consideration in assessing the environment. Any likely change in environmental conditions, which will effect the quality of life for human beings, must therefore be comprehensively addressed.

Effects upon humans may derive from any number of the environmental factors discussed throughout this EIAR. Ultimately, all development effects upon the environment to some extent and upon human beings and their quality of life. Direct effects relate to matters such as water and air quality, noise, and landscape change. Indirect effects relate to matters such as flora and fauna.

Effect on humans arising from other issues such as natural hazards, soils, geology and hydrogeology, water, air quality, noise, vibration traffic and landscape are assessed in the following EIAR chapters:

- Chapter 5: Biodiversity
- Chapter 6: Land & Soil, Geology & Hydrology
- Chapter 7: Water
- Chapter 8: Noise and Vibration
- Chapter 9: Air Quality
- Chapter 10: Wind and Microclimate
- Chapter 11: Landscape and Visual Impact Assessment
- Chapter 12: Traffic and Transport
- Chapter 13: Waste Management
- Chapter 14: Material Assets – Utilities
- Chapter 15: Cultural Heritage (Archaeological)
- Chapter 16: Cultural Heritage (Architectural)
- Chapter 17: Sunlight and Daylight
- Chapter 18: Climate
- Chapter 19: Cumulative Effects

4.1.1 Study Area

The Overall Project is located in South Dublin County Dublin and is within the following electoral divisions:

- Clondalkin Village
- Clondalkin Dunawley

This study area was chosen as it relates to the surrounding environment of the subject site and captures the environmental sensitivity of the geographical areas likely to be affected by the Overall Project.

These electoral divisions are identified in the figure below with the location of the Overall Project identified with a red circle.

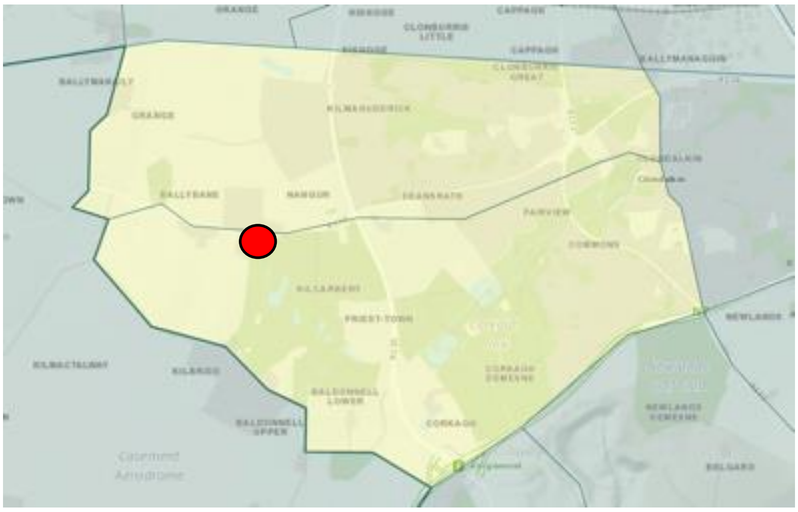


Figure - 4.1 - Clondalkin Village and Clondalkin Dunawley hatched yellow and subject site location identified as a red circle (Source: CSO annotated by author)

4.2 Methodology

In accordance with the EPA Guidelines (EPA 2022) this chapter has considered that:

> *"In an EIAR, the assessment of effects on population and human health should refer to the assessment of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g under the environmental factors of air, water, soil, etc. The Advice Notes provide further discussion of how this can be addressed".*

Based on the above guidelines the methodology can be described in these few steps:

1. Identify baseline conditions of the site and its environs.
2. Identify the sensitivity of receptors with the potential to be affected by changes in the baseline conditions.
3. Predict the magnitude of likely changes to the baseline receiving environment.
4. Assess the significance of the effect taking into account the sensitivity of receptors and the magnitude of the effect.
5. Identify and assess appropriate mitigation measures, including alternatives.
6. Assess the significance of residual effects, taking into account any mitigation measures.

A per Article 3 of the Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU:

1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:
    - i. *Population and Human Health*
    - ii. *Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC*
    - iii. *Land, soil, water, air and climate*
    - iv. *Material assets, cultural heritage, and the landscape*
    - v. *The interactions referred to in the factors referred to in points (i) to iv)*

2. The effects referred to in paragraph 1 on the factors set out therein include the expected effects deriving from the vulnerability of the project to risks of major accidents and/ or disasters that are relevant to the project concerned.

   The 2017 publication by the European Commission (EC), *Environmental impact Assessment of Projects: Guidance on the preparation of the Environmental impact Assessment Report,* considered that:

   Human Health is a very broad factor that would be highly Project dependant. The notion of human health should be considered in the context of other factors in Article 3(1) of the EIA directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the project, effects caused by changes in disease vectors caused by the project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise and 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'.

This chapter follows these EC guidelines and will examine the health effects relevant to the Overall Project and Proposed Development as they relate to a relevant, defined study area described further in Section 4.5.1 below. The effects of the Overall Project on the population and human health are analysed in compliance with the requirements of the Guidelines on the information to be contained in Environmental Impact Assessment Reports 2022 (referred to as EPA Guidelines).

4.3 Significance of effects

The sensitivity of individuals in an area will vary on a case-by-case basis and must be assessed accordingly. It would be unrepresentative to classify an entire population as 'low sensitivity' so for this assessment it is assumed that the receiving population is of a consistent high sensitivity to effectively properly assess the **effect** of the development on human health and population, using a precautionary principle.

To provide an assessment of effects which is comparable to other types of environmental assessment it is necessary to use the criteria specified in the 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' 2022.

The significance of effects has been assessed and rated in accordance with the significance, quality and duration as set out in the EPA Guidelines (2022); see Tables 4.1 to 4.3 below.

With regard to the quality of the effect, ratings may have positive, neutral or negative applications where:

Quality of Effect	***Definition***
Negative	***A change which reduces the quality of the environment (e.g. by causing a nuisance).***
Neutral	***No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.***
Positive	***A change that improves the quality of the environment (e.g. by removing a nuisance).***

Table 4.1: Quality of Potential Effects

The significance of an effect on the receiving environment are described as follows:

Significance of Effect on the Receiving Environment	***Description of Potential Effect***
Imperceptible	***An effect capable of measurement but without significant consequences.***
Not Significant	***An effect which causes noticeable changes in the character of the environment but without significant consequences.***
Slight	***An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.***
Moderate	***An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.***
Significant	***An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.***
Very Significant	***An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.***

Table 4.2: Significance of Effects

The duration of effects as described in the EPA Guidelines are:

Duration of Effect	***Definition***
Momentary	***Effects lasting from seconds to minutes***
Brief	***Effects lasting less than a day***
Temporary	***Effects lasting one year or less***
Short-term	***Effects lasting one to seven years***
Medium-term	***Effects lasting seven to fifteen years***
Long-term	***Effects lasting fifteen to sixty years***
Permanent	***Effects lasting over sixty years***
Reversible	***Effects that can be undone, for example through remediation or restoration***

Table 4.3: Duration of Effects

4.4 Characteristics of the Proposed Development and Overall Project

The details of the Proposed Development and Overall Project are detailed in full this section of the EIAR.

4.4.1 Proposed Development - Modifications to the permitted data centre and development of On Site Power Generation - Ref. SDA22/0156

Equinix intends to seek permission for the proposed development which consists of Modifications to the permitted data centre granted under SDCC Ref. SD21A/0186 and the development of an OSPG and associated works. The OSPG plant is proposed in the area to the south west of the permitted data centre that was previously reserved for a future data centre application. For the purpose of this EIAR, we note there were no amendments made at further information stage to the design of the OSPG. The site layout is illustrated in the Figure below.

Figure 4.2 – Development illustrating OSPG Compound (southwest of the overall site)

The proposed OSPG and modifications to the permitted Data Centre development under Ref. SD21A/0186 consists of the following:

- Reconfiguration, alterations and amendments to the previously permitted scheme and data centre building under Ref. SD21A/0186 which include the following:
    - Omission of third floor level in the office block (removal of approx. 366sq.m of GFA the omission of the third floor has reduced the entire building to a 3 storey development.)
    - Alterations to the floor levels: floor levels within the admin area of the Data Centre have been changed in order to provide consistency throughout the building. One storey of the admin block has been omitted and floor to floor height changed to 5.3m in line with heights in the data halls. We refer to figure 2.5 below for an extract of this drawing that illustrates the alterations to floor levels.
    - parapet height increase of front of house to c.16.8m,
    - Increase of single storey Loading Dock GFA by approx. 60sqm
    - provision of storage at second floor level in lieu of relocated internal generators to the external generator yard and associated elevational alterations.
    - Extension of loading dock at ground floor level by c.60sqm in area with minor height increase to c.5.3m.
    - Alterations to the permitted generator plant yard to the north of the data centre to include removal of 4 no. internal generators and plant rooms spaces from 2nd floor and provision of same within the Generator Yard – Overall increase of number of external gens from 5 no. to 9 no. and increase of number of external electrical plant rooms from 4 no. to 8 no. All previously permitted free standing fuel tanks are now removed. This also includes increase of the yard size, rearrangement of the yard layout. Overall increase of external electrical plant rooms GFA is 49.66sqm.
    - Removal of 3 no. air plenums to the front (north) elevation and provision of screening to generator flues in lieu of omitted plenums.
    - Alterations at roof level to include removal of 2m high gantry screening.
    - Reconfiguration of plant within the permitted chiller plant yard to the south of the data centre.
    - Removal of 1 no. sprinkler/water tank and removal of stairs and door to the side of the waste compound.
    - Reconfiguration of car parking and motorcycle spaces and removal of 1 no. accessible spaces to 64 no. total number of car parking spaces .

- The proposal also includes provision of on-site gas power generation compound OSPG (c.2,604sqm in area) in the area which was previously reserved for a future data centre development under Ref. SD21A/0186 located to the south west of the now permitted data centre under Ref. SD21A/0186.
    - The OSPG compound comprises:
        - 7 no. modular plant rooms (totaling c.180sqm in area),
        - 10 no. gas fired generators and associated flues c.14.7m high,
        - gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and
        - 2 no. vehicular access points including general and emergency access.
- All associated site development works, services provision, drainage works, access, landscaping and boundary treatment works.
- No buildings are proposed above the existing ESB and SDCC wayleaves to the west and north of the site.
- The overall Gross Floor Area of the development is reduced by c.44sqm to c.9,795sqm from previously permitted under SDCC Reg. Ref. SD21a/0186.
- The application was accompanied by a Natura Effect Statement.

4.4.2 Overall Project – permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to this application as per application SDCC Ref. SDA22/0156

The Overall Project includes the 2 no. developments described below which are described in full in section 2.3.2 of this EIAR and are summarized below for the purpose of this Chapter:

1. The permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and;
2. The proposed development under SDCC Ref. SD22A/0156 consisting of an OSPG and modifications to the permitted Data Centre development under Ref. SD21A/0186.

We refer to section 2.3.2 for a full description of the Overall Project.

4.5 Existing Baseline Conditions

4.5.1 Receiving Environment

This section describes the receiving environment in terms of existing context, character, significance and sensitivity which forms the baseline for further assessment.

The study area for population and human health includes review of relevant information concentrated on the 2no. Electoral Districts (ED) within which the project is located as identified in section 4.1.1. This study area was chosen as it relates to the surrounding environment of the subject site and captures the environmental sensitivity of the geographical areas likely to be affected by the Overall Project.

The most recent census data that was available for this report was undertaken in April 2016 and the previous census was undertaken in April 2011. The census compiles data for the whole state as well as smaller individual areas including counties, cities, towns, and electoral divisions. Taking into consideration the location of the proposed development, this chapter assesses the effect of the proposed development on the following topics:

- Population and Demographics,
- Socioeconomics,
- Population Health,
- Natural resources,
- Tourism,
- Social Infrastructure.

4.5.2 Land Use

Development Site Context

The site of the Overall Project which includes the proposed OSPG development and permitted Data Centre is located in Profile Park, Dublin 22 which is approximately 3km west of Clondalkin town centre. The site is a greenfield site, measuring 2.649 hectares / 6.545 acres. It has been recently used by ESB as a site compound during their works in the area. We note there was stockpiling of fill from adjacent sites stored on the site, which has recently been cleared.

The site has formed part of the Profile Park Business Park since its establishment in the year c.2006 which is a 100 acre (40.5 Ha) fully enclosed, private business park. The surrounding land uses comprise of similar large industrial, manufacturing and data storage buildings that are similar to the permitted and proposed development that this EIAR relates to. Existing tenants within Profile Park and the surrounding business and enterprise parks include Google, Microsoft, Digital Realty Trust, Telecity and others. Immediately adjacent to Profile Park is the Castlebaggot 110 / 220 kV substation which provides electrical transmission connectivity to the national electricity transmission grid system.

The site is bounded by Grange Castle Golf Club to the east and south, Baldonnel Stream adjoins the site at its southwest corner. There are similar Data Centre developments neighbouring the site to the South and West of the site. There is a residential dwelling located adjacent to the Circle K Filling Station c.70m from the site. Two detached units to the west of the site are either vacant/derelict and or planned for demolition. There are some residential areas to the east at Oldcastle Drive, including traveller accommodation c.600m distant. Casement Aerodrome is located c.800m south of the subject site.

Property values

Data available from the CSO on property values is presented in terms of Eircode Routing Key areas. The site is located within Eircode Routing Key Area Dublin 22. The CSO data for the year to November 2022 show that the median price of residential properties sold across the area is €345,00.

4.5.3 Population and Demographics

Population Trends for the Local Area

The Central Statistics Office (CSO) provides data on population and socio-economic aspects of the population at a State, County and local Electoral District level.

The subject site falls within the following electoral divisions in South Dublin:

- Clondalkin Village
- Clondalkin Dunawley

These electoral divisions are identified in the figure below.

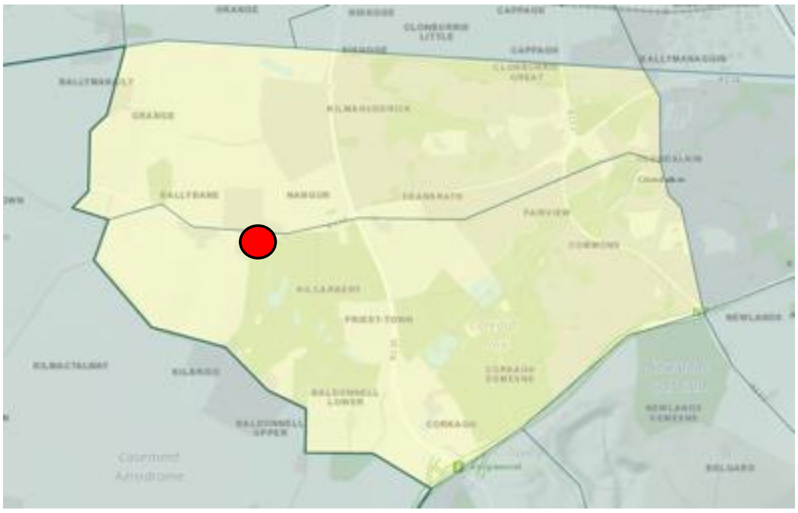


Figure - 4.1 - Clondalkin Village and Clondalkin Dunawley hatched yellow and subject site location identified as a red circle (Source: CSO annotated by author)

CSO population statistics relevant to the subject area are summarised below. The most recent population figures for Clondalkin Village and Clondalkin Dunawley areas are noted as 9,152 and 11,323 respectively, which shows a population increase of 7.8% for Clondalkin Village ED and 4.1% for Clondalkin Dunawley ED from 2011-2016. These population figures are highlighted in Table 4.1 below.

Table 4.1 - Population of electoral divisions associated with the subject site from 2011 and 2016 (Source: CSO)

Electoral Division	2011	2016	Actual Change	% Change
Clondalkin Village	8,492	9,152	660	7.8%
Clondalkin Dunawley	10,877	11,323	446	4.1%

Age Profile

A review of the Clondalkin Village and Clondalkin Dunawley age profile confirmed that communities in the surrounding areas have an age profile weighted generally towards an older population group. This can be assessed following a review of the figures below, which confirm that the area's population profile is dominated by people in the working age group (30 to 44 years of age).

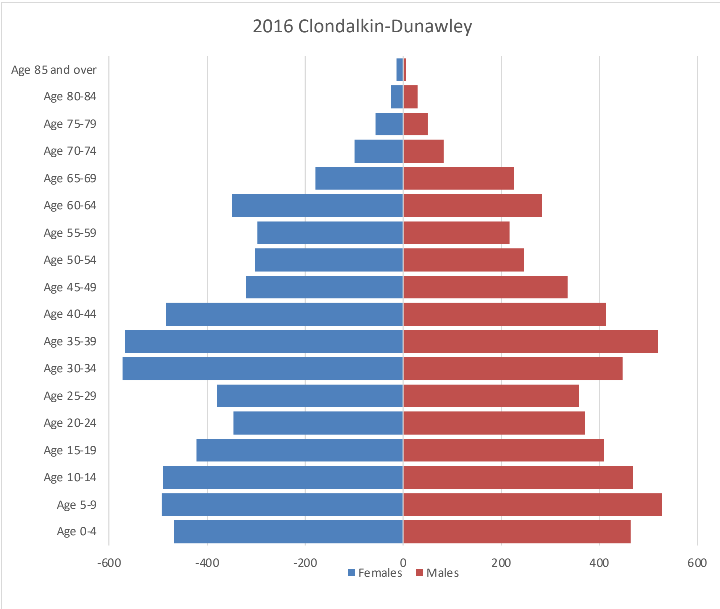
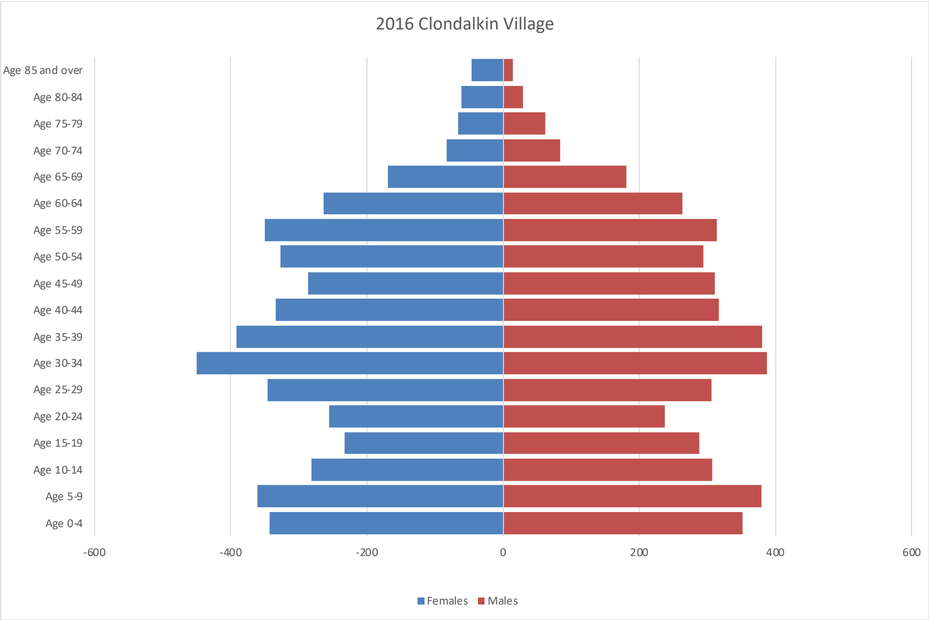


Figure 4.2 - Population Profile by sex & age group in Clondalkin-Dunawley (Source: CSO 2016)

Figure 4.3 - Population Profile by sex & age group in Clondalkin-Village (Source: CSO 2016)



The key points to note are as follows:

- The total number of persons in Clondalkin Village and Clondalkin Dunawley areas are noted as 9,152 and 11,323 respectively, which shows a population increase of 7.8% for Clondalkin Village ED and 4.1% for Clondalkin Dunawley ED from 2011-2016.
- The age profile of communities in the surrounding areas have an age profile weighted generally towards an older population group.

We confirm that the above statistics are applied throughout this chapter to allow for conclusions to be drawn.

Population Density

Population density measures the number of persons occupying a geographical area in proportion to the size of that area. It is a useful indicator of settlement patterns in the area surrounding the proposed project and South Dublin County overall.

Table 4.2 – Population density of electoral divisions associated with the subject site 2016 (Source: CSO)

Electoral Division/ Area	Population Density 2016 (persons/km^2)
Clondalkin Village	1,556
Clondalkin Dunawley	2,419
Dublin City and Suburbs	3,677

The figures above are based on the electoral divisions in comparison the Dublin City and Suburbs which indicates that the population density of this areas is low in comparison to the County overall. This partly reflects the nature of land use activities in the area surrounding the site, which is predominantly made up of industrial uses, open amenity space and a small proportion of low density housing development.

4.5.4 Socio Economics

Employment

The number of employees by industry is represented in the table below. There is a higher proportion of employment within the Commerce and Trade and Professional Services within the area as identified from the CSO data illustrated below.

Table 4.3 - Clondalkin Village ED Persons at Work by Industry 2016

Persons at Work by Industry 2016 Clondalkin Village, Co. Dublin, 03010	Males	Females	Both Sexes
Agriculture, forestry and fishing	6	3	9
Building and construction	209	26	235
Manufacturing industries	311	123	434
Commerce and trade	570	563	1133
Transport and communications	339	142	481
Public administration	138	119	257
Professional services	239	592	831
Other	469	440	909
Total	2281	2008	4289

Table 4.4 - Clondalkin Village ED Persons at Work by Industry 2016

Persons at Work by Industry 2016 Clondalkin-Dunawley, Co.Dublin, 03006	Males	Females	Both Sexes
Agriculture, forestry and fishing	2	2	4
Building and construction	215	29	244
Manufacturing industries	288	141	429
Commerce and trade	534	583	1117
Transport and communications	335	107	442
Public administration	100	95	195
Professional services	268	682	950
Other	509	499	1008
Total	2251	2138	4389

Labour force Survey

The Labour Force Survey (LFS) is a large-scale, nationwide survey of households in Ireland carried out every three months. It generates labour force estimates which include the official measure of employment and unemployment for the state. The CSO is obliged to follow standard definitions and methodology when calculating the official estimates from the LFS.

Employment Rate

The LFS results nationally for Q3 2022 showed that there were 2,554,300 people employed in the state an increase of 3% from Q3 2021. The number of persons aged 15-74 years who were unemployed decreased by 30,000 (-20.1%) to 119,100 in the year to Q3 2022.

The census data illustrates the employment rate for the two electoral divisions that surround the site from the 2006 – 2016 census which indicates an increase in unemployment after the economic crash in 2008 and a subsequent decrease in unemployment as the economy recovered as reflected in the 2016 census data below.

Male Unemployment Rate and Electoral Division	Clondalkin Village	Clondalkin-Dunawley
Unemployment rate-Male 2006	7.9	17.39
Unemployment rate-Male 2011	21.26	34.85
Unemployment rate-Male 2016	11.13	21.61

Female Unemployment Rate and Electoral Division	Clondalkin Village	Clondalkin-Dunawley
Unemployment rate-Female 2006	8.43	16.87
Unemployment rate-Female 2011	14.68	26.76
Unemployment rate-Female 2016	11.56	19.32

Table 4.5 – Employment Rate for each Electoral Division

Deprivation

Deprivation in small areas is mapped using the Pobal HP Deprivation Index. This Index draws on data from censuses and combines three dimensions of relative affluence and deprivation: demographic profile, social class, composition and labour market situation.

The table below shows the Pobal HP Index Relevant Index Score figures at the electoral division level. Both areas can be classified as 'marginally below average' as they fit within the 0 to -10 relative index score.

ED Name	Deprivation Score 2006	Deprivation Score 2011	Deprivation Score 2016
Clondalkin Village	-1.36	-1.17	0.23
Clondalkin-Dunawley	-10.19	-9.85	-9.45
Total	-6.26	-6.04	-5.12

Relative Index Score	Label
> 30	Extremely affluent
20 – 30	Very affluent
10 – 20	Affluent
0 – 10	Marginally above average
0 – -10	Marginally below average
-10 – -20	Disadvantaged
-20 – -30	Very disadvantaged
< -30	Extremely disadvantaged

Table 4.6 - Pobal HP Index Relevant Index Score

Education

Census data presenting the highest level of education completed for key educational levels by people living in the 2no. electoral divisions surrounding the subject site are presented in the table below.

Highest Level of Education Completed by Electoral Division	Clondalkin Village	Clondalkin-Dunawley
Proportion with Primary Education Only 2006	14.63	20.26
Proportion with Primary Education Only 2011	13.49	20.15
Proportion with Primary Education Only 2016	11.71	16.79
Proportion with third level education 2006	24.8	17.49
Proportion with third level education 2011	22.88	14.07
Proportion with third level education 2016	27.7	17.3

Table 4.7 Highest Level of Education Completed by Electoral Division

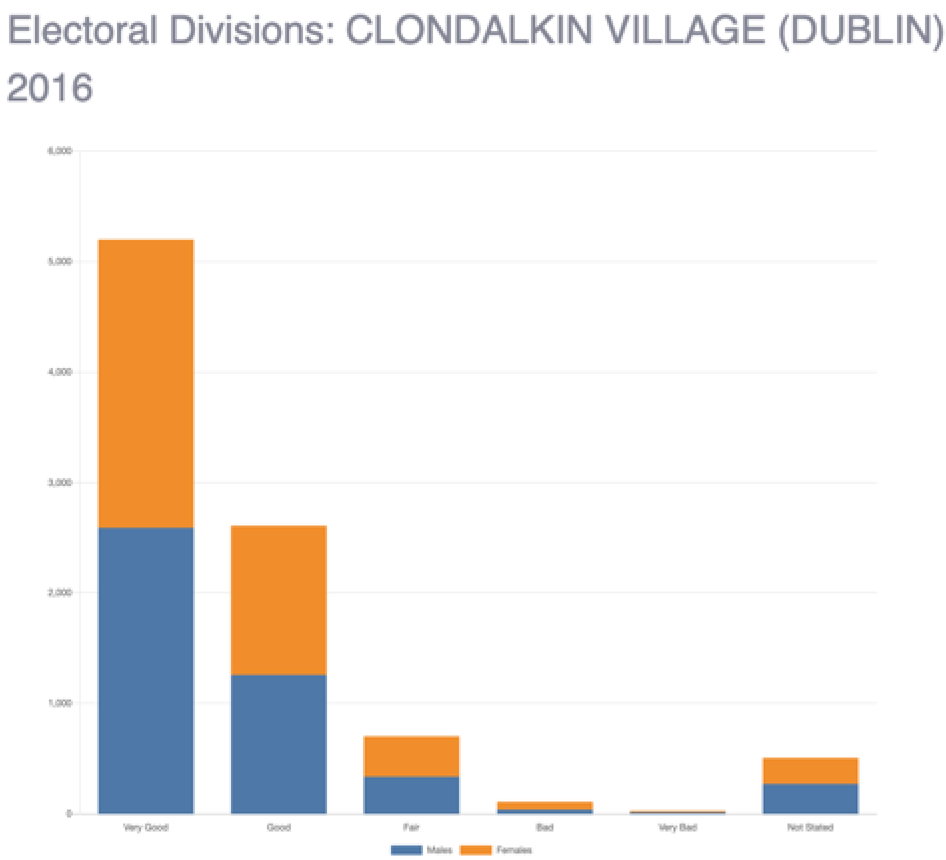
4.5.5 Human Health

Life expectancy in Ireland by sex is a key metric for assessing population health; data for the study area is shown in Table 4.8. Dublin data shows that life expectancy for both males and females has increased consistently since the 2006 census to 2016, with female life expectancy consistently higher than males.

Table 4.8 Period Life Expectancy of County Dublin (Source: CSO)

Sex and Year	2006	2011	2016
Male	76.7	78.3	80.1
Female	81.2	82.7	83.4

A review of the general health data collected from the 2016 census confirmed that the majority of the population in the surrounding areas of the site in the Clondalkin Village and Clondalkin Dunawley electoral divisions have good general health according to the CSO census data.



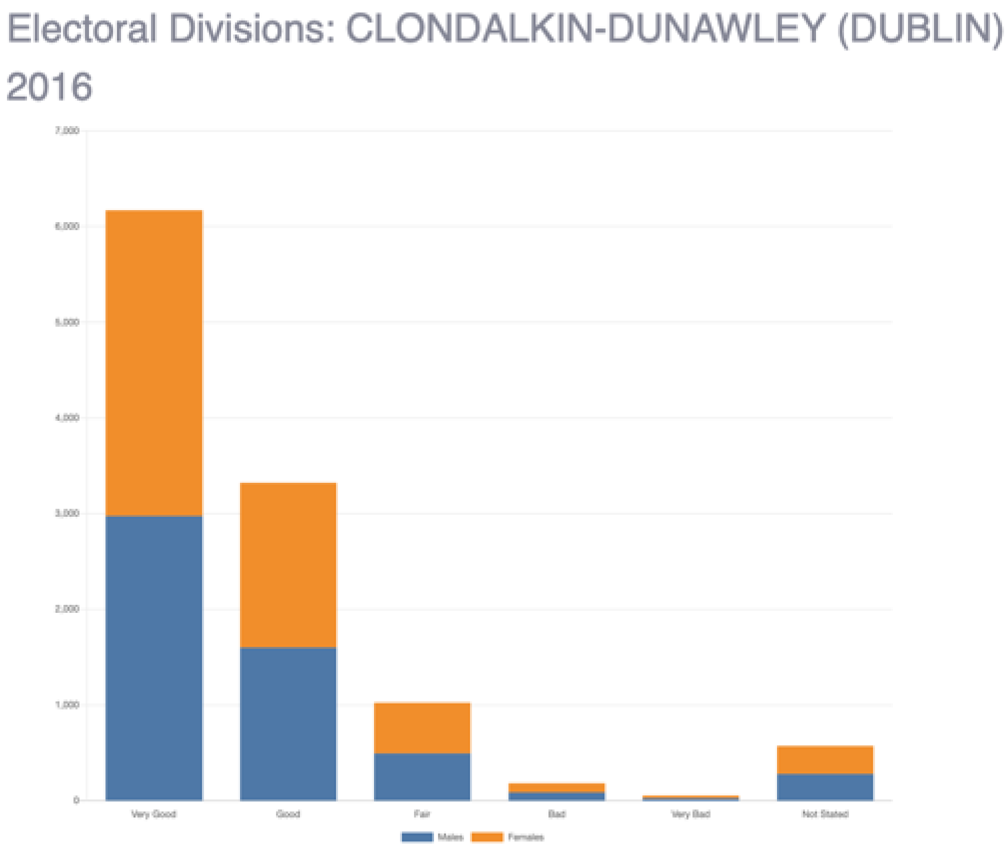


Figure 4.4 - The General Health of both sexes in the relevant Electoral Divisions associated with the subject site (Source: CSO)

4.5.6 Major Accidents/ Hazards - Seveso Site

The Seveso Directive (Directive 82/501/EEC, Directive 96/82/EC, Directive 2012/18/EU) was developed by the EU after a series of catastrophic accidents involving major industrial sites and dangerous substances. Such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident.

The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implement the latest Seveso III Directive (2012/18/EU).

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

We note there is an Upper Tier Seveso Site located approx 3.26 km south from the subject site. The facilities name is identified as Benntag Chemicals Ireland with an address of Unit 405, Greenouge Industrial Estate, Rathcoole, Dublin 24.

4.5.7 Natural Resources

There will be a loss of soil available for agricultural economic use due to the Overall Project. However, within the overall context of Ireland, the loss of available farmland is considered negligible. In addition, the employment created by the construction and operation of the Overall Project counter- balances this economic loss to some extent.

The site has been recently used by ESB as a site compound during their work in the area. There was also stockpiling of fill from adjacent sites stored on the site, which has recently been cleared. We note the business park was earmarked for enterprise since its inception in 2006 and therefore in our opinion, the proposed development does not detract from natural resources or loss of available farmland.

4.5.8 Tourism

The area surrounding the site is characterised by industrial land uses and activity. With the exception of the Golf Course located to the south east of the site which in our opinion is a general amenity and therefore no tourism assets are present within the immediate vicinity of the site. Notwithstanding this, the design team have made an effort in relation to buffer areas bordering the golf course and surrounding the site, including planting of trees and citing of buildings which will not significantly effect local amenity or tourism that may arise from the Golf club/ course located to the south east of the site.

While there are no there are no anticipated negative effects arising from construction for local recreational users. Effects are predicted to be minor or negligible. The likely effects on receptors with regards to noise and vibration, air, traffic and visual appearance are assessed in the relevant chapters of this EIAR.

4.5.9 Social Infrastructure

Education

There are a number of schools located within approx. 4km vicinity of the subject site Including:

- Adamstown Castle Educate Together National School
- St John the Evangelist National School
- Lucan East Educate Together National School
- Talbot Senior National School
- Our Lady Queen of Apostles
- Coláiste Chilliain
- St Johns National School
- Rainbow Magic Pre School
- Sacred Heart National School
- St Peter the Apostle Junior National School
- Moyle Park College
- St. Mary's Senior and Junior National School Rowlagh
- Collinstown Park Community
- Divine Mercy Junior National School
- Lucan Community National School
- Stewarts School
- Saint Bernadette's Senior and Junior National School
- Gaelscoil Naomh Padraig
- St. Thomas' Primary School
- St. Finian's National School
- Adamstown Community College

Emergency Services

There are a number of emergency services surrounding the site including Clondalkin Garda Station located c. 4km east of the subject site on Orchard Road and further c.4km north east identified as Ronanstown Garda Station, Tallaght Fire station is located approx. 3.8km from the subject site and the closest Hospital to the overall project is Tallaght Hospital.

Summary of Baseline Conditions

The sensitivity of the surrounding area has been considered based on the details of the published data. The area surrounding the site is divided between 2no. Electoral divisions Clondalkin Village and Clondalkin Dunawley which has seen a population increase of 7.8% and 4.1% respectively which has a large proportion of this population within the working age the majority between 24 and 39 years old, the population density of this areas is low in comparison to the County overall. The median price of residential properties sold across Dublin 22 is €345,00. The site is bounded by Grange Castle Golf Club to the east and south, Baldonnel Stream adjoins the site at its southwest corner. There are similar Data Centre developments neighbouring the site to the South and West of the site. There is a residential dwelling located adjacent to the Circle K Filling Station c.70m from the site.

4.6 Likely Effects of the Development on Population and Human Health

The main likely effects on population and human health from the Overall Project are likely to comprise of the possibility of spills/leaks, air emissions, noise, visual, and traffic effects. These aspects have been assessed in terms of the appropriate relevant standards within the corresponding specialist chapters that are outlined above in section 4.1 of this chapter.

A summary the likely effects of construction, operation and decommissioning of the Overall Project are considered below in relation to population and human health is presented herein.

4.6.1 Likely effects on Business and Residents

Overall Project and Proposed Development OSPG

The main likely effects on local businesses and residences associated with the Proposed Development will be in relation to air quality, noise, visual impact and traffic.

The Proposed OSPG development will power the permitted data centre and therefore bring to fruition the jobs that can potentially be created by the permitted data centre which forms part of the Overall Project.

It is envisaged that the Overall Project including the proposed and permitted development will be constructed at the same time. During construction it is estimated to employ c. 100 – 120 no. construction workers during the construction phase which is estimated to last up to 16-18 months.

It is estimated that up to 14 full time staff will be employed during the operational phase of the Overall Project to manage the data centre. Staff will be employed on a shift basis over a 24 hour period, seven days a week. There will also be 4-6 contractors working on site.

The OSPG will be operated and maintained by 1 no. plant manager with 2 no. specialists to be on call duty during the night shift. In addition there will be a remote operation team that will be available 24/7 to manage the OSPG facility if required.

Population Trends, Age Profile and Population Density

The construction phase would not result in any permanent change to local population trends with the area. There will be a short-term and imperceptible effect on population during the construction phase.

The site is located within an area of low population density. The construction phase would have a short term positive effect on the existing population trends of the area as a result of the proposed development.

The development will require approximately c. 100 – 120 no. of construction workers on site during the construction phase. It is expected that the workforce will travel from its existing place of residence rather than staying in temporary accommodation in the area. However, this short term increase in employment may result in short-term increased need for accommodation locally which may add value to the local economy.

The main areas in which the construction phase would have a likely effect relate to air quality, noise, visual effects and traffic effects during the construction stage. These likely effects are assessed within the relevant chapters outlined above in this EIA Report.

<u>Property Values</u>

The construction works for the proposed power plant will not have any effect on local property values. Profile Park and the surrounding business parks are zoned for 'Employment and Industry' in the South Dublin County Development Plan 2022-2028. We note there is significant construction being undertaken in this area with no evidence of a reduction in house prices arising from this construction activity. The effect on property values will be ***Neutral, Not Significant*** and ***Long Term***.

<u>Employment</u>

The proposed development will lead to the support and creation of direct and indirect employment during construction.

The development will require approximately c. 100 – 120 no. of construction workers on site during the construction phase. At a local level, employment will rise on site and at a national level. Employment will be created through specialised construction services as well as through the supply of building equipment and materials.

The proposed development has the likely to have a positive effect to indirectly create employment during the construction phase. The procurement of goods and services may likelyly increase employment opportunities and may increase people's incomes and have a positive effect on their health. There is likely for increased spending from construction workers which will have a positive effect at a more local level.

In summary, it is envisioned that the proposed development will have the following effects locally during the construction phase:

- Increased spending locally by construction employees,
- Increased demand for sustenance which will benefit convenience retailers,
- Likely increase in demand for accommodation,
- Increased generation of development activities such as site monitoring, site surveys, site investigations, legal fees, night time security and consultancy studies during pre-construction and construction phases.

Therefore due to the reasons set out above there will be a ***positive, moderate*** and ***Long Term*** effect on employment in the area.

4.6.2 Likely effects on Human Health from Air Quality and Climate

We refer Chapters 9 and 18 Air Quality and Climate which outlines the likely effects during the construction and operational phases that may arise during the proposed development and Overall Project.

The key elements of construction and operation of the proposed development and overall project that are likely to have effects on human health that relate to air quality and climate include:

- Dust emissions from site works including excavation works, infilling and landscaping activities and storage of soil in stockpiles. This leads to the potential for nuisance dust.
- Engine emissions from construction vehicles and machinery,
- Change in traffic flows on roads surrounding the site,

- Air emissions associated with the operation of the OSPG and on site emergency generators.

With reference to the Air and Climate Chapters of this EIAR Chapters 9 and 18 respectively we note that it is predicted that the construction phase and initial commissioning tests will result in an imperceptibly negative impact to air quality in the short-term and thus have a not significant impact.

We refer to Section 9.5.2 and 9.6 for more details on the potential impact to air quality during the operational phase of the proposed development which uses an iterative stack height determination that was undertaken as part of the air dispersion modelling study to ensure that an adequate release height was selected for all emission points to aid dispersion of the plume and ensure compliance with the ambient air quality limit values at all locations beyond the site boundary. Thus, the operational phase of the proposed development will remain in compliance with the ambient air quality standards.

4.6.3 Likely effects on Amenity and Tourism

The location of the Overall Project is within lands zoned for enterprise and employment, which is surrounded by industrial land uses and activity. With the exception of the Golf Course located to the south east of the site which in our opinion is a general amenity and therefore no tourism assets are present within the immediate vicinity of the site.

The development will change the site from a greenfield to an industrial infrastructure use with associated planting.

The site of the proposed development will change from a greenfield site zoned for 'Enterprise and Employment' to the proposed OSPG and permitted Data Centre. This will result in a positive, long-term and significant effect on land use which is consistent with the land use zoning of the site and its environs under the South Dublin County Development 2022-2028.

4.6.3 Likely effects on Human Health from Noise and Vibration

We refer to Chapter 8 Noise and Vibration of this EIAR for the likely effects on Human Health from noise and vibration of the Overall Project.

4.6.4 Likely effects on Health and Safety

The Overall Project has been designed with consideration given to the health and safety risks of people living and working in the vicinity. The Overall Project including the OSPG and Data Centre facility has been designed by an experienced personnel in accordance with relevant standards, design codes, legislation that is referenced to throughout this EIAR.

The potential health and safety risks have been addressed for certain aspects including the vulnerability of the Overall Project to natural disasters flooding, air quality, noise and vibration and traffic we refer to Chapters 6,7,8,9,10,12 and 18.

The potential for major accidents has been considered with reference to Seveso/Control of Major Accident Hazards (COMAH) Regulations. The Overall Project will not be a Seveso/COMAH facility. The only substance stored on site controlled under Seveso/COMAH will be diesel for generators and the amounts proposed do not exceed the relevant thresholds of the Seveso Directive.

The activities of contractors during the construction phase will be carried out in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013, as amended, to minimise the likelihood of any effects on the construction workers' health and safety.

There is a negligible risk of landslides occurring along the routes and in the immediate vicinity due to the topography and soil profile of the site and surrounding areas. There is no history of seismic activity in the vicinity of the routes. There are no active volcanoes in Ireland so there is no risk of volcanic activity.

The Overall Project will not pose any flooding issues we refer to chapter 7 and appendix 7.1 where flood risk assessment was carried out for the permitted development and is appended to this EIAR in appendix 7.1.

Therefore having regard to the reasons set out above the effects of the Proposed Development and Overall Project will have a ***Neutral, Moderate and Long Term effect*** on the health and safety of the population.

4.7 Remedial and Mitigation Measures

As per the mitigation measures outlined in the EPA Guidelines and Annex IV(7) of the amended directive and EIAR should include 'A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.'

Construction phase

Any perceived nuisance effects on the immediate local population will be short-term and temporary in nature due to the length of the construction process for the Overall Project of 16-18 months. No remedial or mitigation measures are therefore required beyond normal landscaping, noise and construction mitigation that are outlined within this EIA Report and in the Construction Environmental Management Report (CEMP) which will be prepared by the works contractor in advance of works commencing on site.

Mitigation measures proposed to minimise the likely effects on human health in terms of air quality and climate and noise and vibration during construction are discussed in the relevant sections of this EIA report.

Operational Phase

The Overall Project and Proposed Development will be entirely beneficial in employment terms as it will power the permitted data centre which forms part of the Overall Project, no remedial or reductive measures are considered necessary for the Overall Project.

Mitigation measures proposed to minimise the likely effects on human health in terms of air quality, climate, noise and vibration during the operational phase of the development are discussed in the relevant sections of this EIA report

4.8 Residual Effects

This section sets out the residual impact on human health after mitigation measures are implemented for the construction and operational phases of the development, when the residual impacts on human health and populations are similar they have not been divided into separate phases.

4.8.1 Effects on Businesses and Residences

There will be a temporary, imperceptible, positive effect on local business with the presence of construction workers using local facilities during the construction phase of the proposed development.

The health effects associated with the employment generation during the construction stage and the decommissioning phase if required would be temporary, not significant and slight positive in nature.

As mentioned previously, the main areas in which the construction phase would have a likely effect relate to air quality, noise, visual effects and traffic effects during the construction stage. These likely effects are assessed within the relevant chapters and outlined above in this EIA Report.

Effects on Tourism and Amenity

As mentioned in the visual assessment chapter, the proposed development would be built in an area where other large-scale industrial developments are already present. The proposed development is therefore in keeping with the existing trends in the area.

4.8.2 Effect on Human Health from Air Quality and Climate

We refer Chapters 9 and 18 Air Quality and Climate which outlines the residual effects during the construction and operational phases of the proposed development and Overall Project.

In relation to human health Air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, emissions from the site, assuming scheduled testing as well as emergency operation of the back-up generators, are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

Once the mitigation measures outlined in Section 9.6 are implemented, the residual impacts on air quality from the construction of the proposed development will be ***short-term*** and ***imperceptibly negative*** and for the operational phase of the proposed development will be ***long-term, negative*** and ***slight.*** Thus, in terms of air quality, both the construction phase and operational phase will be ***not significant***.

4.8.3 Effects on Amenity and Tourism

No significant visual effects on the landscape or visual amenity of the area have been identified. The Overall Project would contribute to the planned urbanisation of the area where an expansion of business and industrial uses are envisioned for the site in Profile Park.

The development will change the site from a greenfield to an industrial infrastructure use with associated planting.

Due to the site context and surrounding landuses set out above the effects on Amenity and Tourism will be ***Neutral, Imperceptible*** and ***long term.***

We refer to Chapter 11 for more details on the Landscape and Visual Impact assessment associated with the Proposed Development and Overall Project.

The design of the proposed development as well as the design of the overall project, includes features, materials as well as planting that will complement and integrate the development into the landscape and the visual environment.

Once the project is completed and all landscape works are fully established, there will be no significant residual impacts on landscape character or visual amenity.

The proposed development is rather a small scale in comparison with the other developments in the area, does not affect the existing ridgelines and will be well integrated into the landscape thanks to the green living wall solution.

The cumulative impact can therefore be described as **slight in magnitude, neutral in quality, and long term / permanent in duration.**

The overall project is comparable in scale to other developments in the area. It impacts the landscape by changing the ridgeline, however, the landscape scheme will partially mitigate that impact.

The cumulative impact can therefore be described as **moderate in magnitude** (the development is in keeping with the existing trends)**, negative in quality, and long term / permanent in duration.**

4.8.4 Effects on Human Health from Noise and Vibration

We refer to Chapter 8 Noise and Vibration of this EIAR for the effects on Human Health from noise and vibration after mitigation measures are incorporated for the Overall Project.

4.9 Monitoring

Overall Project and Proposed Development

Measures to avoid negative effects on population and human health are largely integrated into the overall design of the Overall Project and Proposed Development. Compliance with the design and layout of the proposal applied for will be a condition of the development if granted. Monitoring for compliance with health and safety requirements will be undertaken by the project supervisor for the construction process.

4.10 Cumulative Effects

The cumulative effects as far as practically possible of the Overall Project with any or all relevant existing permitted development as set out in Appendix 19.1 are discussed in Chapter 19 of this EIAR for the construction and operational phases of the Overall Project for each environmental topic.

5 Biodiversity

5.1 Introduction

This chapter of the EIAR has been prepared by Sarah de Courcy and checked and reviewed by Dyfrig Hubble from the MOR team. This chapter provides a description and assessment of the potential, likely and significant impacts of the Proposed Development on ecology and biodiversity. The Site boundary assessed in this chapter covers the redline area which encompasses both the Permitted and Proposed Development i.e. the Overall Project area.

A detailed ecological appraisal has been carried out by fully qualified and experienced MOR Ecologists in line with *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (2018 and revisions) [1]. In addition, an assessment on potential impacts on Natura 2000 sites was also undertaken and is presented in the Stage 2: Appropriate Assessment - Natura Impact Statement which forms part of the planning application [2], which should be read in conjunction with this chapter.

5.2 Study Assessment and Methodology

5.2.1 Relevant Guidance

The following standards and guidance documents were utilised to characterise the baseline conditions of the Site, the assessment of potential impacts to biodiversity and the appropriate mitigation measures required:

Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (2018 and revisions) [1];

European Commission, *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013)* [2];

NRA, *'Guidelines for Assessment of Ecological Impacts of National Roads Schemes'* [3];

Fossitt's Guide to Habitats in Ireland [4];

Heritage Council's '*Best Practice Guidance for Habitat Survey & Mapping*' [5];

NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [6];

JNCC, '*Common Standards Monitoring Guidance*,' [7];

JNCC '*Herpetofauna Worker's Manual*' [8]; and,

Froglife, '*Surveying for Amphibians*' [9].

Scottish Badgers, '*Surveying for Badgers: Good Practice Guidelines,*' [10];

The Mammal Society, '*Surveying Badgers,*' [11]; and,

DoEHLG, '*Bat Mitigation Guidelines for Ireland*' [12];

NRA, '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' [13]; and,

BCT, '*Bat Surveys for Professional Ecologists Good Practice Guidelines*' [14].

SNH, '*Technical Advice Note #2: Otter Surveys*' [15];

DoAHG, '*National Otter Survey of Ireland 2010 / 12*' [16];

CIRIA, *C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors* [17];

CIRIA, *C741- Environmental Good Practice on Site* (4^{th} edition) [18];

NRA '*Guidance for the Treatment of Bats Prior to the Construction of National Road Schemes'* [13]; and,

NRA '*Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes'* [19].

NRA, '*Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* [20]; and,

'*Requirements for the Protection of Fisheries Habitat during Construction and Development'* [21].

5.2.2 Desk Study

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

The area for which biological data were collected was based on an assessment of the ecological zone of influence of the Site (i.e. the area that could be affected by the scheme within which there is the potential for significant ecological effects). Given the scale and nature of the proposed works and the landscape surrounding the Site, significant effects on priority habitats and species as a result of the works are unlikely to occur more than 1km away with the exception of in-river works as discussed further below.

The following literature sources were consulted in January 2023 as part of the desktop study:

- Review of aerial maps of the Site and surrounding area;
- The National Parks and Wildlife Service (NPWS) website was consulted with regard to the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment (https://www.npws.ie) [22];
- The South Dublin County Council Planning Portal to obtain details about existing / proposed developments in the vicinity of the Site [23];
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions (https://maps.biodiversityireland.ie/) [24]; and,
- The EPA Maps website was consulted to obtain details about watercourses in the vicinity of the Site (https://gis.epa.ie/EPAMaps/) [25].

5.2.3 Field Survey

5.2.3.1 Habitat Survey

An initial habitat survey was undertaken on the 6th of November 2020, by two (2No.) suitably qualified MOR Ecologists, Dyfrig Hubble and Amelia Keane, with update surveys completed on the 7th of June 2021, and the 14th of March 2022. These surveys aimed to assess the extent and quality of habitats present on the Site and to identify any potential ecological receptors. All the surveys were undertaken using the Fossitt's Guide to Habitats in Ireland [4] and were conducted in line with the Heritage Council's *Best Practice Guidance for Habitat Survey & Mapping* [5].

The assessment was extended to also identify the potential for these habitats to support other features of nature conservation importance, such as species afforded legal protection under either Irish or European legislation. Based on the habitats present, additional species-specific surveys were also undertaken for both bats and amphibians, please see details below.

5.2.7.2 Protected / Notable Species Survey

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

<u>Flora</u>

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

- Flora (Protection) Order 2022 (S.I. No. 235/2022); and,
- Ireland Red List No. 10: Vascular Plants [26]

Amphibians

The Site was assessed for its potential to provide sheltering, foraging, and breeding habitat for amphibians. These include static or slow-moving waterbodies suitable for egg-laying, and terrestrial habitats comprising open areas with mixed-height vegetation, such as heathland, rough grassland, open scrub or water body margins. Suitable well drained and frost-free areas are needed to enable amphibians to survive the winter. Suitable well drained and frost-free areas are needed to enable amphibians to survive the winter.

Static / slow-moving waterbodies suitable for egg-laying were identified onsite. It was therefore considered that the Site has the potential to support amphibians, presence / absence surveys for amphibians were undertaken. The following survey methodologies were utilised, and four (4No.) survey visits were undertaken on the 26th of April, 4th of May, 24th of May and 8th of June 2021;

- Refugia Search:

  This will take place in daylight. A refugia search is carried out on the terrestrial area near the pond being surveyed. This includes searching amongst old debris, logs, under rocks and through vegetated areas.

- Egg Search:

  This is conducted before dusk. Systematic search through submerged vegetation for egg wraps. The inspection takes place in daylight hours. If smooth newt egg wrap is found, the search ends to avoid further disturbance.

- Netting:

  This is conducted during daylight. Surveyors, using a long-handled dip net walk the perimeter of the water body (where accessible). If a newt is caught, netting is ceased immediately due to the disruptive nature of netting.

- Torching:

  This is conducted after dusk as newts are most active. Torching is used to determine presence or absence of newts and an estimate the population. A high-powered torch (1 million candle power) is used around the margins of the waterbody to detect newt activity.

These methodologies are in line with the following guidance:

- NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [6];
- JNCC, '*Common Standards Monitoring Guidance*,' [7];
- JNCC '*Herpetofauna Worker's Manual*' [8]; and,
- Froglife, '*Surveying for Amphibians*' [9].

Badger

The survey aimed to identify and examine areas where badgers (Meles meles) might occur by noting any evidence of badger activity. This included:

Mammal paths;

Badger hairs caught in sett entrances / fences / vegetation;

Paw prints;

Evidence of foraging (usually in the form of 'snuffle holes');

Latrines; and,

Badger setts.

The field survey of the Site was conducted in line with the following relevant guidance for badger:

- Scottish Badgers, '*Surveying for Badgers: Good Practice Guidelines,*' [10];
- The Mammal Society, 'Surveying Badgers,' [11]; and,
- NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [6].

Bats

An initial assessment was carried out during the 2020 habitat survey for suitability of the habitats within the Site to support bat roosting, foraging and commuting. The inspection was undertaken using close-focusing binoculars and a powerful focused-beam light source.

The following criteria were used to assess mature trees onsite:

- Presence of natural cavities, splits, cracks, loose bark and rot holes in the trunk or boughs of the tree;
- Presence of dense and woody ivy (Hedera helix) growth that could be used by bats for roosting;
- Evidence of bat droppings, which may also be seen as a black streak beneath holes, cracks, branches, etc; and,
- Presence of smooth edges with dark marks and urine stains at potential entrances to roosts.

Given the presence of features suitable for roosting bats, follow up Dusk emergence and activity surveys were undertaken for the Site to confirm if any of the trees were being used by roosting bats and to establish the level and type of activity onsite. These surveys were conducted on the 24th of May 2021 and the 8th of June 2021.

All surveys were undertaken in accordance with recognised best practice as outlined below:

- DoEHLG, '*Bat Mitigation Guidelines for Ireland*' [12];
- NRA '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' [13]; and,
- BCT, '*Bat Surveys for Professional Ecologists Good Practice Guidelines*' [14].

Full details of the survey methodology are provided in Appendix 5.1: Bat Report.

Birds

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

Otter

The survey aimed to identify and examine areas where otter might occur by noting any evidence of otter observed. Evidence of otter searched for included:

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

The field survey of the Site was conducted in line with the following relevant guidance for otter:

- SNH, '*Technical Advice Note #2: Otter Surveys*' [15];
- DoAHG, 'National Otter Survey of Ireland 2010 / 12' [16]; and,
- NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [6].

Invasive Species

The Site was visually assessed for the presence of any noxious / invasive species that are regulated under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) [27] such as Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*).

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

Other Species

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

5.2.7.3 Survey Limitations

No survey limitations were encountered.

5.2.4 Assessment Methodology

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

The approach that was used for determining which receptors have the potential to be significantly affected by the Proposed Development involved using baseline data collected through the desk study and field surveys for the Site. Based on professional judgement data from the following radii was collected: 2km away for protected species, 15km for Natura 2000 sites and 5km away from Natural Heritage Areas. The desk and field-based data was used to determine:

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

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

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

Receptors that have been identified as having sufficient value, and that an impact upon them could be of potential significance, have been taken forward for further consideration. Legally protected species were also considered further (refer to Box 1 below). This involved:

- Identifying, for each receptor, any significant impact that is likely to be caused by the Proposed Development, which has the potential to lead to a significant effect and / or to contravene relevant legislation;

- Determining the area within which the likely impacts would cause a potentially significant impact on the identified receptor and / or could contravene relevant legislation (ecological zone of influence); and,
- If the receptor occurs or is likely to occur within the zone of influence and concluding that the receptor could be significantly affected and / or the relevant legislation contravened, the receptor would be subject to further assessment.

5.2.5 Evaluation of the Conservation Importance of the Site

In terms of biodiversity conservation value, identified receptors have been valued using the National Roads Authority (NRA) Scheme [3], using the following scale:

- International importance;
- National importance;
- County importance (or vice-county in the case of plant or insect species);
- Local importance (higher value); and,
- Local importance (lower value).

5.3 Planning Context

5.3.1 Legislation / Policy Context

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

Box 1 Designated Wildlife Sites and Protected and Otherwise Notable Habitats and Species
The National Park and Wildlife Service (NPWS) notifies sites in Ireland that are of international or national importance for nature conservation (although some sites that are of national importance for certain species have not been so designated). Internationally important sites may also be designated as: • Special Areas of Conservation (SACs) and Candidate Special Area of Conservation (cSACs): the legal requirements relating to the designation and management of SACs in Ireland are set out in the European Communities (Birds and Natural Habitats) Regulations 2011-2021 (S.I. No. 477/2011); • Special Protection Areas (SPAs) and candidate Special Protected Areas (cSPAs): strictly protected sites classified in accordance with Article 4 of the EC Directive on the Conservation of Wild Birds (2009/147/EC), also known as the Birds Directive; and, • Ramsar sites: wetlands of international importance designated under the Ramsar Convention, to which Ireland is a signatory. Other statutory site designations relating to nature conservation are: • National Heritage Areas (NHA): these represent examples of some of the most important natural and semi-natural terrestrial and coastal habitats in the country and are afforded protection under the Wildlife (Amendment) Act 2000. NHAs are legally protected from damage and receive protection from the date they are formally proposed for designation; and, • Proposed Natural Heritage Areas (pNHAs): these sites are not afforded the same protection as NHAs. These sites are proposed by the NPWS but are not statutorily proposed or designated. Prior to statutory designation these are subject to a very limited legal protection. They are, however, sites of significance for wildlife and habitats and are important for the purposes of this Biodiversity Chapter. **Legally protected species** Many species of animal and plant receive some degree of legal protection. For the purposes of this study, legal protection refers to: • Species included in the Wildlife (Amendment) Act 2000, excluding species that are only protected in relation to their sale, reflecting the fact that the site disposal will not include any proposals relating to the sale of species; and, • Species afforded protection under the Flora (Protection) Order 2022 (S.I.No.235/2022); **Other notable habitat/species categories** • Biodiversity Action Plan (BAP) species: those targeted in local or national BAPs as being of particular conservation concern (priority species). • Red and Amber List birds: those listed as being of high or medium conservation concern as listed by Birdwatch Ireland on the Birds of Conservation Concern in Ireland 2020-2026 [28]. • Other Irish Red Data Book species [29] and Nationally/Regionally/Locally Notable species where appropriate.

5.3.2 National Planning Context

A study of biodiversity related planning policy at the national and local level has been undertaken for the Site and locality to highlight any potential conflicts with the relevant legislation and guidance documents as outlined in Box 1.

5.3.2.1 Project Ireland 2040 National Planning Framework

Project Ireland 2040 was launched by the Government in February 2018 [15] and incorporates two policy documents - the National Planning Framework and the National Development Plan.

National Planning Framework

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

'Enhance the conservation status and improve the management of protected areas and protected species by:

- *Implementing relevant EU Directives to protect Ireland's environment and wildlife;*
- *Integrating policies and objectives for the protection and restoration of biodiversity in statutory development plans;*

- *Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites; and,*
- *Continued research, survey programmes and monitoring of habitats and species.'*

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

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

The National Development Plan

The National Development Plan also lists the following items as strategic investment priorities in relation to National Heritage and biodiversity :

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

5.2.2.2 Ireland's National Biodiversity Action Plan 2017-2021

The 3rd National Biodiversity Action Plan (NBAP) sets out a number of strategic objectives that lay out a clear framework for Irelands approach to biodiversity and demonstrates Ireland's commitment to protect our biodiversity and also halt against decline [30]. This NBAP will remain in place until early 2023 when the new NBAP 2023-2027 will be published, please see Section 5.2.2.3 below for further details. The following objective within the current NBAP was considered relevant to the Proposed Development and this report:

Objective 4 of the NBAP aims to ensure:

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

5.2.2.3 Ireland's Draft National Biodiversity Action Plan 2023-2027

Ireland's 4th NBAP has been in development since October 2021 and was put forward for public consultation in September 2022. Submissions were closed on the 9th of November 2022 and, at the time of writing this report, this consultation was under review. The draft NBAP was reviewed as part of this report and a number of objectives were considered relevant to the Proposed Development [31].

Objective 2 of the draft NBAP aims to:

> '*Meet urgent conservation and restoration needs,'*

A number of targeted outcomes are listed under this objective which are considered relevant to the Proposed Development. These include the following:

Outcome 2B:

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

Outcome 2C:

'All freshwater bodies are of at least 'Good Ecological Status' as defined under the EU Water Framework Directive.'

Outcome 2G:

'Invasive alien species (IAS) are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity and measures are undertaken to tackle the introduction and spread of new IAS to the environment.'

Objective 3 of the draft NBAP is to:

'Secure Nature's Contribution to People.'

Under Objective 3, the following targeted outcome is considered relevant to the Proposed Development:

Outcome 3A:

'Ireland's natural heritage and biocultural diversity is recognised, valued, enhanced and promoted in policy and practice.'Regional Planning Context.'

5.2.3 Regional Planning Context

5.2.3.1 Eastern & Midland Regional Spatial and Economic Strategy 2019-2031

The Eastern & Midland Regional Spatial and Economic Strategy 2019-2031 (RSES) [32] recognises the need to conserve and enhance biodiversity through co-ordinated spatial planning in the eastern and midland region.

One of the guiding principles of this document relating to the Proposed Development is to:

'Explore opportunities for biodiversity enhancement to improve ecological connectivity as part of the strategic re-intensification of urban infill and brownfield sites.'

Under the Biodiversity Section (Section 7.5) of the RSES, the following regional policy objectives relative to the Proposed Development are listed:

RPO 7.16

'Support the implementation of the Habitats Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans.'

RPO 7.17

'Facilitate cross boundary co-ordination between local authorities and the relevant agencies in the Region to provide clear governance arrangements and coordination mechanisms to support the development of ecological networks and enhanced connectivity between protected sites whilst also addressing the need for management of alien invasive species and the conservation of native species.'

RPO 10.6

'Delivery and phasing of services shall be subject to the required appraisal, planning and environmental assessment processes and shall avoid adverse impacts on the integrity of the Natura 2000 network.'

5.2.4 Local Planning Context

5.2.4.1 South Dublin County Development Plan 2022-2028

The South Dublin County Development Plan (SDCDP) 2022 – 2028 [33] has a variety of statements in different sections (Sections 3.3.2, 3.3.3, 3.3.5, 3.3.6, 4.2.1, 4.2.2 and 4.2.3) which relate directly to the protection of biodiversity and natural heritage in the context of proposed developments.

These include policies to ensure compliance with EU Habitats Directives and to ensure the protection of the integrity of European sites.

The following policies and associated objectives contained within the SDCDP are relevant to the Proposed Development:

Policy NCBH2: Biodiversity

'Protect, conserve, and enhance the County's biodiversity and ecological connectivity having regard to national and EU legislation and Strategies'

Under this policy, the following objectives are listed:

<u>Objective 1:</u>

'To support the implementation of the National Biodiversity Action Plan (2017- 2021) and the All-Ireland Pollinator Plan (2021-2025) and to support the adoption and implementation of the South Dublin County Biodiversity Action Plan (2020-2026) and Pollinator Action Plan (2021-2025) and any superseding plans.'

<u>Objective 2:</u>

'To ensure the protection of designated sites in compliance with relevant EU Directives and applicable national legislation.'

<u>Objective 3:</u>

'To protect and conserve the natural heritage of the County, and to conserve and manage EU and nationally designated sites and non-designated locally important areas which act as 'stepping stones' for the purposes of green infrastructure and Article 10 of the Habitats Directive.'

<u>Objective 4:</u>

'To protect our rivers and in particular to avoid overdevelopment which could have an adverse effect on the biodiversity and ecosystems of the river.'

Policy NCBH3: Natura 2000 Sites

'Conserve and protect Natura 2000 sites and achieve and maintain favourable conservation status for habitats and species that are considered to be at risk through the protection of the Natura 2000 network from any plans or projects that are likely to have a significant effect on their coherence or integrity.'

Under this policy, the following objectives were considered relevant to the Proposed Development:

<u>Objective 1:</u>

'To prevent development and activities that would adversely affect the integrity of any Natura 2000 site located within or adjacent to the County and promote the favourable conservation status of the habitats and species integral to these site'

<u>Objective 3:</u>

'To ensure that planning permission will only be granted for a development proposal that, either individually or in combination with existing and / or proposed plans or projects, will not have a significant adverse effect on a European Site, or where such a development proposal is likely or might have such a significant adverse effect (either alone or in combination), the planning authority will, as required by law, carry out an appropriate assessment as per requirements of Article 6(3) of the Habitats Directive 92 / 43 / EEC of the 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, as transposed into Irish legislation. Only after having ascertained that the development proposal will not adversely affect the integrity of any European site, will the planning authority agree to the development and impose appropriate mitigation measures in the form of planning conditions. A development proposal which could adversely affect the integrity of a European site may only be permitted in exceptional circumstances, as provided for in Article 6(4) of the Habitats Directive as transposed into Irish legislation.'

Policy NCBH4: Proposed Natural Heritage Areas

'Protect the ecological, visual, recreational, environmental and amenity value of the County's proposed Natural Heritage Areas and associated habitats and species.'

Under this policy, the following objectives are listed:

Objective 1:

'To ensure that any proposal for development within or adjacent to a proposed Natural Heritage Area (pNHA) is designed and sited to minimise its impact on the biodiversity, ecological, geological and landscape value of the pNHA particularly plant and animal species listed under the Wildlife Acts and the Habitats and Birds Directive including their habitats.'

Objective 2:

'To restrict development within or adjacent to a proposed Natural Heritage Area to development that is directly related to the area's amenity potential subject to the protection and enhancement of natural heritage and visual amenities including biodiversity and landscapes. Such developments will be required to submit an Ecological Impact Assessment prepared by a suitably qualified professional.'

Policy NCBH5:

'Protect and promote the conservation of biodiversity outside of designated areas and ensure that species and habitats that are protected under the Wildlife Acts 1976 to 2018, the Birds Directive 1979 and the Habitats Directive 1992, the Flora (Protection) Order 2015, and wildlife corridors are adequately protected.'

Under this policy, the following objectives are listed:

Objective 1:

'To ensure that development does not have a significant adverse impact on biodiversity, including known rare and threatened species, and that biodiversity enhancement measures are included in all development proposals.'

Objective 2:

'To ensure that an Ecological Impact Assessment is undertaken for developments proposed in areas that support, or have the potential to support, protected species or features of biodiversity importance, and that appropriate avoidance and mitigation measures are incorporated into all development proposals.'

Policy NCBH10: Invasive Species

'Protect against and prevent the introduction and spread of invasive species within the County and require landowners and developers to adhere to best practice guidance in relation to the control of invasive species.'

Under this policy, the following objectives were considered relevant to the Proposed Development:

Objective 1:

'To ensure that development proposals do not lead to the spread or introduction of invasive species. If developments are proposed on sites where invasive species are or were previously present, applicants should submit a control and management programme with measures to prevent, control and / or eradicate the particular invasive species as part of the planning process and to comply with the provisions of the European Communities Birds and Habitats Regulations 2011 (S.I. 477 / 2011)'

Policy NCBH11: Tree Preservation Orders and Other Tree / Hedgerow Protections

'Review Tree Preservation Orders (TPO) within the County and maintain the conservation value of trees and groups of trees that are the subject of a Tree Preservation Order while also recognising the value of and protecting trees and hedgerows which are not subject to a TPO.'

Under this policy, the following objectives were considered relevant to the Proposed Development:

Objective 3:

'To protect and retain existing trees, hedgerows, and woodlands which are of amenity and / or biodiversity and / or carbon sequestration value and / or contribute to landscape character and ensure that proper provision is made for their protection and management taking into account Living with Trees: South Dublin County Council's Tree Management Policy (2015-2020) or any superseding document and to ensure that where retention is not possible that a high value biodiversity provision is secured as part of the phasing of any development to protect the amenity of the area.'

Objective 4:

'To protect the hedgerows of the County, acknowledging their role as wildlife habitats, biodiversity corridors, links within the County's green infrastructure network, their visual amenity and landscape character value and their significance as demarcations of historic field patterns and townland boundaries. (Refer also to Chapter 4: Green Infrastructure).'

Objective 5:

'To ensure that intact hedgerows / trees will be maintained above the 120m contour line within the County ensuring that the strong rural character will not be diluted and that important heritage features and potential wildlife corridors are protected.'

Policy GI2:

'Strengthen the existing Green Infrastructure network and ensure all new developments contribute towards GI, in order to protect and enhance biodiversity across the County as part of South Dublin County Council's commitment to the National Biodiversity Action Plan 2021- 2025 and the South Dublin County Council Biodiversity Action Plan, 2020-2026, the National Planning Framework (NPF)and the East Region Spatial and Economic Strategy (RSES).'

Under this policy, the following objectives were considered relevant to the Proposed Development:

Objective 1:

'To reduce fragmentation and enhance South Dublin County's GI network by strengthening ecological links between urban areas, Natura 2000 sites, proposed Natural Heritage Areas, parks and open spaces and the wider regional network by connecting all new developments into the wider GI Network.'

Objective 2:

'To protect and enhance the biodiversity and ecological value of the existing GI network by protecting where feasible (and mitigating where removal is unavoidable) existing ecological features including tree stands, woodlands, hedgerows and watercourses in all new developments as an essential part of the design and construction process, such proactive approach to include provision to inspect development sites post construction to ensure hedgerow coverage has been protected as per the plan.'

Objective 4:

'To integrate GI, and include areas to be managed for biodiversity, as an essential component of all new developments in accordance with the requirements set out in Chapter 12: Implementation and Monitoring and the policies and objectives of this chapter.'

Objective 5:

'To protect and enhance the County's hedgerow network, in particular hedgerows that form townland, parish and barony boundaries recognising their historic and cultural importance in addition to their ecological importance and increase hedgerow coverage using locally native species including a commitment for no net loss of hedgerows on any development site and to take a proactive approach to protection and enforcement.'

Objective 10:

'To enhance biodiversity and the health of pollinator species by banning the use of glyphosphate in or close to public parks, public playgrounds, community gardens / allotments and within residential estates, whether by directly employed Local Authority staff or private contractors.'

Policy GI4: Sustainable Drainage Systems

'Require the provision of Sustainable Drainage Systems (SuDS) in the County and maximise the amenity and biodiversity value of these systems.'

Under this policy, the following objectives were considered relevant to the Proposed Development:

Objective 1:

'To limit surface water run-off from new developments through the use of Sustainable Drainage Systems (SuDS) using surface water and nature-based solutions and ensure that SuDS is integrated into all new development in the County and designed in accordance with South Dublin County Council's Sustainable Drainage Explanatory Design and Evaluation Guide, 2022.'

Objective 2:

'To incorporate a SuDS management train during the design stage whereby surface water is managed locally in small sub-catchments rather than being conveyed to and managed in large systems further down the catchment.'

Objective 3:

'To require multifunctional open space provision within new developments to include provision for ecology and sustainable water management.'

Policy GI5: Climate Resilience

'Strengthen the County's GI in both urban and rural areas to improve resilience against future shocks and disruptions arising from a changing climate.'

Under this policy, the following objectives were considered relevant to the Proposed Development:

Objective 6:

'To provide more tree cover across the county, in particular to areas that are lacking trees, with an emphasis on planting native Irish trees as appropriate.'

Objective 7

'To require the provision of green roofs and green walls, providing benefits for biodiversity and as an integrated part of Sustainable Drainage Systems (SuDS) and Green Infrastructure, in apartment, commercial, leisure and educational buildings, wherever possible and develop an evidence base for specific green roof requirements as part of the Council's ongoing SuDS strategy development.'

5.4 Receiving Environment

5.4.1 Desk Study Results

5.4.1.1 European Designated Sites

In accordance with the European Commission Methodological Guidance [34] and policies NCBH2 and NCBH3 of the SDCDP [33], a list of European sites that can be potentially affected by the Proposed Development has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government [35] states that defining the likely Zone of Influence for the screening and the approach used will depend on the nature, size, location, and the likely effects of the project. The key variables determining whether or not a particular Natura 2000 site is likely to be negatively affected by a project are:

The physical distance from the Site to the Natura 2000 site;

The presence of impact pathways;

The sensitivities of the ecological receptors; and,

The potential for in-combination effects.

All SPAs and SACs within 15km have been considered to assess their ecological pathways and functional links. As acknowledged in the OPR guidelines [36], few projects have a Zone of Influence this large, however the identification of Natura 2000 sites within 15km has become widely accepted as the starting point for the screening process. For this reason, all SPAs and SACs in 15km have been identified for consideration as part of the screening.

There are seven (7No.) European sites located within 15km of the Site - these are identified in Figure 5-1 and Table 5-1.

Figure 5-1: Natura 2000 Sites within 15km

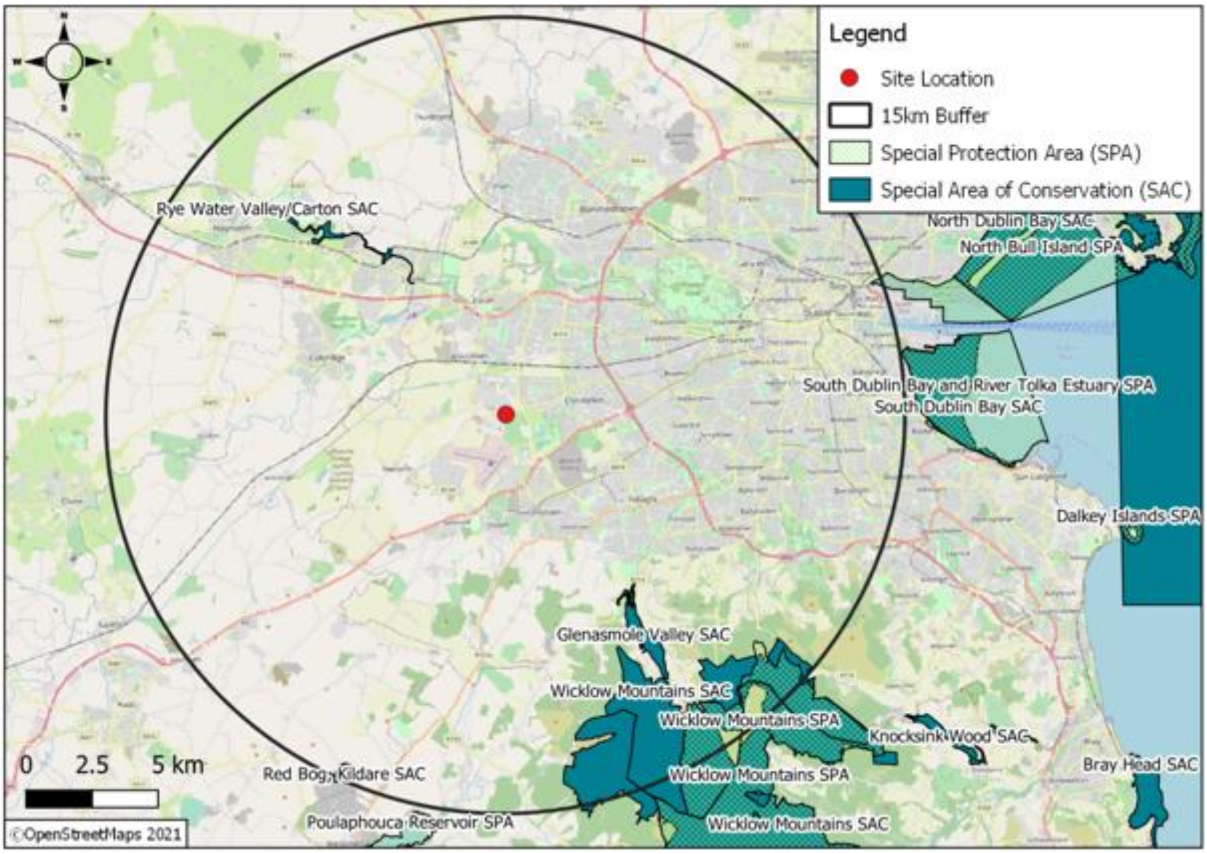


Table 0-1: Natura 2000 Sites within 15km of the Site

Site Name	Code	Distance (km)	Direction from the Site
Special Areas of Conservation (SAC)			
Glenasmole Valley	001209	7.9km	SE
Wicklow Mountains	002122	9.7km	SE
Rye Water Valley / Carton	001398	6.0km	NW
Red Bog, Kildare	000397	14.4km	SW

Site Name	Code	Distance (km)	Direction from the Site
South Dublin Bay	000210	15km	E
Special Protection Area (SPA)			
Wicklow Mountains	004040	12.7km	SE
South Dublin Bay and River Tolka Estuary	004024	14.7km	E

Further consideration to these Natura 2000 sites is provided in the Stage 2: Appropriate Assessment: Natura Impact Statement (NIS) that has been submitted as part of the overall planning application.

5.4.1.2 Nationally Designated Sites

There are no Natural Heritage Areas (NHA) located within 5km of the Site. However, there are two (2No.) proposed Natural Heritage Area (pNHA) identified within 5km of the Site (refer to Figure 5-2 and Table 5-2).

Figure 5-2: Proposed Natural Heritage Areas within 5km of the Site

Table 0-2: Proposed Natural Heritage Areas within 5km of the Site

Site Name	Code	Distance (km) & Direction	Qualifying Interest
Proposed National Heritage Areas (pNHA)			

Site Name	Code	Distance (km) & Direction	Qualifying Interest
Grand Canal	002104	1.5km N	Grand canal is of ecological value due to the diversity of species it supports within and along its margins. These species include smooth newts, otters and opposite-leaved pondweed (*Groenlandia densa*), which is protected under the Flora Protection Order 1987.
Liffey Valley	000128	4.6km N	The Liffey Valley pNHA is a site of ecological importance due to the diversity of habitats and species it supports. Hairy St. John's wort (Hypericum hirsutum) which is protected under the Flora Protection Order 1987 has been identified within this pNHA alongside yellow archangel (*Lamiastrum galeobdolon*) and green figwort (*Scrophularia umbrosa*) which are both listed within the Irish Red Data Book. This pNHA forms part of the Liffey Valley Special Amenity Areas Order 1990.

5.4.1.3 Notable / Protected Species

Table 5-3 provides a summary of records of legally protected or otherwise notable species that occur within 2km of the Site over the last 10 years [37]. The parameter of 10 years was chosen on the basis of habitat and modification, it is considered that any records over 10 years old are not representative of the current distribution of species populations.

Table 0-3: NBDC Records of Notable / Protected Species within 2km of the Site

Common Name	*Scientific Name*	Date of last record	Designation
Bird Species			
Barn Swallow	*Hirundo rustica*	07/05/2016	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Coot	*Fulica atra*	13/01/2018	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Starling	*Sturnus vulgaris*	16/09/2017	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Common Swift	*Apus apus*	07/05/2016	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List

Common Name	***Scientific Name***	**Date of last record**	**Designation**
Common Wood Pigeon	*Columba palumbus*	28/03/2013	Wildlife Acts 1976 / 2000
House Martin	*Delichon urbicum*	14/07/2017	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Sand Martin	*Riparia riparia*	07/05/2016	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Bat Species			
Daubenton's Bat	*Myotis daubentonii*	19/08/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Soprano Pipistrelle	*Pipistrellus pygmaeus*	19/08/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex IV
Terrestrial			
Pine Marten	*Martes martes*	25/06/2020	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex V
West European Hedgehog	*Erinaceus europaeus*	20/05/2021	Wildlife Acts 1976 / 2000
Amphibians / Aquatic			
Freshwater White-clawed Crayfish	*Austropotamobius pallipes*	18/08/2013	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex V
Invasive species*			
American Mink	*Mustela vison*	30/07/2018	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Eastern Grey Squirrel	*Sciurus carolinensis*	31/12/2017	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Indian Balsam	*Impatiens glandulifera*	24/08/2021	High Impact Invasive Species Regulation S.I. 477 (Ireland)

Common Name	*Scientific Name*	Date of last record	Designation
Japanese Knotweed	*Fallopia japonica*	07/05/2016	High Impact Invasive Species Regulation S.I. 477 (Ireland)
Spanish Bluebell	*Hyacinthoides hispanica*	07/05/2016	Invasive Species Regulation S.I. 477 (Ireland)
Three Cornered Garlic	*Allium triquetrum*	01/05/2021	Medium Impact Invasive Species Regulation S.I. 477 (Ireland)

*Note: Table includes only invasive species regulated under S.I. 477 (Ireland).

5.3.4 Field Surveys

5.3.4.1 Habitats

Site Context and Surrounding Habitats

The Site is situated within the Profile Park business park. The Site is bordered by the R134 regional road to the north, the Profile Park Road to the west and the Grange Castle Golf Club to the south and east.

The Site is comprised primarily of a construction compound, disturbed ground and spoil heaps, which have grown over with vegetation. There is also a drainage ditch and hedgerow bordering the southern and eastern Site boundary, separating the Site from the golf course.

A description of the habitats and features of ecological significance are outlined below, and their distribution is illustrated in Figure 5-3.

Artificial Surfaces (BL3)

Artificial surfaces are located within the north-western portion of the Site, there is also a smaller area of compacted ground located in the north-eastern portion of the Site. These areas of artificial surfaces comprise of hard standing and bare ground. There is limited vegetation growth within these areas given the nature of these habitats and recent disturbances at the Site.

Recolonising Bare Ground (ED3)

Areas of recolonising bare ground were noted throughout the Site. The overall Site had been previously disturbed and currently vegetation growth has reclaimed these areas.

The recolonising vegetation includes perennial ryegrass (*Lolium perenne*), Yorkshire fog (*Holcus lanatus*), cocksfoot (*Dactylis glomerata*), creeping buttercup (*Ranunculus repens*), lady's thumb (*Persicaria maculosa*), nettle (*Urtica dioica*), dandelion (*Taraxacum vulgaria*), common hogweed (*Heracleum sphondylium*), prickly sowthistle (*Sonchus asper*), ragwort (*Senecio jacobaea*), ribwort plantain (*Plantago lanceolata*), coltsfoot (*Tussilago farfara*), rush species (*Juncus spp.*), bramble (*Rubus fructicosus*), hedge bindweed (*Calystegia sepium*), daisy (*Bellis perennis*), common vetch (*Vicia sativa*), European beech saplings (*Fagus sylvatica*), ground ivy (*Glechoma hederacea*), bittersweet (*Solanum dulcamara*), poppy (*Papaver rhoeas*), fringed willowherb (*Epilobium ciliatum*), sun spurge (*Euphorbia helioscopia*), common fumitory (*Fumaria officinalis*), shepherd's purse (*Capsella bursa-pastoris*), cutleaf geranium (*Geranium dissectum*) and shortpod mustard (*Hirschfeldia incana*).

Spoil and Bare Ground (ED2)

Spoil heaps are located within the central portion of the Site and were classified as spoil and bare ground. Also, areas of bare ground were identified within the centre of the spoil heaps and along the northern Site boundary, which seems to act as an access track between the construction compounds.

Species identified within this habitat include fringed willowherb, bramble, poppy, hedge bindweed, ground ivy, nettle, creeping buttercup, wild mustard (*Sinapis arvensis*), butterfly bush (*Buddleja davidii*), willow saplings (*Salix spp.*), elder saplings (*Sambucus nigra*) and rushes (*Juncus spp*.).

<u>Hedgerow / Treeline (WL1 / WL2)</u>

The eastern and southern Site boundary is made up of a mature hedgerow / treeline. This habitat is comprised of predominantly ash (*Fraxinus excelsior*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium),* sycamore (*Acer pseudoplatanus*) and willow.

Brambles (*Rubus fructicosus*) and nettles (*Urtica dioica*) are frequent in the understorey layer throughout. Ivy (*Hedera hibernica*) is common both in the trees and in the ground layers. An array of herbaceous species was recorded in the ground layer of the hedgerow / treeline, including ground ivy, common vetch, creeping buttercup, and willow herb.

<u>Drainage Ditches (FW4)</u>

A drainage ditch borders the Site along the southern and eastern Site boundary. The drainage ditch discharges into the Baldonnell Stream in the south-western corner of the Site.

At the time of the survey, the western section of the drainage ditch along the southern Site boundary was wet and there was a steady flow of water towards the Baldonnell Stream. There seemed to be a connection from the Grange Castle Golf Course discharging into this drainage ditch as well. The drainage ditch along the southern Site boundary is steep sided, approximately 0.5-1m deep. This section of the drainage ditch was heavily shaded by the hedgerow / treeline.

However, the section of the drainage ditch along the eastern Site boundary was drier and there was no discernible flow of water. The drainage ditch along this section was also shallower, only 0.5m deep at its deepest point.

The species identified growing along the sides of the drainage ditches included ivy, bramble, fringed willowherb, common hogweed, and butterfly bush. Floating plants within the drainage ditch included common duckweed (*Lemna minor*) and watercress (*Nasturtium officinale*).

The drainage ditch is currently fenced off with a silt fence, however, the fences are currently in disrepair and as such are not effective.

<u>Surface Water Ponds</u>

Surface water ponds were noted throughout the Site. These temporary shallow wet areas were dominated by rushes, broadleaf cattail (*Typha latifolia*) and algae.

Figure 5-3: Habitat Map

5.3.4.2 Notable / Protected Species

Flora

No plant species protected under the Flora Protection Order were recorded onsite.

Amphibians

The NBDC does not hold any records of common frog within 2km of the Site [37].

During the targeted amphibian surveys undertaken on the 26th of April, 4th of May, 24th of May and 8th of June 2021, two (2No.) surface water ponds onsite were assessed (TN1, Figure 5-3). No amphibians were recorded utilising either of these waterbodies. It should be noted that following a period of dry weather, these ponds had decreased in size and two surface water ponds identified during the initial site walkover had completely dried out. Given the lack of aquatic invertebrates noted in these waterbodies, it can be concluded that these waterbodies are temporary in nature.

A common frog was observed in the drainage ditch bordering the Site in 2021 (TN2, Figure 5-3).

On the 14th of March 2022, frog spawn (TN3, Figure 5-3) was noted in the stagnant drainage ditch at the southern boundary of the Site.

Badger

The NBDC does not hold any records for badger within 2km of the Site [37]. The Site survey did not identify any definitive evidence of badger activity within the Site boundary. The onsite habitats are not considered suitable for badger given their disturbed nature, proximity to the R134 Regional Road and setting in an industrial / commercial environment.

However, as badgers are common and widespread across Ireland, it is considered possible that badgers may commute through the Site.

Bats

According to the NBDC, the Site is located within an area of moderate bat suitability, ranging from 21.3-28.1, and two (2No.) bat species – Daubenton's bat and soprano pipistrelle – were identified within 2km of the Site [37].

The targeted bat surveys did not identify any bat roosts onsite and identified only commuting / foraging activity.

The majority of activity recorded onsite was along the existing hedgerow /treeline and within the golf course located to the east of the Site. The following bat species were noted commuting / foraging during these surveys: lesser noctule, pipistrelle and soprano pipistrelle. Lesser noctule was the most active species recorded. Please see Appendix 5.1 – Bat report for further details.

Birds

Given the disturbed nature of the onsite habitats and the setting of the Site in an industrial / commercial area, the Site is not considered to be a site of importance for any notable or protected bird species.

However, the hedgerow / treeline located onsite has the potential to provide suitable nesting habitat for a range of common bird species. The birds recorded onsite include blackbird (*Turdus merula*), blue tit (*Cyanistes caeruleus*), bullfinch (*Pyrrhula pyrrhula*), garden warbler (*Sylvia borin*), hooded crow (*Corvus cornix*), magpie (*Pica pica*), raven (*Corvus corax*), robin (*Erithacus rubecula*), rook (*Corvus frugilegus*) and woodpigeon (*Columba palumbus*). These species are common species within Ireland.

Otter

The NBDC do not hold records for otter within 2km of the Site from the last 10 years [37]. During the Site walkover, no evidence of otter was identified within the drainage ditch and no suitable habitats for otter were found onsite or the surrounding area.

However, there is a potential indirect hydrological link between the Site and watercourses further down the catchment which potentially support otter.

Invasive Species

No invasive species were noted within the study area.

Other Species

The NBDC holds records of protected and notable mammals within 2km of the Site [37].

Hedgehogs and pygmy shrews are common and widespread species that typically occur in scrub, woodland, and rank grassland habitats. Hedgehogs have been recorded within 2km of the Site [37]. However, most of the habitats onsite are not considered suitable for these species given the recolonising vegetation / bare ground and the damp ground conditions. In addition, no evidence of this species was identified onsite. However, the hedgerow / treeline bounding the Site has the potential to support foraging and commuting hedgehogs and pygmy shrews.

According to the NBDC, pine martens have been recorded within 2km of the Site [37]. As pine martens display a preference for woodland habitats, the onsite habitats are not considered optimal for this species. Although pine martens have been recorded in scrub and other habitats, no evidence of this species was identified onsite within the recolonising vegetation / bare ground.

A fox dropping was identified on reeds within one of the onsite surface water ponds. It is likely that foxes forage and commute within the Site. No fox dens were identified within the Site.

White-clawed crayfish have been identified within 2km of the Site [37]. However, these recordings are from waterbodies unrelated to the Site and therefore, this species is not considered relevant to this project. It should be noted that aquatic surveys conducted on the Baldonnell Stream for a nearby proposed development (Planning Application No.: SD21A/0217) did not identify any notable or protected species within the Baldonnell Stream [38].

5.4 Characteristics and Potential Impacts of the Proposed Development

5.4.1 Sensitive Design

Specialist ecological input was a key element of the proposed design for the Overall Project, to ensure that the design of the proposed infrastructure works was sensitive to ecological and features that occur or may occur within the Site and the surrounding landscape. The key measures relevant for this project have been detailed below:

The Site contains limited vegetation cover; however, the hedgerow / treeline bordering the Site will be retained and protected from unnecessary damage in line with policies NCBH5, NCBH11 and GI2 of the SDCDP [33];

The Overall Project has been designed to include an 8m landscape buffer from the drainage ditches to protect this feature; and,

A landscape plan and ecological enhancement measures for the Overall Project will be implemented as part of the works. This landscape plan includes wildflower and wetland habitats designed with pollinators in mind, tree and hedgerow planting and green roofs and trellises. Hibernacula and habitat piles will also be installed onsite. The landscape plan is in line with policies NCBH5, GI2 and GI4 of the SDCDP [33].

5.4.2 Identification of Potentially Significant Effects on Identified Receptors

Based on the methodology that is set out in Section 5.2, Table 5-4 sets out the findings of the evaluation of important and legally protected receptors. Each receptor is assessed and a scoping justification for each receptor is provided for the Construction and Operational Phases combined. Table 5-4 includes an assessment of the impacts associated with the Overall Project inclusive of the Proposed Onsite Power Generation (OSPG) compound and the proposed modifications to the Permitted Development (SDCC Planning Reference 21A/0186). As such, Table 5-4 has also taken into account the currently Permitted Development under SDCC Planning 21A/0186.

Table 0-4: Valuation of Potential Ecological Receptors

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Scoping Result
Protected Sites				
Natura 2000 Sites	European Communities (Natural Habitats) Regulations 1997 (as amended)	Internationally designated sites for conservation.	A Natura Impact Statement (NIS) was prepared as part of the overall planning application, in line with policies NCBH2 and NCBH3 of the SDCDP [33] and Article 6(3) of the Habitats Directive. The NIS concluded that the Proposed Development would not cause any significant adverse effects on any European designated sites or any of their designated features of interest provided the mitigation measures incorporated within the NIS are adhered to and that progression to Stage 3 of the Appropriate Assessment process (i.e., Assessment of Alternative Solutions) was not considered necessary [2]. For full details on the assessment of impacts to Natura 2000 sites, refer to the NIS submitted as part of planning [2].	Natura 2000 sites have been scoped in for further consideration. Refer to NIS submitted as part of planning for full details.
Nationally Designated Sites	Wildlife Act 2000 (as amended)	Nationally designated sites for conservation.	There are no NHAs within 5km of the Site; however, there are two (2No.) pNHAs. These sites were included in this assessment in-line with policies NCBH2 and NCBH4 of the SDCDP [33]. There is no hydrological connection between the Site and the Grand Canal pNHA and therefore, no impacts on this pNHA as a result of potential water quality impairment arising from the Proposed Development are predicted. This pNHA has been scoped out from further assessment. Given, the hydrological connection between the Site and the Liffey Valley pNHA, this receptor has been scoped in for further consideration. It is considered that without appropriate water quality mitigation measures, there is potential for adverse impacts to this pNHA. Refer to Section 5.5 below and Chapter 7: Water for further details.	Natural Heritage Areas have been scoped in for further consideration.
Habitats				
Artificial Surfaces (BL3)	N/A	No Local Value	This habitat has no ecological value, subsequently, any alteration / loss of this habitat is not considered to be significant. Therefore, the impact of the	This habitat has been scoped out

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Scoping Result
			Proposed Development on buildings and artificial surfaces is not significant and this receptor has been scoped out from further consideration.	from further consideration.
Recolonising Bare Ground (ED3)	N/A	Low Local Value	Recolonising bare ground is of low ecological value. Therefore, any alteration / loss of this habitat is not considered to be significant. Subsequently, the impact of the Proposed Development on recolonising bare ground is not significant and this receptor has been scoped out from further consideration.	This habitat has been scoped out from further consideration.
Spoil and Bare Ground (ED2)	N/A	Low Local Value	Spoil and bare ground habitats are of limited ecological value. Therefore, any alteration / loss of this habitat is not considered to be significant. Subsequently, the impact of the Proposed Development on spoil and bare ground is not significant and this receptor has been scoped out from further consideration.	This habitat has been scoped out from further consideration.
Surface Water Ponds	N/A	Low Local Value	This habitat is currently of low biodiversity value and appears to be temporary in nature given the absence of aquatic invertebrates. During the construction phase, these temporary surface water ponds will be removed. Given the low ecological value of these ponds, this loss is not considered to be significant. Therefore, the impact of the Proposed Development on surface water ponds is not significant and this receptor has been scoped out from further consideration. Furthermore, as part of the landscaping works, a wetland area and attenuation pond will be installed to provide opportunities for aquatic and amphibian species.	This habitat has been scoped out from further consideration.
Hedgerows / Treelines (WL1 / WL2)	Wildlife Act 2000 (as amended)	Low Local Value	All hedgerows / treelines bordering the Site will be maintained and protected as part of the proposed works. Standard tree protection measures will be implemented as part of the proposed works in line with policies NCBH2, NCBH11 and GI2 of the SDCDP [33], refer to Section 5.5 below.	This habitat has been scoped in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Scoping Result
Drainage ditches (FW4)	N/A	Low Local Value	The Drainage ditches onsite are not considered to be of significant value. However, they do have the potential to support local biodiversity. In addition, these drainage ditches are connected to the Baldonnell Stream and subsequently the wider river network. Therefore, in-line with policies NCBH2, NCBH5, and GI2 of the SDCDP [33], water mitigation measures as outlined in Section 5.5 below and Chapter 7: Water will be implemented to prevent any impacts to the drainage ditch network and in turn, the water quality of the nearby Baldonnell Stream and wider river network. A minimum 8m landscaping buffer will also be implemented onsite.	This habitat has been scoped in for further consideration.
Flora and Fauna				
Protected Flora	Flora (Protection) Order 2022 (S.I. No. 235/2022)	N/A	No plant species protected under the Flora Protection Order were noted onsite. Overall, the impact of the Proposed Development on notable / protected flora is considered unlikely to be significant. Therefore, the impact of the Proposed Development on protected flora is not significant and this receptor has been scoped out from further consideration.	Flora have been scoped out from further consideration.
Birds	<u>Nesting Birds</u> Wildlife Act 2000 (as amended)	Low Local Value	The hedgerow / treelines bordering the Site provide suitable foraging and nesting habitat for a range of common bird species. However, these areas will not be affected by the Proposed Development and therefore, specific mitigation in relation to bird species is not considered necessary. In addition, birds are highly mobile and will move away from any temporary disturbance arising from the proposed works. Therefore, the impact of the Proposed Development on birds is not significant and this receptor has been scoped out from further consideration. In addition, the proposed landscaping works have the potential to provide additional nesting and foraging habitats for these species.	Birds has been scoped out from further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Scoping Result
Amphibians	Wildlife Act 2000 (as amended) EU Habitats Directive Annex V	Low Local Value	A common frog, and frog spawn were identified within the drainage ditch on separate occasions bordering the Site. Therefore, there is potential for this species to utilise the Site. However, it should be noted that the majority of habitats onsite are not considered suitable for this species and given the abundance of more suitable habitats within the vicinity of the Site, the loss of areas of recolonising ground or surface water ponds is not considered to be significant. However, measures will be implemented for amphibians (Section 5.5) to ensure that no impacts occur during the construction works. An 8m landscape buffer will be maintained from the Proposed Development to the drainage ditches to protect this habitat and the amphibians it supports, in line with policy NCBH5 of the SDCDP [33]. Therefore, this receptor has been scoped in for further consideration. However, it is not considered that the Proposed Development with impact on this species in the long term. In addition, there are opportunities to enhance the Site for amphibians by the creation of an attenuation pond. The placement of hibernacula and habitat piles around the margins of the attenuation pond would create refuges for amphibians.	Amphibians have been scoped in for further consideration.
Badgers	Wildlife Act 2000 (as amended)	Low Local Value	No signs of badger activity were noted during the field survey and the Site is not considered to be of significant value for badger. However, given the potential, albeit unlikely, for badgers to commute through the Site, standard precautionary measures for terrestrial mammals will be incorporated into the construction works. Therefore, taking a precautionary approach, this receptor has been scoped in for further consideration and mitigation measures are outlined below (Section 5.5).	Badgers have been scoped in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Scoping Result
Bats	Wildlife Act 2000 (as amended) EU Habitats Directive Annex IV	High Local Value	All trees with bat roost potential were surveyed. No bats were identified emerging from these trees during either of the surveys. The bat activity onsite consisted of commuting and foraging bats along the hedgerow / treeline which will remain untouched and protected throughout the lifetime of the Proposed Development. There are no buildings onsite and the Proposed Development will not result in the loss of any areas currently utilized for foraging / commuting. However, given the presence of commuting and foraging activity along the Site boundaries and within the wider area, bats have been scoped in for further consideration in relation to lighting as part of the Overall Project. In addition, as part of the landscape plan for the Site, a wildflower and wetland habitat will be created, and the hedgerows / treelines onsite will be strengthened with additional planting. These habitats will provide suitable foraging and commuting areas for a range of species including bats by supporting increased insect populations.	Bats have been scoped in for further consideration.
Otter	Wildlife Act 2000 (as amended)	Low Local Value	No signs of otter were noted during the field survey within the drainage ditches or the Baldonnell Stream. It is not considered that either of these waterbodies are suitable for or will be utilised by this species. However, given the connectivity of the drainage ditch network to the Baldonnell Stream which in turn discharges into the River Grifeen and eventually the Liffey, there is potential for otter utilising the surrounding river network to be impacted during the construction phase / operational phase without appropriate water mitigation measures. Therefore, mitigation measures will be implemented for the protection of water quality (as outlined in Section 5.5 below and Chapter 7: Water to ensure that no impacts occur to otter or any other aquatic species during the construction works.	Otter have been scoped in for further consideration

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Justification	Scoping Result
Invasive	Species dependant	N/A	No invasive species were noted on the Site during the field surveys. However, standard measures will be implemented in order to ensure no invasive species are introduced to the Site during the construction phase (see Section 5.5 below). This is in compliance with policy NCBH10 of the SDCDP [33].	Invasive species have been screened in for further consideration.
Other fauna	N/A	N/A	It is considered that the Proposed Development will not give rise to any significant impacts to other fauna, given the localised nature of the Proposed Development and the overall low ecological value of the Site. However, given the identification of fox scat onsite, standard protection measures for terrestrial mammals will be incorporated into the works in line with policy NCBH5 of the SDCCP [33] As outlined in Section 5.3, the habitats onsite are not considered suitable for hedgehogs or pine marten. However, in the unlikely event that these species occur onsite, they will be protected by the standard protection measures for terrestrial mammals mentioned above and outlined in Section 5.5 below.	Other fauna has been scoped in for further consideration.

5.4.3 Summary of Potential Impacts

Following the detailed assessment outlined in Section 5.4.1 and 5.4.2 above, the following receptors were identified as significant receptors and were brought forward for further consideration, see Section 5.5 below and the NIS submitted as part of planning:

Natura 2000 sites;

Proposed Natural Heritage Areas (pNHAs);

Hedgerow / Treeline (WL1 / WL2);

Drainage ditches (FW4);

Amphibians;

Badgers;

Bats;

Otter;

Invasive Species; and,

Other fauna.

In addition to the species listed above, general mitigation / best practice measures have also been included for the Proposed Development. As noted above, the Proposed Development and Overall Project presents opportunities for enhancing the area for biodiversity. Further details of ecological enhancement measures are provided below.

5.5 Remedial and Mitigation Measures

The following mitigation measures will be incorporated and adhered to during the Construction and Operation Phases of the Overall Project to ensure that the works do not result in contravention of wildlife legislation.

5.5.1 Construction Phase

During the construction phase, all works will comply with all relevant legislation and best practice guidance to reduce any potential environmental impacts. The following guidance relevant to biodiversity will be referred to:

- C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [17];
- CIRIA C741- Environmental Good Practice on Site (4th edition) [18];
- Guidance for the Treatment of Bats Prior to the Construction of National Road Schemes [13]; and,
- Guidance for the Treatment of Badgers Prior to the Construction of National Road Schemes [19].
- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads [20]; and,
- All works will be undertaken in accordance with the 'Requirements for the Protection of Fisheries Habitat during Construction and Development' [21].

A working draft of a Construction Environmental Management Plan (CEMP) [39] was prepared by MOR and will be used by the appointed contractor to prepare an updated and comprehensive CEMP prior to the commencement of any onsite works. If required by the conditions of the grant of planning permission, the updated plan will be approved by the Planning Authority in advance of any works commencing onsite. The approved CEMP will be implemented for the duration of the construction works to protect the receiving environment from potential impacts arising during the construction works. The updated CEMP will include all mitigation measures outlined in this EIAR and the accompanying NIS [2].

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

- All activities will comply with all relevant legislation and best practice to reduce any potential environmental impacts. The mitigation measures detailed within this EIAR and the NIS will be fully adhered to;
- The Site manager shall ensure that all personnel working onsite will be trained and made aware of the mitigation measures detailed within this EIAR and the NIS;
- An Ecological Clerk of Works (ECoW) will be appointed for the construction works and will be available should protected or notable species be encountered during operations at the Site; and,
- In advance of works, all Site personnel will receive a toolbox talk regarding the mitigation measures outlined in the CEMP, EIAR and NIS. Everybody working onsite must understand the role and authority of the EcoW.

An ECoW will inspect the Site in advance of works commencing and will undertake monthly Site inspections during the works, to ensure that all works will be completed in line with the CEMP and all wildlife legislation. Additional inspections will be undertaken as required.

5.5.1.1 Protection for Hedgerows / Treelines

During construction, all boundary hedgerows / treelines will be retained and protected in line with policies NCBH2, NCBH11 and GI2 of the SDCDP [33]. During construction, care will be required to protect trees from both direct and indirect disturbance. For full details on the tree protection measures to be implemented onsite, refer to the Arboricultural Impact Plan and Arboricultural Inventory and Impact Assessment prepared by Murray & Associates and attached as Appendix 11.4 and 11.5. Outline measures to be adhered to during the works are outlined below:

- Hedgerows / Treelines to be retained that will be located within close proximity to the construction areas will be fenced off by effective construction proof barriers before construction works commence. These barriers will remain in place for the duration of the works to prevent accidental disturbance and define the limits for construction vehicles and other construction staff;
- Care will be required to prevent disturbance to root systems – a buffer zone / construction exclusion zone of unexcavated ground will be maintained along the retained hedgerows / treelines. The unexcavated ground will be located behind the construction proof barriers described above;
- Where machinery access has to encroach areas within close proximity to the retained hedgerows / treelines, a Root Protection Area (RPA) will be established and suitable ground protection will be put in place to prevent any significant soil compaction or root damage. This will either take the form of suitable strength ground protection mats or a cellular confinement system capable of supporting the appropriate weight;
- All weather notices will be erected on the fences, and the fencing will be inspected on a monthly basis during the construction process;
- Trench digging or other excavation works for services etc. will not be permitted within close proximity to retained trees unless approved and supervised using methods outlined in BS5837: Trees in relation to design, demolition and construction (2012);
- No materials, equipment or machinery will be stored within the RPA. Storage of materials will be sited as far as possible from retained hedgerows / treelines;
- In order for these tree protection measures to work effectively, all personnel associated with the operation of heavy plant machinery must be familiar with the above principles for the protection of treelines;
- Care will be taken when planning Site operations to ensure that wide or tall loads or plant with booms, jibs and counterweights can operate without coming into contact with retained trees. Such contact can result in serious damage to them and might make their safe retention impossible;
- Notice boards, wires, etc. will not be attached to any trees. Site offices, materials and contractor parking will all be outside the Construction Exclusion Zone; and,
- The retained trees will be assessed by a suitably qualified arborist following the completion of the construction works. A report detailing the findings of this survey will be submitted to the Council. This report will include appropriate mitigation and remediation measures as required.

As part of the Overall Project, there will be additional landscape planting along the southern and eastern boundaries in line with policies NCBH2 and GI2 of the SDCDP [33] (see Appendix 11.7 – Landscape Plan). The plantings will comprise a mix of native woodland / hedgerow planting, including birch (*Betula pendula*), oak (*Quercus rober*), field maple (*Acer campestre*) and bird cherry (*Prunus padus*), which will provide cover and potential foraging opportunities for wildlife.

5.5.1.2 Protection for Amphibians

In order to ensure that the proposed works do not have adverse effects on amphibians, the following construction procedures and mitigation measures will be implemented:

- Vegetation clearance and ground stripping adjacent to the drainage ditch will be supervised by the ECoW to ensure no adverse effects occur to any amphibians in the area; and,
- Should amphibians be encountered during the construction works, the EcoW will be consulted for advice.

In addition, hibernacula and habitat piles will be installed in the landscaped area around the drainage ditch network and along the attenuation pond to support any potential amphibians in the area (See Section 5.5.3 below).

5.5.1.3 Protection for Terrestrial Mammals

As outlined in Table 5-3, the NBDC holds records of pine marten and hedgehogs within 2km of the Site and evidence of foxes was identified onsite during the field surveys. As described in Table 5-4, there is potential for badgers to commute through the Site given their widespread abundance across Ireland. Therefore, to ensure that the works in relation to the Overall Project do not have significant impacts on mammals (including badgers and foxes), construction works will be in line with the NRA (now TT) guidance for Badgers [19] and policy NCBH5 of the SDCDP [33]. The following mitigation measures will be implemented onsite:

Should construction works be required outside of daylight hours, the appointed project EcoW will be consulted as required;

Where deep excavations are required onsite, appropriate measures (such as covers, or fencing) to protect mammals from ingress will be installed as required; and,

If unidentified burrows are identified within the works area during construction, works will cease within that area and the project EcoW will be contacted for advice.

<u>Noise Disturbance Impacts on Terrestrial Mammals</u>

There is potential that terrestrial mammals utilising the Site and surrounding area may be subject to noise disturbance from the Overall Project. Construction noise and vibration can result in disturbance behavioural impacts, stress and displacement from feeding grounds for various species. Therefore, noise mitigation measures will be implemented during the construction phase of the Overall Project to minimise potential impacts arising from the proposed works, refer to Chapter 8: Noise and Vibration for further details.

However, it should be noted that the Site is located within a predominantly urban environment with associated road infrastructure. Therefore, there are elevated levels of human and noise related disturbance within the area and as a result, any species utilising the area will be habituated to elevated levels of activity or will avoid this area. In addition, the construction works are temporary in nature and species can and will move away from any temporary disturbance to alternative habitats within the wider surrounding area.

5.5.1.4 Protection of Water Quality during Construction

The Site is adjacent to Baldonnell Stream and is bound by a drainage ditch which discharges into this waterbody. Therefore, potential runoff of pollutants / sediments during construction could adversely affect the water quality within the drainage ditch onsite and downstream in the Grifeen River and the River Liffey.

Potential pollutants resulting from the construction of the Overall Project include suspended solids, cementitious materials, silt and hydrocarbon leaks or spills. Sediment / silt have the potential to clog fish gills, degrade spawning habitats and cover / smother aquatic plants. The potential release of these pollutants would result in decreased food availability and therefore, could indirectly affect predators by impacting their food supply. In addition, should hydrocarbons enter the river network, there is potential that the chemical balance of the river network could change which can prove toxic for fish and other wildlife such as otters.

In order to ensure that the works do not have an impact on drainage ditches onsite or further downstream in the Grifeen and Liffey Rivers, mitigation measures will be implemented as part of the proposed works in line with NCBH2, NCBH5, and GI2 of the SDCDP [33]. All mitigation measures relating to water quality are described in Chapter 7: Water.

5.5.1.5 Measures for Invasive species

To mitigate against the unintentional introduction of invasive species during construction, the following mitigation measures will be followed in line with policy NCBH10 of the SDCDP [33]:

- All vehicles, machinery and any other equipment used for the works will be washed prior to its use at the Site to prevent the import of plant material or seeds;
- Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed;
- Any vehicles and machinery that are not clean will not be permitted entry to the Site;
- All materials to be imported to the Site including additional planting will be sourced from a reputable supplier and records of all material and supplies will be maintained;
- In advance of works, all Site personnel will receive a toolbox talk with regards to invasive species; and,
- Everybody working onsite must understand the role and authority of the EcoW managing the issue of the non-native species.

5.5.2 Operational Phase

5.5.2.1 Measures for Nocturnal Species

Nocturnal mammals such as bats and badgers are impacted by lighting. Therefore, it is important that lighting installed within the Site is completed with the sensitivity of local wildlife in mind whilst still providing the necessary lighting for human use.

The external lighting onsite will be installed as per the updated lighting scheme attached as Appendix 5.2. The lighting plan has been designed to mitigate against potential impacts on nocturnal species in line with the Bat Conservation Trust (BCT) Guidelines on '*Bats and Artificial Lighting in the UK*,' [40] and the NRA (now TT) guidance for Bats [13]. These design measures included:

- Avoidance of excessive lighting;
- Light Emitting Diodes (LEDs) will be used and the brightness will be set as low as possible;
- Lighting will be aimed only where it is needed, with no upward lighting;
- Lighting will be directed away from landscaped areas and retained sections of hedgerows and trees; and,
- Lighting will be turned down / off when not required.

Following the installation of the lighting for the Overall Project, the project ECoW will undertake a further Site inspection in order to check the lighting patterns and lux levels along the Site boundaries.

5.5.2.2 Protection of Water Quality during the Operational Phase

The proposed drainage system and fuel storage onsite has been designed to avoid adverse effects on water quality within the onsite drainage ditches and further downstream in the Grifeen and Liffey Rivers during the Operation Phase of the Overall Project. All elements of the Proposed Development are described in Chapter 3: Description of the Proposed Development and all elements of the Permitted Development are detailed under SDCC Ref. SD21A/0186. Both the Proposed Development and Permitted Development combine to form the Overall Project. All mitigation measures relating to water quality are described in Chapter 7: Water.

5.5.3 Ecological Enhancement Measures

5.5.3.1 Trees and Hedgerows / Treelines

The hedgerow / treeline bordering the Site will be maintained and protected during the construction and operational phase of the Overall Project and enhancement plantings will strengthen these existing linear habitats.

All hedgerow planting will provide shelter and a source of food for a variety of species throughout the year including birds, small mammals, amphibians and butterflies. It will also allow movement of species such as badger and other small mammals across the Site and provide connectivity to the wider landscape.

To maximise the value of these features, plantings will include a mix of native species, of local providence and / or those that have a known attraction or benefit to local fauna as listed in Table 5-5. It should be noted that ornamental trees will also be planted as part of the Overall Project within the carpark and along the western border, however, along the eastern and southern boundaries of the Site, only native species will be introduced. The planting along the eastern boundary will provide additional screening between the Site and the Grange Castle golf course and supplement the existing ash trees onsite.

Table 0-5: Hedgerow / Tree Planting Mix Onsite

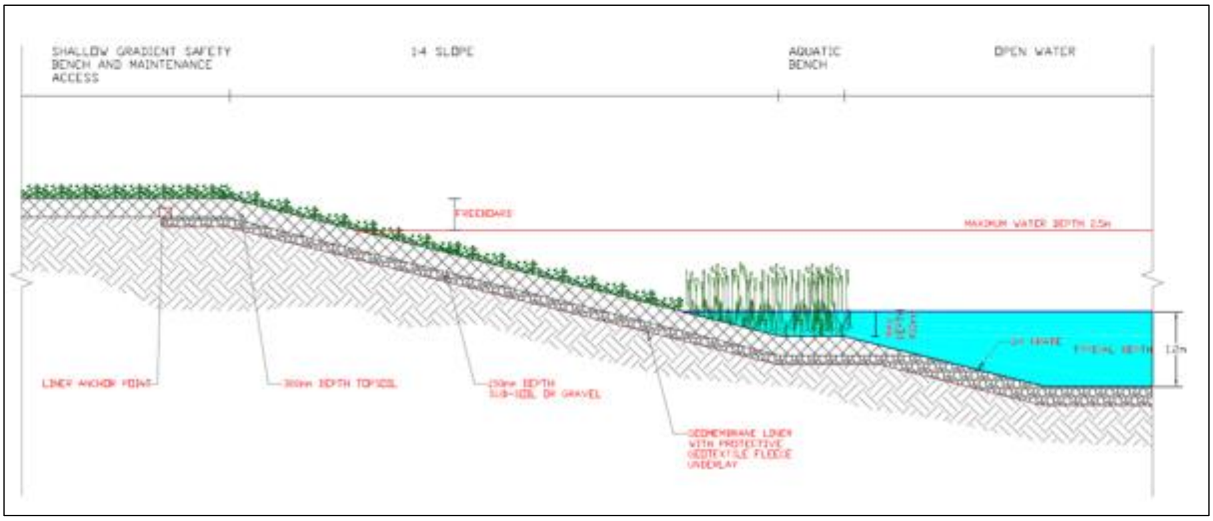
Planting Type	Common Name	*Scientific Name*
Woodland / Hedgerow Planting (75No.)	Birch	*Betula pendula*
	Oak	*Quercus rober*
	Bird Cherry	*Prunus padus*
	Field Maple	*Acer campestre*
Boundary Wetland Trees (12No.)	Black Alder	*Alnus glutinosa*
	Goat Willow	*Salix caprea*
Thorny Hedge Mix (335 ln/m)	Blackthorn	*Prunus spinosa*
	Holly	*Ilex aquifolium*
	Hawthorn	*Crataegus monogyna*
Hedge (305 ln/m)	Beech	*Fagus sylvatica*
Street Trees (11No.)	Turkish Hazel	*Corylus columa*
	Field Maple	*Acer campestre*
	Small Leaved Lime	*Tilia cordata greenspire*
Ornamental trees (13No.)	Cherry Blossom	*Prunus spp.*
	Japanese Maple	*Acer Palmatum*
	Evergreen Magnolia	*Magnolia grandiflora*
	Crab Apple	*Malus spp.*

5.5.3.2 Attenuation Pond and Wetland Habitat

A surface water attenuation pond will be created as part of the Overall Project. The areas surrounding this feature will have gradual sloping shoreline banks with shallow areas to foster a variety of wildlife, refer to Figure 5-4 for proposed cross section. The availability of relatively warm, still water with emergent wetland vegetation is essential to allow amphibian / aquatic wildlife to breed and reproduce. Suitable ponds, for example, will hold flourishing populations of damselflies and dragonflies, which provide food source for frogs, birds and bats. The attenuation pond will be designed to ensure that it remains wet year-round.

Planting of marsh vegetation around the pond will jump start the plant establishment process which will lead to earlier colonisation of wetland species such as aquatic invertebrates, amphibians and birds. The landscape plan, attached as Appendix 11-7, has included for the planting of curled and lesser pondweed (*Potamogeton spp.*), brandy bottle (*nuphar lutea*) and white water lilly (*Nymphaea alba*) within the attenuation pond for this purpose. In addition, suitable marginal and emergent plants will be planted around the banks of the attenuation pond including marsh marigold (*Caltha palustris*), yellow flag iris (*Iris pseudacorus*), flowering rush (*Butomus umbellatus*), bog bean (*Mentanthes trifoliata*), marsh cinquefoil (*Potentilla palustris*), water mint (*Mentha aquatica*) and arrowhead (*Sagittaria sagotifolia*).

Figure 5-4: Proposed Cross Section of the Attenuation Pond



It should be noted that as part of the Landscape Plan, the swales will be planted with a wetland flora mix that is suitable for seasonally flooded groundcover. Table 5-6 includes a breakdown of the species mix proposed and includes some increasingly threatened / endangered species.

Table 0-6: Proposed EC05 Wetland Wild Flora Mix

Common Name	***Scientific Name***
Devils Bit Scabious	*Succisa pratensis*
Common Sorrel	*Rumex acetosa*
Corn Marigold	*Glebionis segetum*
Corn Poppy	*Papaver rhoeas*
Corn Cockle	*Agrostemma githago*
Corn Flower	*Centaurea cyanus*
Cowslip	*Primula Veris*
Fleabane	*Erigeron spp.*
Greater Trefoil	*Lotus corniculatus*

Common Name	*Scientific Name*
Hemp Agrimony	*Eupatorium cannabinum*
Lesser Knapweed	*Centaurea nigra*
Marsh Marigold	*Caltha palustris*
Meadow Buttercup	*Ranunculus Acris*
Meadowsweet	*Filipendula ulmaria*
Meadow Rue	*Thalictrum spp.*
Oxeye Daisy	*Leucanthemum Vulgare*
Purple Loosestrife	*Lythrum salicaria*
Ragged Robin	*Lychnis Flos Cuculi*
Red Clover	*Trifolium pratense*
Red Rattle	*Pedicularis sylvatica*
Ribwort Plantain	*Planatago Lanceolata*
Redshank	*Persicaria maculosa*
Scented Mayweed	*Matricaria recutita*
Self-Heal	*Prunella Vulgaris*
Sneezewort	*Achillea ptarmica*
Tufted Vetch	*Vicia cracca*
Water Avens	*Geum rivale*
Wild Angelica	*Angelica sylvestris*
Wild Valerian	*Valeriana officinalis*
Yarrow	*Achillea millefolium*
Yellow Flag Iris	*Iris pseudacorus*
Yellow Rattle	*Rhinanathus Minor*

5.5.3.3 Wildflower Meadows

Wildflower meadows are not only visually attractive but can also significantly enhance the local biodiversity and support a rich community of wildlife. Planting a range of flowering plants, including night-scented plants, can provide a source of nectar for a range of species such as butterflies and bumblebees and will attract insects for bats to feed on.

As part of the proposed landscape plan ca. 3946m^2 of bee friendly wildflower mixed will be introduced onsite. All wildflower planting will consist of a mixture of native species, see Figure 5-5 and Table 5-7 for examples of wildflower habitats and a potential native planting mix.

Figure 5-5: Wildflower Meadow Habitats

Table 0-7: Example of a 100% Native Wildflower Meadow Seed Mix for General Purpose

Common Name	*Scientific Name*	Percentage Mix (%)
Birdsfoot Trefoil	*Lotus Corniculatus*	2.5%
Common Cat's Ear	*Hypochaeris Radicata*	1.0%
Corn Poppy	*papaver Rhoeas*	2.5%
Cowslip	*Primula Veris*	0.2%
Field Scabious	*Knautia Arvensis*	2.5%
Lady's Bedstraw	*Galium Verum*	7.5%
Lesser Knapweed	*Centaurea Nigra*	7.5%
Meadow Buttercup	*Ranunculus Acris*	7.5%
Meadow Vetchling	*Lathyrus pratensis*	1.0%
Musk Mallow	*Malva Moschata*	7.5%,
Ox Eye Daisy	*Leucanthemum Vulgare*	2.0%,
Ragged Robin	*Lychnis Flos Cuculi*	0.2%,
Red Campion	*Silene Dioica*	7.5%,
Ribwort Plantain	*Planatago Lanceolata*	7.5%
Rough Hawkbit	*Leontodon hispidus*	0.5%,
Salad Burnet	*Sanguisorba Minor*	7.5%,
Self-Heal	*Prunella Vulgaris*	7.5%,
Small Scabious	*Scabiosa columbaria*	0.5%,
Common Sorrel	*Rumex Acetosa*	2.5%,
White Campion	*Silene Alba*	7.0%,

Common Name	*Scientific Name*	Percentage Mix (%)
Wild Carrot	*Daucus carota*	5.0%,
Upright Hedge Parsley	*Torilis Japonica*	2.5%
Yarrow	*Achillea millefolium*	2.5%
Yellow Rattle	*Rhinanathus Minor*	5.0%
Wild Clary	*Salvia Verbenaca*	2.5%

5.5.3.4 Hibernacula and Habitat Piles

Artificial hibernacula or habitat piles will be installed around the attenuation pond to provide shelter and hibernation sites for amphibians. These habitats act as refuges and hibernation sites for amphibians as well as a host of other species of inverts and small mammals, refer to Figure 5-6 and 5-7.

Hibernacula are constructed through the placement of either piles of rocks or logs around the margins of wetland areas / onsite waterbodies and adjacent to drainage ditches. They should be placed in a position with adequate sunlight and can be tailored to accommodate amphibians and invertebrates by placing them nearer to the water's edge.

Figure 5-6: Typical hibernaculum and cross section

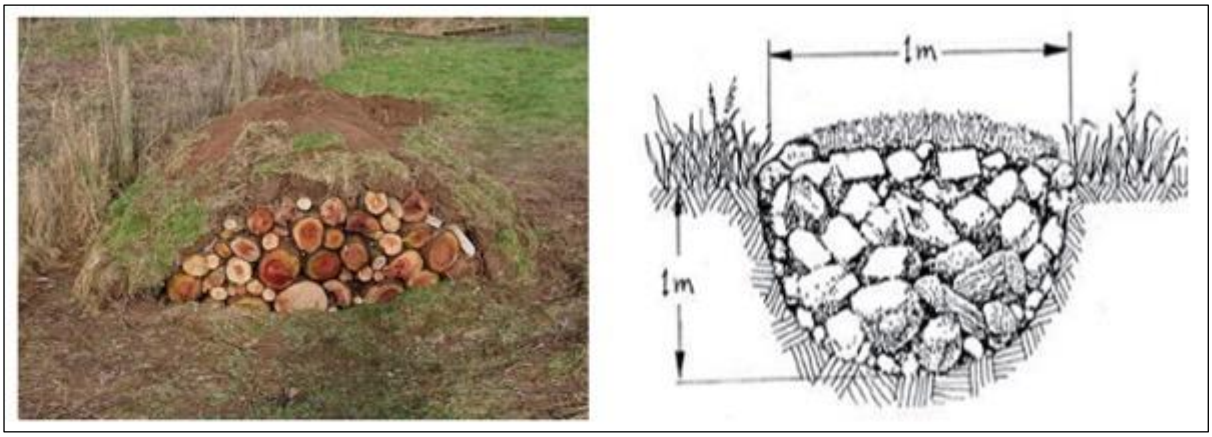


Figure 5-7: Habitat Piles

5.5.3.5 Green Roofs and Trellises

The addition of green roofs and trellises onsite will promote surface water attenuation and these features have also been linked to noise insulation, temperature moderation, and the filtration of air-borne pollutants; these properties will further reduce the impact of the proposed operational phase on any wildlife utilising the surrounding area. Green trellises and roofs designed with biodiversity in mind can provide foraging opportunities, shelter and even resting / nesting habitats for wildlife.

Introducing green roofs onsite will help compensate for the vegetation clearance required for the Overall Project whilst providing food for herbivorous insects such as caterpillars. In addition, incorporating floral species into the design, particularly flowers with a long blooming season, will benefit pollinators in the area, refer to Table 5-8 for further details on the proposed native species mix for the green roofs onsite. Enhancing the Site for insects will in turn increase prey populations for any future bats or amphibians utilising the Site or its adjoining lands.

Table 0-8: Native Green Roof Seed Mix

Common Name	***Scientific Name***
Common bent grass	*Agrostis capillaris*
Burnet saxifrage	*Pimpinella saxifrage*
Centaury	*Centaurium erythraea*
Wild chamomile	*Chamaemelum nobile*
Corn pansy	*Viola spp.*
Cowslip	*Primula veris*
Eyebright	*Euphrasia spp.*
Lady's bedstraw	*Galium verum*
Ox-eye daisy	*Leucanthemum vulgare*
Red bartsia	*Odontites serotina*
Yellow rattle	*Rhinanthus minor*
Selfheal	*Prunella vulgaris*
Sheep's bit scabious	*Jasione montana*
White stonecrop	*Sedum album*
Blackstonia	*Blackstonia perfoliata*
Fairy foxglove	*Erinus alpinus*
Sea campion	*Silene uniflora*
Ivy leaved toadflax	*Cymbalaria muralis*
Quaking grass	*Briza media*
Wall pennywort	*Umbilicus rupestris*
Storksbill	*Erodium cicutarium*
Thyme (wild)	*Thymus polytrichus*

Common Name	*Scientific Name*
Sweet violet	*Viola odorata*
Dog violet	*Viola riviniana*
Keeled garlic	Allium carinatum
Harebell	*Campanula rotundifolia*
Cat's ear	*Hypochaeris radicata*
Corn spurry	*Spergula arvensis*
Fairy flax	*Linum catharticum*
Lesser yellow clover	*Trifolium dubium*

A wire trellis system will be introduced around the OSPG compound, refer to DB080-MA-LS-XX-DR-L-PLNT-7053 for further details. These beds will be planted with Chinese wisteria (*Wisteria sinensis*) and Persian ivy (*Hedera colchica*), non-native ornamental species. Chinese wisteria and Persian ivy are both flowering plants that provide a source of nectar / pollen for pollinators.

5.6 Interactions with other Environmental Attributes

The Environmental Attributes with which flora and fauna interact include:

- Chapter 6: Land, Soils Geology and Hydrogeology; potential impacts on soils through contamination can have adverse effects on local biodiversity and ecological conditions. An assessment of potential effects arising from the Proposed Development and Overall Project on soils was carried out and is presented in Chapter 6;
- Chapter 7: Water. The drainage ditches onsite are hydrologically connected to Grifeen River and subsequently the River Liffey. As a result, the Site is hydrologically connected to the wider river network. Water quality deterioration has the potential to impact aquatic and riparian species as discussed in Section 5.5 above. However, appropriate mitigation measures are presented in Chapter 7 of this EIAR to combat this issue;
- Chapter 8: Noise and Vibration. Species within the locality have the potential to be affected by noise disturbance as discussed in Section 5.5 above. However, appropriate mitigation measures are presented in Chapter 8 to combat potential noise issues.
- Chapter 9: Air quality. Air quality has the potential to impact ecosystems. Therefore, an assessment was carried out on the emissions to air from the Proposed Development / Overall Project. Refer to Chapter 9 for further details;
- Chapter 11: Landscape and Visual. The Landscape Plan for the Proposed Development / Overall Project has taken into account the mitigation measures and proposed ecological enhancements outlined in Section 5.5 of this chapter; and,
- Chapter 18: Climate: Climate change has the potential to impact ecosystems. Therefore, an assessment was carried out on the projected GHG emissions arising from the Proposed Development / Overall Project, refer to Chapter 18 for further details.

5.7 Residual Impacts of the Proposed Development

Based on the methodology set out in Section 5.2, the initial assessment of ecological receptors (Table 5-4) screened out the following protected sites, habitats and species:

Artificial Surfaces (BL3);

Recolonising Bare Ground (ED3);

Spoil and Bare Ground (ED2);

Surface Water Ponds;

Flora; and,

Birds.

These ecological receptors were screened out from further assessment as the potential impacts were not considered to be significant, refer to Table 5-4 for further details. The following species and habitats outlined in Table 5-4, were identified as receptors that warranted further consideration to avoid impacts:

- Natura 2000 sites;
- Proposed Natural Heritage Areas (pNHA)
- Hedgerow / Treeline (WL1 / WL2);
- Drainage ditches (FW4);
- Amphibians;
- Badgers;
- Bats;
- Otter;
- Invasive Species; and,
- Other fauna.

Mitigation has been proposed for each of these ecological receptors alongside enhancement measures for the Site as part of the landscape plans as outlined in Section 5.5. The results of these measures on these ecological receptors and the resulting residual impact are described below in Table 5-9.

Table 0-9: Valuation of Potential Ecological Receptors Post Mitigation and Enhancement

Receptor	Potential Impact	Assessment of Impacts Post Mitigation and Enhancement	Residual Impact
Hedgerow / Treeline	Vegetation removal / disturbance to root systems	Following the implementation of the proposed tree protection measures as per the Arboricultural Impact Plan and Arboricultural Inventory and Impact Assessment prepared by Murray and Associates and as outlined in Section 5.5, all hedgerows / treelines onsite will be protected from disturbance / damage during the construction phase of the Proposed Development.	Imperceptible.
	Planting	Following the successful implementation of the Landscape Plan, reference DB080-MA-LS-XX-DR-L-PLNT-1050, it is considered that the Proposed	Slight positive

Receptor	Potential Impact	Assessment of Impacts Post Mitigation and Enhancement	Residual Impact
		Development has the potential to have a slight positive impact on ecology due to the additional trees introduced and reinforcement planting undertaken at the Site	
Natural Heritage Areas	Water quality deterioration	Following the implementation of the mitigation measures outlined in Chapter 7: Water, water quality within the drainage ditches onsite and downstream in the Grifeen and Liffey Rivers will be protected. Therefore, species utilising the watercourse and its margins will be safe guarded during the construction and operational phase of the Proposed Development and the Liffey Valley pNHA will be protected.	Imperceptible
Drainage Ditches			
Otter			
Amphibians	Disturbance	Following the implementation of the mitigation measures outlined in Section 5.5, it is considered that potential impacts on amphibians will be imperceptible and as such, there will be no residual impacts. .	Imperceptible
Badgers	Disturbance and entrapment	Following the implementation of the mitigation measures outlined in Section 5.5, it is considered that potential impacts on badgers and other terrestrial fauna will be imperceptible and as such there will be no residual impacts.	Imperceptible
Other Species			
Bats	Disturbance from lighting	Following the implementation of the approved lighting plan and a review of lighting patterns and lux levels	Imperceptible

Receptor	Potential Impact	Assessment of Impacts Post Mitigation and Enhancement	Residual Impact
		by the ECoW, it is considered that the potential impacts on bats and other nocturnal fauna will be imperceptible.	
Invasive Species	Introduction and spread of invasive species.	Provided the mitigation outlined in Section 5.5 is followed, it is considered that no impacts will occur to valued ecological receptors as a result of the spread or introduction of invasive species.	Imperceptible

Taking into account the mitigation measures and proposed enhancement measures for the Site, it is considered that the construction and operational phase onsite will have an imperceptible residual impact.

5.8 Monitoring

The ECoW will inspect the Site in advance of construction works commencing and will undertake monthly Site inspections during the works. In addition, the ECoW will be present during any works adjacent to or near waterbodies or treelines to ensure that these works are completed in line with the mitigation measures detailed within this EIAR and the NIS.

As outlined in Section 5.5, the ECoW will undertake an inspection of the lighting patterns and lux levels along the Site boundaries once lighting has been installed onsite.

An arborist will be required to assess the health of retained trees following the completion of construction.

5.9 Decommissioning of the OSPG

As outlined in Chapter 3, subject to a grid connection, the OSPG could potentially be decommissioned after 6-8 years. Alternatively, if the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre, the proposed OSPG would remain operational for the long term (+15 years).

An updated ecological appraisal of the Site will need to be undertaken at the time of decommissioning to ensure that no notable or protected species are utilising the Site and adjoining areas. Given the nature of the proposed OSPG compound, it is not considered likely that this facility will support significant biodiversity receptors. However, any future decommissioning works will have to ensure that no impacts occur to biodiversity. Any future redevelopment of the Site will be subject to the required statutory consents and assessments.

5.10 Reinstatement

Not applicable.

5.11 Cumulative and In-combination Impacts

The Proposed Development is an extension and amendment of planning application (SD21A/0186) which proposed to construct a 3-4No. storey data centre, plant room, ESB substation, parking facilities and all other auxiliary works within the Site. The original application, which included an NIS and EcIA, was granted planning on the 24th of March 2022. The reports submitted in support of the Permitted Development (Planning Reference: SD21A/0186) concluded that following the implementation of mitigation measures outlined in the reports submitted, there would be no significant direct or indirect effects on biodiversity onsite or in the wider surrounding area.

As the Proposed Development is located within the boundary of this granted development, cumulative or in-combination impacts on biodiversity have been considered throughout this assessment with both the Proposed and Permitted Developments onsite being viewed as the Overall Project. Therefore, the original construction works, and operational phases of the data centres have been re-assessed to account for any modifications as a result of the Proposed Development. The mitigation included as part of this report also includes for the potential in-combination effects between the Proposed Development and the Permitted Development onsite, therefore, it can be stated that no cumulative effects on biodiversity will occur as a result of the Overall Project.

A review of the South Dublin County Council Planning Portal identified the following projects within Profile Park which were considered relevant to the Overall Project in terms of likely cumulative effects [23].

Vantage Data Centers DUB11 Ltd. have submitted a planning application for the demolition of a two-storey residential dwelling and outbuildings to be replaced by the construction of a two-storey data centre and its associated infrastructure, ca.20m west of the Site (Planning Application No. SD22A/0420). This planning application is currently awaiting a decision from SDCC. A Request for Further Information (RFI) was issued on the 12th of January 2023. This development was subject to an Appropriate Assessment and an EIAR. Chapter 11 of the EIAR submitted in support of this development assessed the likely significant ecological effects arising from the development. This chapter states, '*no significant effects are predicted on ecology as a result of the proposed development alone in either the demolition and construction or the operation stage so there is no potential for cumulative effects*.' Therefore, should this development receive planning permission, it is considered highly unlikely that the Overall Project will result in any in-combination effects on biodiversity with this development.

Moffash Ltd. received planning consent for the construction of a Distribution Warehouse Building and associated works in Profile Park, ca.40m west of the Site in 2020 (Planning reference: SD20A/0124). This development was subject to an Ecological Impact Assessment (EcIA) prepared by Scott Cawley as part of a Request for Further Information (RFI) from the Council. This EcIA assessed a number of potential receptors and concluded that following the implementation of mitigation measures outlined in the EcIA, the potential effects on these receptors were '*not considered to be significant at any geographic scale.*' Therefore, taking the above into account and given the low ecological value of the Site, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this granted development. This site was subject to an additional planning application in 2022 by Vantage Data Centers Dub 11 Ltd. (Planning Application No. SD21A/0241). This application included for the demolition of the single storey dwelling onsite and the construction of two (2No.) data centres, a gas-powered generation plant and all associated site works. This project was subject to an Appropriate Assessment and a full Environmental Impact Assessment Report (EIAR). This application was granted by SDCC on 16th May 2022. An appeal was lodged with An Bord Pleanála (ABP) but was withdrawn. The EIAR prepared by Ramboll UK Ltd. for this development concluded that '*no significant effects are predicted on ecology as a result of the proposed development alone in either the demolition and construction or the operation stage so there is no potential for cumulative effects.*' Therefore, it can be concluded that the Overall Project will not result in any in-combination effects on biodiversity with this granted development.

Greener Ideas Limited have submitted a planning application for the construction of a gas fired power plant with associated plant, equipment and buildings ca.130m southwest of the Site (Planning Application No. SD21A/0167). This planning application was granted on 19th of July 2022. An EIAR was submitted as part of planning for this development. This EIAR concluded that there was no potential for in-combination effects on biodiversity with other developments at the time. Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this granted development.

Digital Netherlands VIII B.V. have submitted a planning application for the removal of an existing unused wastewater treatment facility onsite and the erection of two data buildings and all associated siteworks ca.68m southof the Site (Planning Application No. SD21A/0217). This planning application also proposed to reroute and widen the Baldonnell Stream. This planning application was granted by SDCC on 2nd of August 2022. However, it is currently awaiting a decision from an ABP appeal due in April 2023 (ABP Reference: 314461-22). This development was subject to a Appropriate Assessment and an EcIA. This EcIA concluded that the development in question would 'not result in any significant impacts on ecological receptors identified both onsite and in the surrounding area following the implementation of appropriate mitigation measures.' Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this development.

Microsoft received planning consent for the demolition of an existing single storey vacant hose, garage and outhouse followed by the construction of a 1-4 storey Central Administrations Building and two 2-storey data centres in 2021 (Planning Reference: SD20A/0283). Microsoft then issued a renewed application for modifications and minor additions to the granted development under SD21A/0203. This development was granted on the 10th of November 2021. Both planning submissions included an EIAR. As part of Chapter 5 of the EIAR submitted in support of SD21A/0203 and SD20A/283, an assessment of in-combination effects with other plans or projects on biodiversity was conducted and no developments were identified that could lead to cumulative effects with the development in question. Chapter 5 of the EIAR included a number of mitigation measures to ecological receptors and as such, the predicted impacts on biodiversity were predicted to be, '*neutral and imperceptible*.' Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this development. The likelihood for in-combination effects is further diminished by the distance between the Site and this development which is ca.900m from the Site.

CyrusOne Irish Data Centre Holdings Ltd. submitted a Strategic Infrastructure Development (SID) planning application to An Bord Pleanála (ABP) for the provision of a new 110kV Gas Insulated Swithgear (GIS) Substation under ABP Planning Reference: 309146. This development was granted in 2021 and altered in 2023. The location of this development is ca.700m west of the Site. An Appropriate Assessment Screening Report and an EIAR were submitted in support of this development. Chapter 6 of the EIAR states, '*The assessment presented in the AA Screening Report concluded that the Proposed Development poses no risk of likely significant effects on any European sites, either alone or in combination with any other plans or projects. The Proposed Development also will not result in any significant effects on any nationally designated sites for nature conservation (i.e. pNHA or NHA sites).*' Chapter 6 of this EIAR also states that there is potential for cumulative effects to arise on water quality or through disturbance to birds and bats should construction take place in tandem with other plans or projects. However, the report goes on to state that '*these potential cumulative impacts would be temporary and could occur at a local geographical scale, in the absence of mitigation*.' It is important to note that mitigation measures have been included as part of the EIAR for this development which result in a prediction of no significant impacts. Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this development.

CyrusOne received planning permission for modifications to the permitted data centre development (granted under Planning Reference SD18A/0134 and ABP Reference: 302813-18). This development was submitted under Planning Reference SD20A/0295 and is located ca.700m west of the Site. An Ecological Impact Assessment (EcIA) was submitted as part of the application which states that, '*with the mitigation measures outlined above in section 6 above, it is considered that there are no residual significant ecological effects, therefore there is no potential for cumulative effects to arise.*' Therefore, it can be concluded that the Overall Project will not result in any in-combination effects on biodiversity with this granted development.

UBC Properties received planning permission for the development of three 2-storey data centres ca.700m south of the Site under Planning Reference SD20A/0121. An EIAR was submitted as part of the planning application for this development. This development is currently undergoing construction and therefore, it is considered unlikely that the construction phase of this development will overlap with the construction phase of the Overall Project. In addition, the EIAR submitted in support of this application included a number of mitigation measures for identified ecological receptors. The implementation of mitigation measures as part of the granted development coupled with the intervening distance between the Site and this development make it highly unlikely that any in-combination effects will occur.

It should be noted that any likely cumulative effects will be minimised as all works will be completed in line with relevant best practice guidelines as outlined in Section 5.2.1 and legislation alongside the mitigation measures detailed within this EIAR. Likely effects associated with the deterioration in water quality, noise, air and climate have been addressed within Chapters 7, 8, 9 and 18.

Taking into account that the Overall Project will have an imperceptible residual impact on biodiversity provided the mitigation measures within this EIAR are implemented as outlined in Section 5.5 and 5.7, it is considered unlikely that any significant cumulative and in-combination impacts will arise as a result of the Overall Project. Subsequently, the cumulative effects on ecology arising from the Overall Project in-combination with other developments is considered to be imperceptible.

5.12 Do Nothing Scenario

Article IV, of the EIA Directive states that the description of the baseline scenario should include:

"An outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge."

Given the location and nature of the onsite habitats as described above, it is not considered that they are of significant conservation value. Should the Site be left undeveloped, it is considered likely that over time the area will be encroached by pioneer species and will transition to scrub. Scrub habitat will provide some additional habitat at a local level for species within the area but given the location of the Site within an industrial / commercial environment, this habitat will not be of considerable conservation value.

Given the quality of the onsite habitats, it is considered that the implementation of the proposed habitat enhancement works will be beneficial at the local level and will provide a better outcome than the do nothing scenario.

5.13 Conclusions

Based on the findings of a detailed desk-based study, a review of all the ecological information available for the Site and wider area and a field survey by MOR Ecologists, it is considered reasonable to conclude the following:

- The Site itself is currently of low local ecological value;
- The Site is located in an area predominantly made up of compacted bare ground and recolonising bare ground and is zoned under objective EE which aims to, '*provide for enterprise and employment related uses*.' It is not of value to any Annex I or Annex II species or Red listed birds;
- The bat surveys did not identify any bats roosting onsite;
- The amphibian surveys did not identify any amphibians utilising the surface waterbodies on the Site. However, amphibians were noted within the drainage ditch along the southern border of the Site;
- The Proposed Development will not result in any significant impacts on ecological receptors identified both onsite and in the surrounding area following the implementation of appropriate mitigation measures; and,
- The proposed landscape planting and biodiversity enhancement measures will supplement the existing vegetation onsite and provide additional habitats and opportunities for species already existing within the area.

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6. Land, Soil, Geology & Hydrogeology

Introduction

This chapter of the ES has been prepared by Delta-Simons Limited and presents an assessment of the likely significant effects of ground conditions and contamination from the construction works associated with the EIA Development comprising the Permitted Development of a data centre (application ref. SD21A/0186) and the Proposed Development of 10 gas fired generators and associated flues (application ref. SD22A/0156. The Overall Project comprises the Permitted Development and the Proposed Development. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. Taking into account these mitigation measures, the nature and significance of the likely residual effects are reported.

6.2 Supporting Appendices

- **Appendix 6.1** '*Phase I Environmental Site Assessment*' IER Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.01) dated, February 2021;
- **Appendix 6.2** '*Geo-Environmental Assessment*', Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.02) dated, April 2021; and,
- **Appendix 6.3** '*Geotechnical Assessment*', Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.03), dated, August 2021.
- **Appendix 6.4** - Environmental Impact Assessment for Profile Park Roads and Services Application by RPS Planning and Environment dated, July 2006. Chapter 6 and Appendix B – Soils, Geology and Hydrogeology (including waste), including trial pit logs by WYG.

6.3 Competence

Mike Gennaro is an Associate Director for Delta-Simons Limited and heads up the contaminated land team in their Gateshead office. An Environmental Consultant with a BSc in Geology and an MSc in Environmental Sciences, he has more than 20 years' multidisciplinary experience in the UK contaminated land and waste management industries.

Mike has extensive project expertise, having worked on numerous brownfield re-development schemes, and has designed, implemented and managed numerous geo-environmental appraisals of brownfield sites for planning, Part 2A and environmental liability purposes. During this time, he has managed, or provided technical input into, the preparation of a number of Environmental Impact Assessment Reports for residential, commercial and industrial developments.

Harry Whittle is a Principal Consultant with seven years' experience in geo-environmental consultancy, who joined Delta-Simons in 2016 after completing a BSc in Geology. During his time at Delta-Simons, Harry has been involved with a range of projects including several brownfield redevelopments that have included the preparation of Environmental Statement chapters.

6.4 Description of the Characteristics of the Proposed Development

1. **The Proposed Development** for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development. (Note: the Proposed Development (no. 1) is a subset of the Overall Project (no. 2))

2. **The Overall Project** which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR.

    - Matheson note*: The description and assessment of the "Overall Project" must include integral related projects (such as gas / electricity / fibre connections).*
    - *The EIAR Guidelines (2022) state:*
        - *"The description includes other projects (sometimes by other developers and sometimes off site) or individual project components which occur as a direct result of the main project, such as a power line, a substation or a road junction upgrade which may result in significant effects. Some of these may require parallel separate consent. Omission of such projects or components may be referred to as project splitting where they are 'integral' to the primary project (i.e. they are required for the primary project to operate)."*

Please note the below Matheson comment in relation to the baseline scenario:

- The EIA Directive describes a "*baseline scenario*" as "*a description of the relevant aspects of the current state of the environment*". This concept is broader than just the permitted development and greenfield site. For example, it might include the air quality or noise emissions in the area.
- Therefore, we note that the baseline "***includes*** *the permitted development*" and "***includes*** *an empty greenfield site*".

Terms

- When the "Permitted Development" is referred to it refers to the Data Centre development SDCC Ref. SD21A/0186.

- When the "Proposed Development" is referred to it refers to:
    - Modifications to the permitted data centre and development of On Site Power Generation - Ref. SD22A/0156

- When the "Overall Project" is referred to it refers to the
    - o Granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development **and** the proposed amendments to this application as per application SDCC Ref. SD22A/0156.

6.5 Study Area

The study area for the assessment includes the Proposed Development Site and any areas of contamination within 1 km of the Proposed Development Site boundary based on historical and current land mapping and records.

6.6 Methodology

6.6.1 Establishing Baseline Conditions and Sensitive Receptors

Identification of the geological characteristics and potential sources of contamination on the Proposed Development Site and its environs has been undertaken with reference assessments previously undertaken by Delta-Simons, as summarised in Section 6.2 previously and appended to this EIAR chapter.

Although the supporting information was viewed, obtained and assessed in 2021, this is still considered to be relevant to the current conditions of the Proposed Development Site given that the majority of entries relate to historical features/records which are unlikely to have changed since 2021.

For the purposes of this assessment, it has been assumed that there will be no significant differences between existing baseline and future baseline conditions given that no other significant sources of contamination have been introduced to the Proposed Development Site since the 2021 Delta-Simons assessments. On this basis, it is considered reasonable that the contamination status (and prevailing ground conditions) in the future baseline to be largely as per the present day (i.e. as established by the Delta-Simons 2021 study) in the absence of any remediation.

The identification of potential sensitive receptors has been undertaken in accordance with due cognisance of the guidance presented in the Office of Environmental Protection's document "Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites. These include:

- construction/maintenance workers on the Application Site and Wider Site;
- adjacent users and residents;
- controlled waters (groundwater and surface watercourses); and
- buildings, utilities and services.

Future users within both the Proposed Development and Overall Project sites and the built environment (new buildings and infrastructure/utilities) have not been considered to be plausible receptors given the requirement to appropriately mitigate potentially unacceptable risks from soil and/or groundwater contamination shall be addressed prior to construction.

6.6.2 Methodology for the Assessment of Likely Significant Effects

The likelihood of contaminated land being present at the Proposed Development Site and the potential effect on sensitive receptors has been assessed using a conceptual model and risk-based framework based on a combination of established experience of the potential type and the extent of contaminants identified through the previous ground investigations, as described above.

The assessment of contaminated land is a staged process, initially based on a qualitative assessment. This underpins the formulation of a 'conceptual model', which represents the relationships between contaminant sources, pathways and receptors, to support the identification and assessment of Plausible Pollutant Linkages (PPL) for human health, controlled waters and the built environment. Definitions of the components that comprise a PPL are as follows:

- source - a contaminant at a concentration capable of causing adverse health or environmental effects;
- pathway - there must be an exposure pathway through which the receptor comes into contact with the contamination source; and
- receptor - there must be a receptor (e.g. human, controlled waters, ecological or property) present, which may be at risk of harm or impact from the source.

The presence of contamination in the soil or groundwater is only a concern if a PPL between each of these components exist. Each of these components can exist independently but only present potential risk when they are linked or present together, i.e. a particular contaminant affects a named receptor through a specific pathway.

Following the determination of potential pathways using the conceptual model, the preliminary risk assessment (***Appendix 6.1***) identified any PPL to determine the probability of receptor exposure to the identified source and the consequences of such exposure. Consideration is given to:

- if it could result in significant harm being caused to the receptor in the pollutant linkage;
- if it presents a significant possibility of significant harm being caused to that receptor; or
- if it is resulting in the pollution of controlled waters, which constitute the receptor; or is likely to result in such pollution.

6.6.3 Significance Criteria

6.6.3.1 Receptor Sensitivity

The baseline information has been used to identify relevant receptors and establish their sensitivity (i.e. their ability to absorb effects without perceptible change). In the absence of EIA definitions that specifically relate to contaminated land, the receptor sensitivity criteria used in this assessment have been based upon professional judgement and experience. Factors which may affect the sensitivity of a human (health) receptor include age, weight, gender, duration of exposure or distance from the application Site or Wider Site. For controlled waters, factors include distance from the Wider Site and resource potential. The adopted criteria are set out in **Table 6.1**.

Table 6.1 : Receptor Sensitivity Descriptors

Value (Sensitivity)	Descriptor	Examples
High	Nationally or regionally significant attribute of high value	Human population (e.g. local residents and construction workers). Groundwater currently used, or likely to be suitable for use as, public potable supplies (e.g. Principal Aquifers, Source Protection Zone for a potable groundwater supplies). Groundwater that is providing baseflow to 'very good' Water Framework Directive (WFD) status quality surface waters.
Medium	Of moderate quality and rarity	Groundwater currently used for, or likely to be suitable for, providing non-potable supplies or limited domestic supplies (e.g. Secondary Aquifers for domestic supplies or industrial abstractions). Groundwater that is providing baseflow to 'good' WFD quality status surface waters.
Low	Of low quality and rarity	Groundwater that is unlikely to be suitable for providing abstractions (e.g. aquifers in areas of saline intrusion).
Very Low	Of very low quality and rarity	Non-sensitive water resources (non-classified, static groundwater).

6.6.3.2 Impact Magnitude

The magnitude of change to the ground conditions from the baseline conditions as a result of the construction works of the Proposed Development and Overall Project has been classified as either being: high, medium, low or very low/negligible. The magnitude of impact is based on the scale set out in **Table 6.2**.

Table 6.2 : Impact Magnitude Descriptors

Impact Magnitude	Descriptor
High	Activities result in a major pollution release or create/remove a pollutant linkage with a substantial pollutant source. Serious risk/improvement to human health/life. The development introduces or removes a large-scale source of potential contamination or pollutant linkage.
Medium	Activities result in a moderate pollution release or create/remove a pollutant linkage with moderate pollutant source. Moderate risk/improvement to human health/life. The development introduces or removes a relatively small-scale source of potential contamination or pollutant linkage.
Low	Enabling works and construction activities result in a minor pollution release or create/remove a pollutant linkage with a minor pollutant source. Temporary pathway or receptor is introduced or removed during enabling works or construction. Minor risk/improvement to human health. The development introduces or removes a minor source of potential contamination or pollutant linkage.
Very Low / Negligible	An insignificant pollution release or creation/removal of a pathway with an insignificant pollutant source. No/reversible affect to human health. No foreseeable measurable change to the existing conditions. No appreciable impacts/reversible impacts.

6.6.3.3 Assessing Significance of Effect

There is no published guidance for transposing a risk-based approach to assessing contaminated land into significance criteria for the EIAR, i.e. current guidance and best practice within contaminated land appraisals focusses on an *assessment of risk*, whereas EIAR methodology focusses on an assessment of *significance of effect*. In the absence of published guidance, the following significance criteria presented in **Table 6.3** have been developed with due cognisance for relevant guidance, in particular with reference to CIRIA Report C552 'Contaminated Land Risk Assessment: A Guide to Good Practice' (Rudland et al., 2001)[1], with due cognisance of the guidance presented in the Office of Environmental Protection's document "Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites, and professional judgement.

A level of significance has been assigned to both likely effects and likely residual effects. Essentially, the combination of the sensitivity of the receptor and the magnitude of change from the baseline condition as a result of the EIAR Development inform the significance of the effect. A description of the significance criteria used for this assessment are presented in **Table 6.3**.

The level of effect takes into account the sensitivity of the receptor and the magnitude of the change or effect, as set out in **Table 6.1** and **Table 6.2**. The implementation of mitigation measures has the potential to alter the magnitude of impact, e.g. enabling works and construction workers using appropriate Personal Protective Equipment (PPE).

Table 6.3 : Significance Criteria Matrix

Value (Sensitivity)	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low / Negligible**
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Negligible	Negligible	Negligible	Negligible

Likely effects that are determined as being moderate or major are classed as 'significant' effects. Where an effect has been anticipated to be negligible or minor, these are classed as ' not significant' effects. Descriptions of the levels of effects are outlined within **Table 6.4**.

Table 6.4: Description of Ground Conditions and Contamination Effects

Effect	**Risk Category (from CIRIA C552)**	**Consequence**
Major Adverse **(Significant)**	VERY HIGH There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. Urgent investigation (if not undertaken already) and remediation are likely to be required. HIGH Harm is likely to arise to a designated receptor from an identified hazard. Urgent investigation (if not undertaken already) is required and remedial works	Acute or severe chronic effects to human health and/or animal and plant populations predicted. Effect to a potable groundwater or surface water resource of regional importance, e.g. Principal Aquifer, public water reservoir or inner protection zone of a public supply borehole. Permanent adverse alteration to the regional hydrological or hydrogeological regime, e.g. a significant increase in flood risks within the river basin. Acute or severe effects on property/humans from ground subsidence.

Effect	Risk Category (from CIRIA C552)	Consequence
	may be necessary in the short term and are likely over the longer term.	
Moderate Adverse **(Significant)**	MODERATE It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk. Some remedial works may be required in the longer term.	Proven or likely significant pollutant linkages with human health and/or plant and animal populations with harm from long term exposure. Impact to potable groundwater or surface water resource at local level. Temporary changes to the regional hydrological or hydrogeological regime. Likely impact on property/humans from ground subsidence.
Minor Adverse (Not significant)	LOW It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.	Potential pollutant linkages with human health and/or animal and plant populations identified. Reversible, localised reduction in the quality of surface or groundwater resources used for commercial or industrial abstractions, Secondary Aquifer etc. Noticeable or temporary changes to the local hydrological or hydrogeological regime. Potential limited effect on property/humans from ground subsidence.
Negligible **(Not significant)**	VERY LOW There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.	No appreciable effect on human, animal or plant health, potable groundwater or surface water resources. No appreciable effect on property/humans from ground subsidence.
Minor Beneficial **(Not significant)**	Not applicable (N/A)	Risks to human, animal or plant health are reduced to acceptable levels. Local scale improvement to the quality of groundwater or surface water resources used for commercial or industrial

Effect	Risk Category (from CIRIA C552)	Consequence
		abstraction and/or reduction in flood risk on-site. Risks to property/humans from ground subsidence are reduced.
Moderate Beneficial **(Significant)**	N/A	Significant reduction in risks to human, animal or plant health, to acceptable levels. Significant local improvement to the quality of groundwater or surface water resources. Measurable reduction in flood risk to the Site and locality. Significant reduction in risks to property/humans from ground subsidence.
Major Beneficial (Significant)	N/A	Major reduction in risks to human, animal or plant health. Significant regional scale improvement to the quality of potable groundwater or surface water resources. Major reduction in risks to property/humans from ground subsidence.

6.6.3.4 Assumptions and Limitations

A number of assumptions have been made in the assessment of ground conditions and contamination effects as a result of the construction works of the EIA Development. These include the following:

- The **Overall Project** will utilise a shallow square pad foundation solution, founding up to 3 m bgl in un-weathered bedrock;
- the entire Proposed Development and Overall Project Site would be subject to ground disturbance and excavations during the enabling works and construction works;
- relevant legislative requirements are fulfilled during the enabling works and construction works; and
- whenever possible, excavated materials will be reused, subject to compliance with risk-based remedial targets. However, it is understood the majority of material will be subject to off-Site disposal.

Although the previous assessments of the Site by Delta-Simons (***Appendices 6.1 to 6.3)*** were undertaken in 2021, given that no additional potential sources of contamination have been introduced, these assessments are still considered to be valid.

6.7 Baseline Conditions

6.7.1 Site Specific Assessments

- **Appendix 6.1** '*Phase I Environmental Site Assessment*' IER Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.01) dated, February 2021;
- **Appendix 6.2** '*Geo-Environmental Assessment*', Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.02) dated, April 2021; and,
- **Appendix 6.3** '*Geotechnical Assessment*', Grange Castle, Dublin by Delta-Simons Ltd, (project ref. 20-2018.03), dated, August 2021.
- **Appendix 6.4** - Environmental Impact Assessment for Profile Park Roads and Services Application by RPS Planning and Environment dated, July 2006. Chapter 6 and Appendix B – Soils, Geology and Hydrogeology (including waste), including trial pit logs by WYG.

6.7.1.1 Appendix 6.1 Phase I Environmental Site Assessment (project ref. 20-2018.01) Sources of Information

6.7.1.1.1 Scope of Work

The Phase I ESA process was divided into the following four parts:

Task 1 – Records/Documents Review

Delta-Simons records review included records from standard sources that are publicly available, obtainable from their source within reasonable time and cost constraints and are practically reviewable. Records were reviewed for properties within the approximate minimum search distances (determined at the discretion of the Environmental Professional) unless adjusted at the discretion of the Environmental Professional.

Record sources included the following:

- Readily available public environmental databases maintained by the Environmental Protection Agency, the Geological Survey of Ireland, Ordnance Survey of Ireland, the Office of Public Works, The Heritage Council, Minerals Ireland and South Dublin County Council to identify relevant permits, licences, contamination incidents and other environmental records relating to the Site and the surrounding area;
- Regulatory information from Environmental Regulator consultation relating to the Site;
- Any relevant permits, licences and consents provided by the current Site user;
- Available published geology, hydrogeology and hydrology of the Site and surrounding area;
- Available Site-specific geology and hydrogeology from representative site investigation data made publicly available or from third-party reports;
- Available historical documents (including mapping and historical aerial photographs of the Site and the adjacent land parcels) in order to develop a history of the subject property and adjoining properties. This task involved discretionary review of as many of the historical sources as necessary and reasonably ascertainable to meet this objective; and
- Third-party reports relating to the Site or neighbouring properties (where obtained or provided to Delta-Simons).

Task 2 – Site Reconnaissance

A Site reconnaissance conducted in a systematic manner to visually characterize on-Site conditions and identify potential environmental conditions on neighbouring properties. Prior to conducting a Site visit, the Client arranged permission and access for Delta-Simons personnel to enter and view the Site. The Site reconnaissance was planned by a Delta-Simons Environmental Professional and performed by personnel possessing sufficient training and experience necessary to conduct the Site reconnaissance and having the ability to identify relevant issues in connection with the subject property.

The Site reconnaissance included the following activities:

- Visual observation and description of the general setting of the subject property. The Site reconnaissance was performed on areas of the subject property that could be readily accessed safely;
- Identification and documentation of current property uses that use, treat, store, dispose of, or generate hazardous substances or petroleum, along with the quantities and description of storage or use conditions. Past property use, to the extent visually or physically observed, was also identified and documented;
- Visual and/or physical observation and documentation of conditions that suggest a past or potential release of hazardous substances or petroleum products (i.e., stressed vegetation or soil staining);
- Visual identification and documentation of equipment and structures that are commonly known to contain polychlorinated biphenyls (PCBs), including electrical and hydraulic equipment;
- Observation and documentation of building interiors, including identification of the means of heating and cooling of building, and waste disposal;
- Visual observation and documentation of exterior property conditions including exterior waste disposal, surface water drainage (i.e. presence of oil-water interceptors), groundwater wells, surface staining, and stressed vegetation;
- Visual observation and description of current land uses on adjoining properties for evidence of current and/or past uses that may contribute to environmental risks to the adjoining properties or the subject property. Adjoining land use was viewed from the subject property or a publicly accessible vantage point; and
- Photographic documentation of current subject property setting and activities (as allowed).

A current Site Layout Plan is presented as **Figure 6.1**.

Task 3 – Interviews

Interviews intended to gather information about current and past uses and conditions of the subject property that may be relevant in identifying potential environmental risks associated with the subject property were not able to be carried out. As an alternative to an interview, a questionnaire was submitted for completion by the landlord or appropriate representative.

A reasonable attempt was made to contact the Environmental Protection Agency and relevant Local Authority. Content of the questions was formulated at the discretion of the Environmental Professional to obtain information indicating potential environmental risks in connection with the subject property.

Task 4 – Phase I ESA Report

This report contains the following items:

- Summary of services performed, and the information obtained during the course of the Phase I ESA;
- Discussion of the Site reconnaissance;
- Identification of potential contamination sources based on the data and information reviewed; and
- Discussion of data gaps and limiting factors.

Figure 6.1 – Site Layout Plan within Phase I Environmental Assessment

6.7.1.2 Appendix 6.2 Geo-Environmental Site Assessment (project ref. 20-2018.02) Ground Investigation

Upon completion of the desk based Phase I Environmental Assessment, during which current and former land uses, potential sources of land contamination, sensitive environmental receptors and the environmental setting (geology, hydrogeology and hydrology) were established, a Geo-Environmental Site Assessment was completed. The Geo-Environmental Site Assessment included the production of a preliminary conceptual site model (CSM), from which likely plausible pollutant linkages can be established to determine the potential for actual plausible risk to exist at the site associated with land contamination. The CSM informed the design of an intrusive ground investigation, comprising the drilling of boreholes and excavation of trial pits to obtain samples, record observations and undertake in-situ field tests.

The ground investigation included the following scope of works:

- Supervision of all works by a Geotechnical Environmental Services Ltd engineer. All intrusive locations were logged to BS 5930:2015+A1:2020 Code of Practice for Site Investigations;
- Excavation of 11 no. trial pits (TP01 to TP11) to a maximum depth of 3.00 m bgl;
- Drilling of four dynamic sampler holes (WS01 to WS04) to a maximum depth of 3.25 m bgl, with three monitoring wells installed (WS01 to WS03);

- Drilling of 12 no. rotary auger holes (BH01 to BH12) to a maximum depth of 4.40 m bgl, with seven monitoring wells installed (BH01, BH03, BH05, BH08, BH10-BH12); and,
- Collection of four samples from stockpiled materials on-Site.
- One groundwater sample was collected from each of the installed boreholes with sufficient water present on two occasions, 5th March 2021 and 24th March 2021. The groundwater samples were collected using a dedicated disposable bailer.
- Production of a Geo-Environmental Assessment Report comprising the field observations and findings of the ground investigation, production of ground model (ground conditions encountered), completion of a Generic Quantitative Risk Assessment, Bulk Ground Gas Risk Assessment and an updated Conceptual Site Model to determine plausible pollutant linkages and

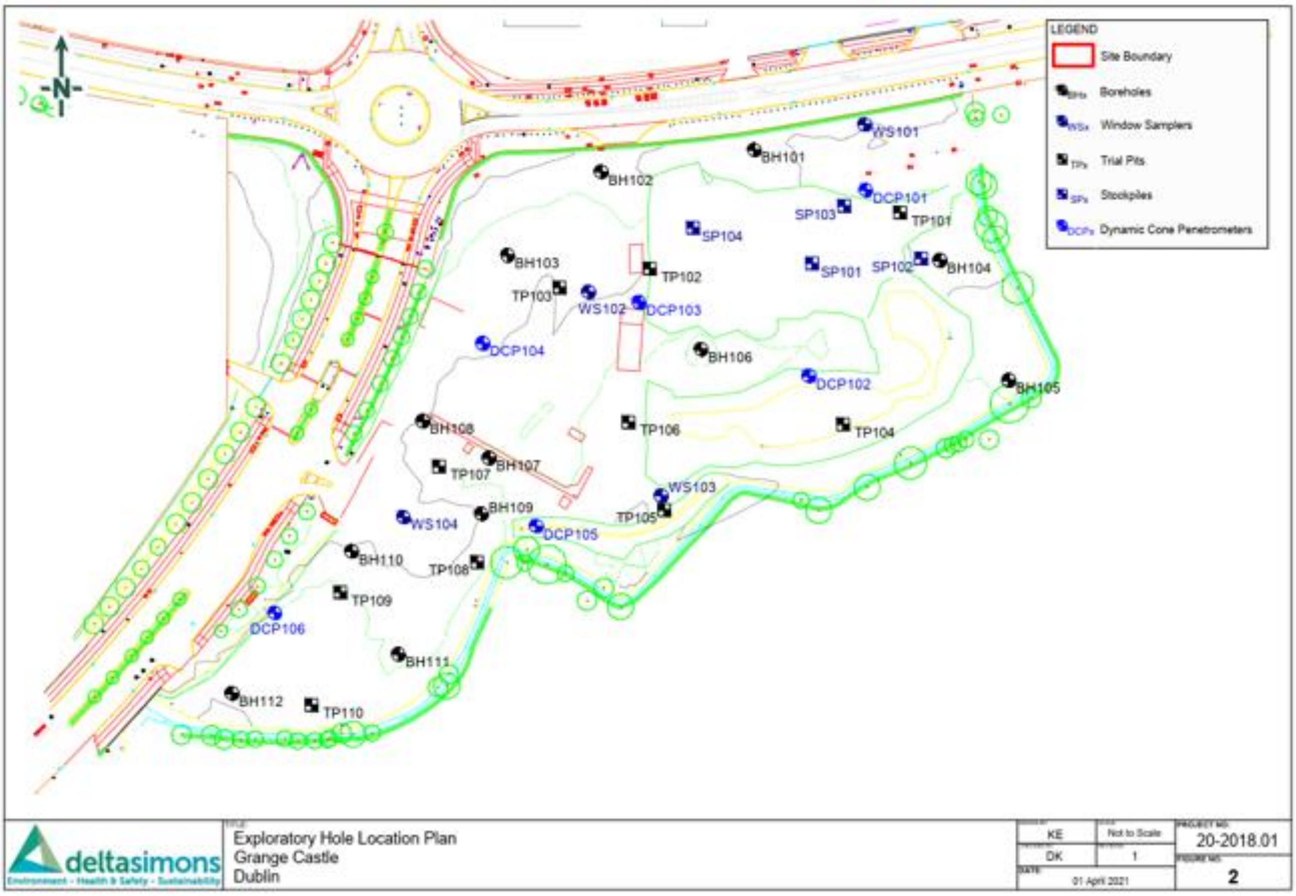


Figure 6.8 - Exploratory Hole Location Plan from Geo-Environmental Report

risk associated with the presence of any land contamination to the future site users and the environment. The report included a plan of exploratory hole locations (sampling and testing points), provided below and **Figure 6.2**.

6.7.1.3 Appendix 6.3 Geotechnical Assessment (project ref. 20-2018.03) Ground Investigation

Delta-Simons was requested to undertake additional Ground Investigation works in support of the foundation design strategy proposed by the Structural Engineer at the above Site and to provide additional geotechnical information to optimise their preferred foundation design. Whilst this assessment is not considered to provide significant findings which will impact this EIAR Chapter, additional information and data was obtained to inform the baseline condition of the site.

The report included a plan of exploratory hole locations (sampling and testing points), provided below and **Figure 6.3**.

The ground investigation included the following scope of works:

- Supervision of all works by a Geotechnical Environmental Services Ltd engineer. All intrusive locations were logged to BS 5930:2015+A1:2020 Code of practice for ground investigations;
- Drilling of 3 No. rotary cored boreholes (RC01 to RC03) to a maximum depth of 10 m bgl, with 3 monitoring wells installed;
- 3 No. rising head tests; and,
- Production of a Geotechnical Assessment Report to inform future foundation design.

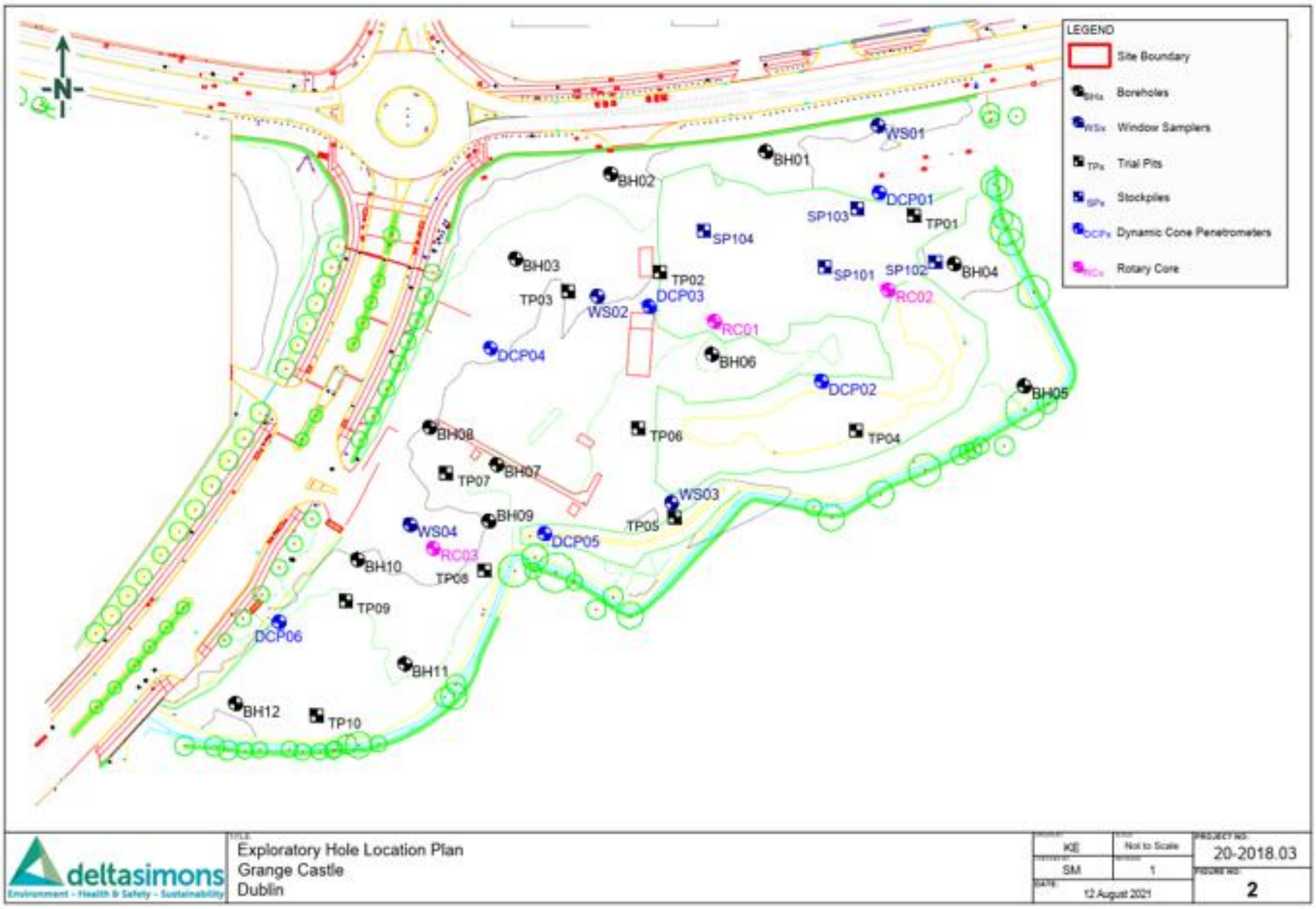


Figure 6.9 - Updated Exploratory Hole Location Plan including additional borehole sampling locations.

6.7.1.4 Appendix 6.4 - Environmental Impact Assessment for Profile Park Roads and Services Application by RPS Planning and Environment dated, July 2006. Chapter 6 and Appendix B – Soils, Geology and Hydrogeology (including waste), including trial pit logs by WYG.

The Environmental Impact Statement was prepared in support of the application for roads and servicing for the Profile Park development, including the Site and a larger area to the south-west. A range of potential environmental impacts of the development were considered, of which Chapter 6, concerning soils, geology, hydrogeology and waste, and the supporting Appendix B, are considered relevant to the current assessment and have been reviewed. Although the EIS was authored by RPS, Chapter 6 was based on a desktop study, Site walkover and trial pit investigation by a WYG hydrogeologist.

The site investigation comprised twenty-nine trial pits in total, or which four, TP12 to 15, were located on the current Site. The soils encountered in these four trial pits were of natural origin, although an area of Made Ground incorporating waste materials was identified c. 100 m south of the Site. Soil chemical analysis samples were taken from the trial pits and were also analysed for "*soil gases*". Detailed monitoring data and laboratory analysis certificates were not appended to the report.

6.8 Subject Site Characteristics

6.8.1 General Description of the Site

Land at Castle Grange, located to the south of the R134 New Nangor Road and to the east of Profile Park, Ballybane, Co. Dublin. The Site is located at the Profile Park development area, located to the south of New Nangor Road and to the east of Profile Park, Kilcarbery, Co. Dublin. It is located in South Dublin County approximately 12 km east of Dublin City Centre. A Site Location Map is included as **Figure 6.4**.

The Site is largely vacant having most recently been used as an Electric Supply Board (ESB) construction compound occupying 40% of the Site in the north-west. The construction compound contained prefabricated cabins and storage containers and open storage of construction related materials. Ground cover now comprises a mixture of gravel hardstanding in the north-west with stockpiles of aggregate and soil in the north-east. The south of the Site is dominated by undulating grass cover and scrub vegetation.

The Land Registry plan provided by the Client indicates that the northern and western boundaries of the plot run along the centre line of New Nangor Road and Profile Park approach road respectively and therefore include parts of the above-named highways.

6.8.2 Site Reconnaissance Observations

A site reconnaissance visit was undertaken on 19th November 2022 by Delta-Simons, during which, pertinent observations relating to potential land contamination were recorded, summarised below.

The majority (c. 60%) of the Site is vacant land where ground cover is dominated by stockpiles of construction and demolition materials and coarse infill. Ground cover in peripheral areas comprises scrub-type vegetation.

A construction compound occupies the north-west covering c. 40% of the Site.

No permanent structures have been developed. A construction site compound is located in the west of the Site comprising pre-fabricated cabins and converted storage containers.

Whist not observed, it is assumed that some small quantities of fuels, oils and lubricants will be stored in the construction site compound for vehicle and service building maintenance.

A single above ground storage tank was observed in the site compound adjacent to the female toilets. It was not labelled to contain any petroleum oils. Intermediate bulk containers (IBCs) were observed in the construction site compound, the contents of which were not confirmed due to access constraints. No oil or gas fired heating systems were identified. It is assumed that the site compound is serviced by electric heating.

No **strong, pungent or noxious** odours were noted during the Site reconnaissance.

Pools of standing water were observed between material stockpiles in the east of the Site, and in compacted gravel hardstanding in the south.

No electrical or hydraulic equipment were observed during the Site reconnaissance. No staining or corrosion was noted during the Site reconnaissance. No interceptors, drains or sumps were noted during the Site reconnaissance.

A high-voltage electrical cable was identified entering the south-west of the site.

No pits, ponds or lagoons were noted during the Site reconnaissance.

Some stockpiles of construction and demolition waste were identified in the centre/east of the Site. No evidence of asbestos containing materials was visible, but presence of ACM cannot be discounted.

As of 17th February, 2021, the ESB compound had been removed with only the limited hard standing associated with the line of prefabricated cabins remaining. Some limited ground scarring from the storing of materials in the north-west of the site was observed. There was no evidence of gross contamination associated with the former compound or its removal.

Figure 6.10 - Site Location Map

6.8.3 General Description of the land surrounding the Site

The Site is located within an area zoned for enterprise and employment related uses, extending to the north, west and south-west of the Site and including Profile Park, under development to the south-west and Grange Castle Business Park to the north and west. Current occupants of premises on Profile Park include web/technology company data centres. Occupants of Grange Castle business park on the north side of New Nangor Road include food distribution depots, IT companies, office buildings and a hotel.

Opposite the Site on the north side of New Nangor Road is a petrol filling station operated by Circle K. 400 m west along New Nangor Road is a garage and crash repair business.

Land immediately to the west on the far side of the Profile Park access road, although zoned for development, currently remains in agricultural use. The land to the south-east consists of Grange Castle golf course, an area zoned for open space and recreational amenities.

In the wider surrounding area, within Grange Castle business park around 200 m to 400 m to the north are located several pharmaceutical companies including a large biotechnology facility operated by Pfizer, several data centre facilities and offices.

Approximately 500 m south of the Site is located Baldonnell military aerodrome.

Table 6.5 – Surround Land Use

General Observations	The Site is located in a commercial and recreation development area dominated by commercial and warehouse buildings, a golf course and areas of undeveloped greenfield land.	
Adjoining Property Use	**North**	The Kilcarbery Park industrial and commercial estate comprising commercial premises and office space, and a petrol filling station to the east of the estate.
	East	Grange Castle Golf Course
	South	Grange Castle Golf Course
	West	Undeveloped lands possibly used for agriculture.
Past Use(s) of Adjoining Properties	The majority of the lands that adjoin the property were undeveloped and unoccupied until at least c. 2000 when development of the Kilcarbery complex is shown.	
Evidence of Contamination	Evidence of past site investigations were identified at the petrol station directly north of the Site, comprising surface scarring indicative of boreholes. The boreholes had not been installed as monitoring wells.	

6.8.4 Historical Land Use

The historical development of the Site and surrounding area has been assessed through a review of available historical maps, aerial photographs and Google Earth historical satellite imagery. A summary of the key historical Site uses and developments in the surrounding area is presented below.

The following table provides a detailed review of the available historical mapping and aerial photography for the subject, adjacent and surrounding properties.

Table 6.6 - Historical Site Uses

Date of Map	Source	Subject Property Description	Surrounding Area (c.100 m radius)
1837 to 1913	Ordnance Survey of Ireland	The subject property appears to be undeveloped vacant land.	The surrounding areas appear to be undeveloped, rural and in assumed agricultural use.
1995	OSI aerial photograph	The subject property appears to be undeveloped vacant land.	The R134 (New Nangor Road) runs along the northern boundary of the Site. A building, possibly a farmhouse, is present on north side of road. Further buildings, possibly farmhouse/barns, are present 60 m west. The remainder of the surrounding area comprises fields.
2000	OSI aerial photograph	The subject property appears to be undeveloped vacant land. Bare ground is adjacent to the new roundabout at north-west corner of Site.	The Petrol filling station forecourt and adjoining buildings are present on north side of the road. New commercial development comprising offices and warehouses are under construction to north-west of the roundabout. The golf course is now present abutting the Site to the south-east.
2005	OSI aerial photograph	The Site appears unused, covered in rough grass.	Commercial development to the north-west of the roundabout is now complete, with three large warehouse/depots and a row of office buildings. Further office buildings are present to the north of the Site, north-east of the roundabout abutting the petrol filling station.
May 2009	Google Earth	The Site appears to have been in use as a construction yard. Blocks and other materials are stocked on the western half. The eastern half contains dark grey material (possibly locally excavated spoil) in heaps.	A new dual carriageway, Profile Park access road, forms the western boundary of the Site.
June 2014	Google Earth	Materials have been cleared from the western side of the Site. The eastern side still contains spoil materials.	Development of data centres to the north of the commercial development/filling station is now underway. 100 m south, a new facility (probable data centre) is under construction on Profile Park.
January 2017	Google Earth	No significant changes.	The construction of the data centre now extends to the east of the filling station (30 m north-east of Site).

Date of Map	Source	Subject Property Description	Surrounding Area (c.100 m radius)
June 2019	Google Earth	The western half of Site is in use as a construction compound, with vehicles and construction materials visible.	Data centres to the north and north-east appear complete. The assumed data centre facility 100 m to the south extended further to the south.
January 2020	Google Earth	No significant changes.	No significant changes.

Based on a review of the compilation of historical sources presented above dating back to 1837, it appears that the subject property was in agricultural use until the construction of the Profile Park access road on the Site's western boundary in around 2007-2009. Although a retail and office development was proposed for the Site and planning consent granted, it was not implemented and the Site has been used intermittently as a construction compound and for stockpiling excavated soil and builders rubble up to the present day. A strip of land along the northern edge contains a wayleave for a trunk water main and high voltage electricity cables.

Potentially contaminative land uses identified in the surrounding area include a petrol filling station to the north, dating from the late 1990s. The office and warehouse development to the north-west of the roundabout is of recent construction and is considered unlikely to be a source of contamination likely to affect the Site.

6.8.5 Published Geology

From Geological Survey of Ireland (GSI) mapping data, the Site is indicated to be underlain by superficial deposits of Till derived from limestones. The underlying bedrock is described as dark limestone and shale of the Lucan Formation, also locally known as Calp. Superficial and Bedrock Geological Maps are presented as **Figure 6.4** and **Figure 6.5** respectively.

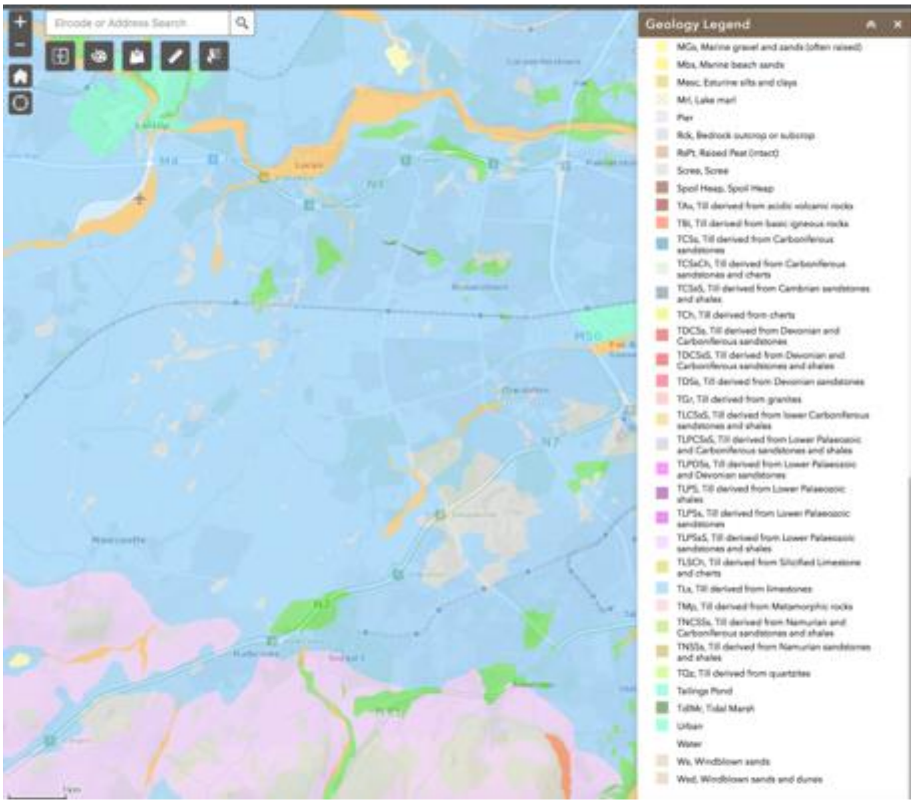


Figure 6.4 - GSI Superficial Geological Mapping

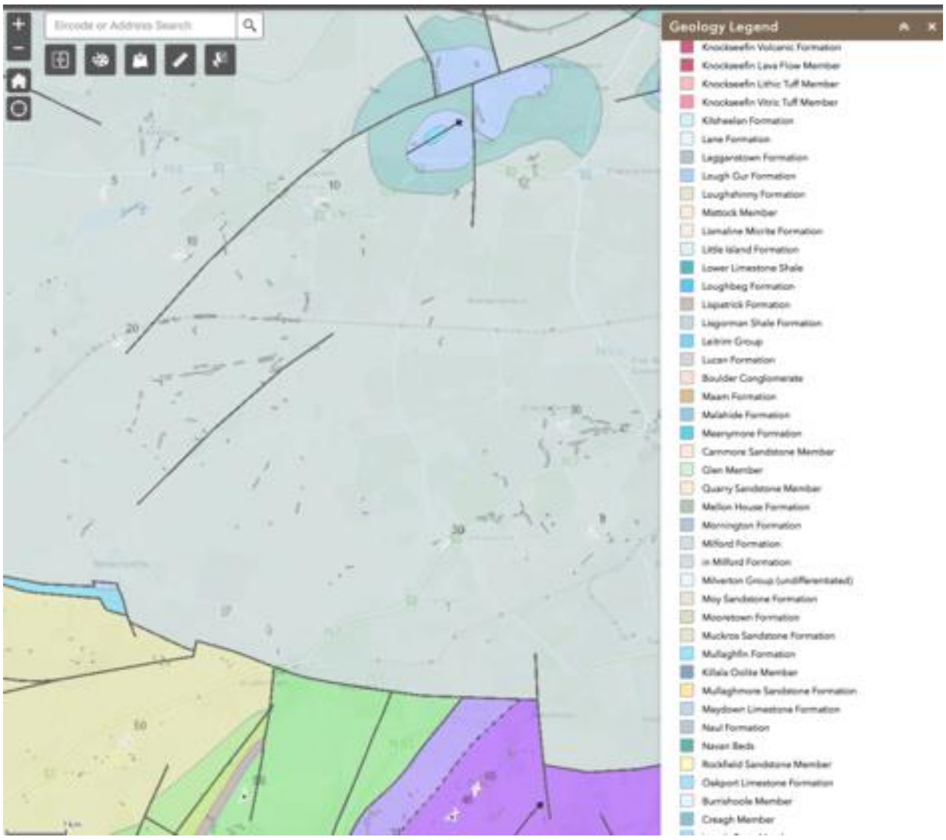


Figure 6.5 - GSI Bedrock Geological Mapping

6.8.6 Ground Conditions identified during intrusive investigation

The results of the previous ground investigations of the Application Site and Wider Site by Delta-Simons are presented in ***Appendix 6.2*** to **6.3**; the main findings of which are summarised below.

The ground investigations have identified topsoil up to 0.25m thick localised to the southeast of the site.

Hardstanding up to 0.95m thick was encountered in the north centre and western areas of the site comprising hardcore with rebar, red brick and geotextile membrane. Underlying the hardstanding is Made Ground comprising sandy gravelly silty clay with cobbles and some anthropogenic material including timber, wire, tarmac, metal, plastic and concrete fragments. Made Ground was encountered to 1.60m bgl (1.45m thick) across the site with a sporadic distribution.

Reworked Made Ground was encountered as a sandy gravelly silty clay in the north east of the site to 3.00m bgl (1.55m thick). Alluvium interspersed with granular deposits and domestic waste (e.g. glass bottles and ceramics).

Superficial deposits were encountered across the whole site underlying all Made Ground and topsoil deposits. Superficial deposits were of glacial till comprising soft to firm becoming still sandy gravelly silty clay with occasional cobbles. The glacial till was encountered to 4.35m bgl (3.90m thick).

Bedrock geology of the Lucan Formation was encountered underlying the glacial till across the whole site comprising weathered limestone, described as grey fine to coarse angular gravel in a sandy clay matrix.

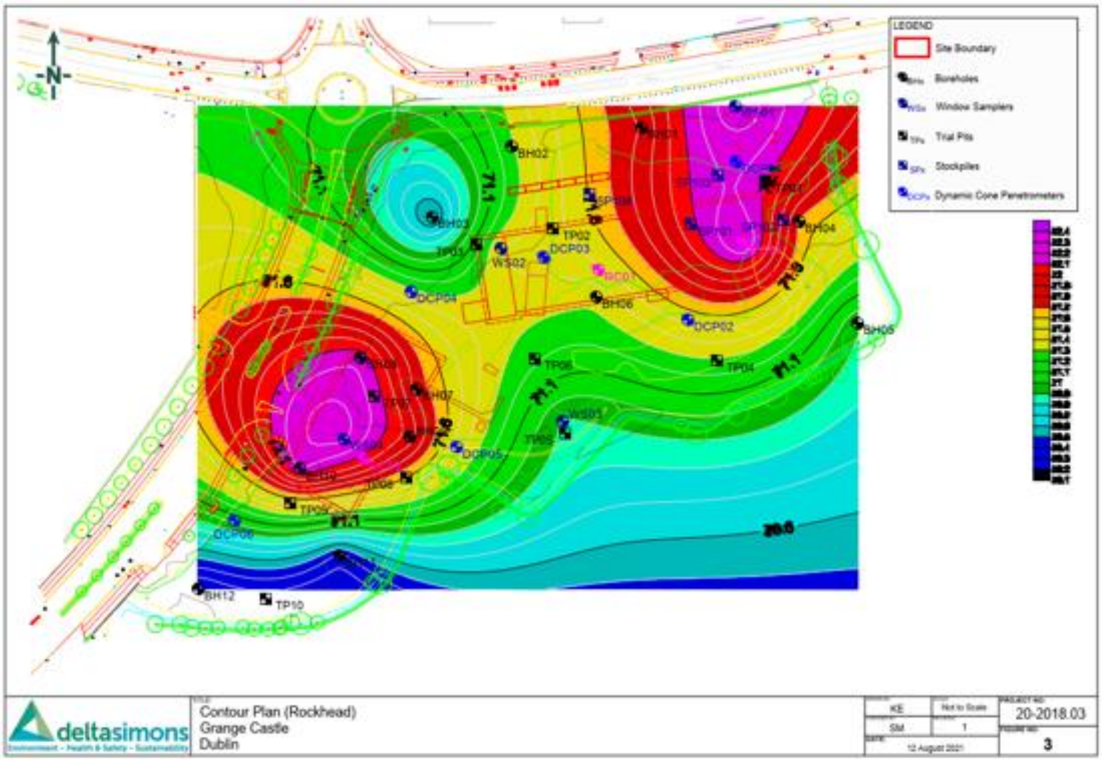


Figure 6.6 – Depth to bedrock contour plot

Stockpiled materials were noted to be heterogenous, comprising soft friable black sandy gravelly silty clay with cobbles, black clayey sandy gravel, grey sandy gravel, or stockpiled natural glacial till deposits based on the four stockpile excavations undertaken.

No visual or olfactory evidence of potential gross contamination was observed in soils during the investigation.

6.8.7 Hydrogeology

The GSI system for classifying aquifers in Ireland is based upon parameters including the area extend of the aquifer (km^2), well yield ($m/^3/d$), specific capacity ($m^3/d/m$) and groundwater transmissivity (mm^3/d).

There are three main classifications of aquifer in Ireland, regionally important, locally important and poor aquifers.

From GSI mapping data, the bedrock underlying the Site is classified as a locally important aquifer which is moderately productive only in local zones. It is part of the Dublin WFD groundwater body. It is not within a drinking water protection area and there are no proximate abstractions recorded.

Previous ground investigations undertaken by Delta-Simons in 2021 encountered groundwater across the site during drilling works, at depths of between approximately 0.5m bgl and 2.9m bgl beneath the Application Site. Groundwater levels were monitored during three weekly return visits, with resting groundwater levels between approximately 0.37m bgl and 2.46 bgl.

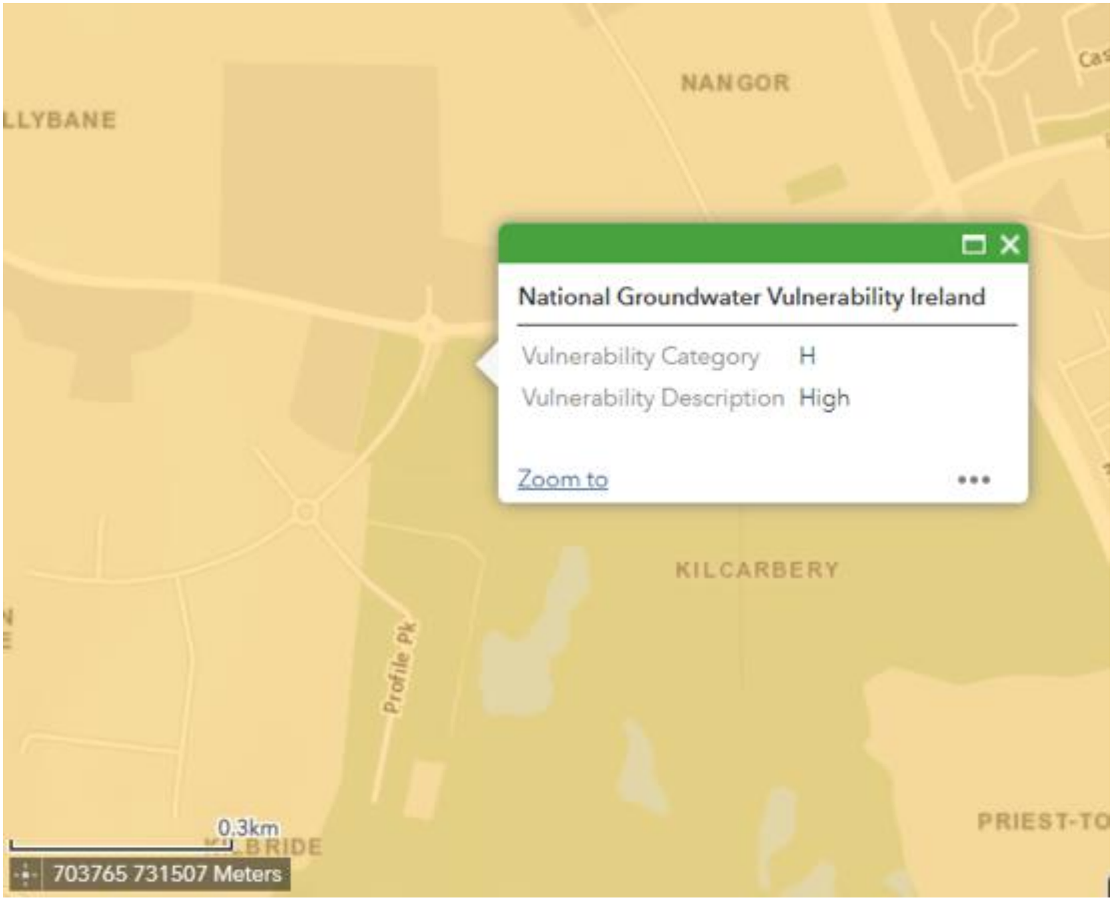
It is not clear how consistent groundwater levels are across the Site and with depth, due to the presence of shallow bedrock, which may or may not be permeable enough to be in continuity. The presence of shallow bedrock may locally influence groundwater flow direction, where the mudstone is effectively impermeable. Available evidence does suggest that the superficial glacial till does carry a laterally consistent groundwater body.

No visual or olfactory evidence of potential gross contamination was observed in groundwater during the investigation.

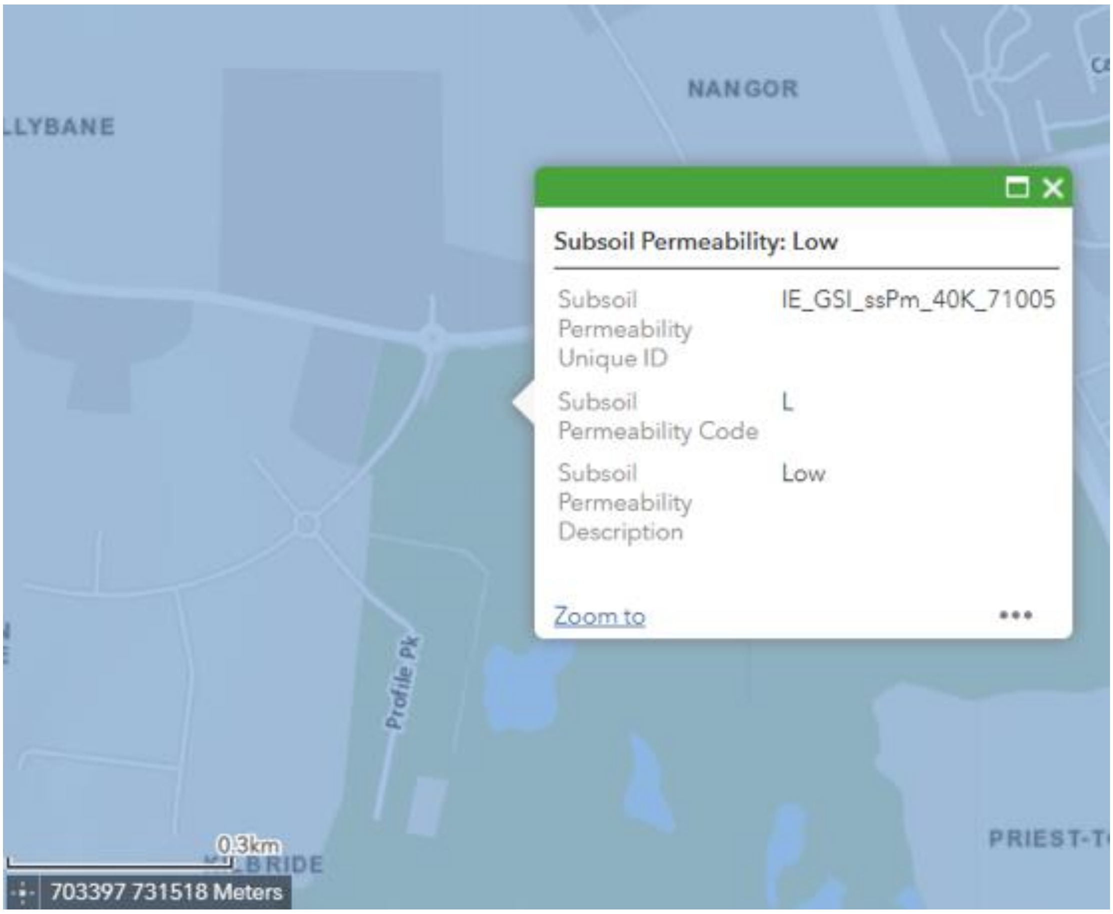
6.8.8 Aquifer Vulnerability

Aquifer vulnerability relates to the hydrogeological conditions which affect the potential migration of contaminants from human activities to enter an aquifer. Groundwater flow in Ireland is principally through bedrock fissures. Therefore, the principal protection of bedrock aquifers is from the overlying subsoil. The Application Site is overlain by glacial till which includes a low permeability clay content which will act as a protective barrier, breaking the pollutant linkage to reduce, slow or prevent contamination from entering the underlying locally important aquifer.

GSI classifies the aquifer underlying the Application Site to be of high vulnerability (H) but low subsoil permeability (L) as illustrated within **Figures 6.7** and **6.8** respectively.



- *Figure 6.7 – Aquifer Vulnerability*



- *Figure 6.8 – Subsoil Permeability*

6.8.9 Hydrology

The main watercourses in the vicinity of the Site are:

- The Baldonnel Stream, abutting the south-west corner of the Site and fed by a tributary stream running alongside the southern Site boundary, and flowing north-west to join the Griffeen River, around 1 km from the Site. The Baldonnel Stream water framework directive status (2013-18) is recorded as good;
- The Griffeen River, 1 km north-west of the Site, flowing north to join the River Liffey at Lucan, c. 4 km north of the Site; and
- The River Liffey, c.4 km north of the Site, flowing east to Dublin Bay.

In addition, The Grand Canal is located approximately 1.4 km to the north of the Site flowing east. This is not in hydraulic continuity with the groundwater and waterways in the area; the Griffeen River intersects the canal to the north-west of the Site on its path to the River Liffey.

Based on the Office of Public Works flood mapping information reviewed, the Site is not located within an area considered to be at significantly elevated risk of fluvial flooding. The fluvial flood risk is considered to be very low (more than 1 in 1000 year flood return period (<0.1 % annual probability)).

6.8.10 Economic Geology

From information available through the Northern Mine Research Society, the Site is not located in an area of known coal mining.

6.8.11 Radon

The Site lies within an area where between 5 % and 10 % of homes are above the EPA Reference Level for homes of 200 bequerel per cubic metre (Bq/m^3) for radon. The EPA website indicates that radon protective measures may be necessary in the construction of new buildings at the Site.

6.9 Land Contamination

6.9.1 Potential Sources of Contamination

6.9.1.1 On-site

Up to May 2009, the site appears to have been undeveloped, vacant grass land. From May 2009, the site has been used as a construction yard with materials and stockpiled materials stored on-site. Construction materials stockpiled may contain contaminants of concern, particularly asbestos (should stockpiled originate from demolition activities).

6.9.1.2 Off-site

From 2000 a petrol filling station appeared to the north of the site, across the R134 road. From 2005, a commercial development was complete including warehouses and depots. Potential storage of fuels and materials at these commercial units could represent a potential off-Site source of contamination.

6.9.2 Findings of Delta-Simons Ground Investigation

The previous assessment (intrusive investigation and follow-on monitoring) undertaken at the Proposed Development Site in 2021 by Delta-Simons (presented in ***Appendices 6.2*** and ***6.3***) did not encounter visual and/or olfactory evidence of contamination.

A total of 30 soil and 16 groundwater samples from across the site were submitted for chemical analysis to determine the presence and concentrations of contaminants of concern. Plans showing the locations of the exploratory holes, sampling locations and laboratory results are included within the two Delta-Simons Site Condition Reports ***(Appendices 6.2*** and ***6.3)***.

Laboratory testing on soils samples included asbestos, metals, polycyclic aromatic hydrocarbons (PAH), free cyanide, petroleum hydrocarbons, volatile organic compounds and semi volatile organic compounds.

Laboratory testing on groundwater samples included metals, polycyclic aromatic hydrocarbons (PAH), free cyanide, petroleum hydrocarbons, volatile organic compounds and semi volatile organic compounds.

6.9.2.1 Risks to Human Health

The assessment of risks in relation to human health has been undertaken using Generic Assessment Criteria (GAC) as detailed within the appropriate tables. Risks from soil, groundwater, and Non-Aqueous Phase Liquids (NAPL) have been considered. The GAC are predominantly based on long term (chronic) risk to health. However, in the limited circumstances where short-term (acute) risks are more pronounced, these GAC have been utilised to ensure a thorough and conservative initial assessment is undertaken.

The end use scenario adopted for the assessment is a commercial/industrial end use, considered appropriate based on the proposed development for a data centre.

Risks from Soil Sources

The results of the soil chemical analysis indicated None of the contaminant concentrations reported in soil exceeded the relevant Generic Assessment Criteria (GAC). Therefore, the soil contaminant concentrations are not considered likely to represent a risk to human health.

Risks from Groundwater Sources

Based on the proposed use of the Site for commercial/industrial use, the soil and groundwater chemical data has been compared against commercial/industrial end use GAC developed by the Society of Brownfield Risk Assessment (SoBRA) to assess risks from groundwater sources to indoor air and subsequent vapour inhalation indoors.

None of the site-specific contaminants of concern were recorded at concentrations in excess of their respective GAC.

Risks from Ground Gas Sources

Gas monitoring undertaken at the site by Delta-Simons in 2021 indicated elevated concentrations of carbon dioxide and methane, with negligible flow rates in the south of the site indicating a ground gas Characteristic Situation 2, localised to the south of the Site. However, across the majority of the site, concentrations of ground gases were very low-negligible, and on the basis of these results, and in the absence of any appreciable ground gas source, it is considered appropriate to apply a CS1 condition to the Site (very low risk).

Risks to Groundwater

The approach adopted to assessing risks to Controlled Waters/Water Environment is based principally on considering the concentrations of contaminants identified within the groundwater samples obtained in comparison to relevant GAC.

Given the 'prevent and limit' approach of the Water Framework Directive (2000/60/EC) and the identified receptors, a range of Water Quality Standards (WQS) have been applied as Generic Assessment Criteria (GAC), these include European Communities Environmental Objectives standards and thresholds (ECEO), or WHO Guidelines for Drinking Water Quality which have been used as initial conservative GAC to assess whether groundwater contamination requires further assessment or discussion in terms of the risks to controlled waters. Where specific water quality standards are not available, Delta-Simons has adopted surrogate values based on professional judgement.

Groundwater contaminant concentrations that exceed the applied GAC are then considered in the context of the Site's environmental setting as to whether further qualitative or quantitative assessment is required as described in subsequent sections. Laboratory results above relevant detection limits are summarised in the table below with a comparison to the GAC applied.

Widespread significant contamination has not been identified at the Site.

Localised concentrations of cadmium, copper, naphthalene and total TPH have been identified as exceeding the relevant GAC in samples collected during the first groundwater monitoring; however, it is noted that subsequent sampling of the same locations during the second sampling round found concentrations either below GAC or below lower laboratory detection limits, indicating that the initial exceedances were likely the result of ground disturbance from the drilling and installation of the monitoring wells. These initial concentrations are not considered to represent a potential risk to controlled waters.

Distributed but widespread concentrations of total chromium have been detected exceeding the conservative screening GAC for chromium VI across the two sampling rounds. Concentrations in four of the five exceeding wells were noted to be broadly consistent between the two sets of samples. In the absence of an on-Site or off-Site potential source of chromium in the area, it is considered probable that the detected chromium concentrations are from a natural source. These concentrations, although elevated above the GAC, are not considered to represent a potential significant risk to controlled waters.

6.9.3 Revised Conceptual Site Model

The soil and groundwater conditions are summarised in a conceptual model produced by Delta-Simons, which defines the key sources, pathways and receptors that have been identified as being relevant to the Wider Site and Application Site in order to determine PPL. The key potential sources, pathways and receptors are listed below.

6.9.3.1 Potential Sources

The potential sources of contamination identified by previous investigation are summarised below:

Localised temporarily elevated concentrations of metals, naphthalene and total TPH identified. Potential elevated background levels of chromium present sporadically distributed;

- Localised slightly elevated methane or GSV (from carbon dioxide and elevated flow rate);
- No elevated volatiles in soils or groundwater; and
- Potentially unidentified 'hotspots' of contamination which may be present in between sampling points which have not been directly investigated.

6.9.3.2 Potential Pathways

Exposure pathways are the potential routes and mechanisms by which contamination sources could be linked to the identified potential receptors and thereby expose them to potential harm. The following potential exposure pathways have been identified:

- direct contact with contaminated soils and/or groundwater;
- inhalation (i.e. of dust and vapours);
- ingestion of contaminated soils and/or groundwater;
- permeation of hydrocarbons through plastic pipe work;
- vertical and lateral migration of contaminants within the soil and groundwater; and
- vertical / horizontal migration of ground gases.

6.9.3.3 Potential Receptors

Based on the environmental setting, the following potential receptors have been identified:

- ground workers and construction workers;
- future Site users;
- adjacent Site users and residents;
- controlled waters – The underlying aquifer and the Baldonnel Stream watercourse

Although the bedrock aquifer underlying the Site is classified as locally important, the presence of low permeability glacial till is considered to limit the migration of contamination; and

- buildings, utilities, and services.

Conceptual models for the site are presented in the respective Delta-Simons Site Condition Reports, presented as ***Appendices 6.2*** and ***6.3.***

6.9.4 Future Baseline

Based on the available information, including the previous ground investigations at the Site, it is considered that there will be no significant changes between the existing baseline and the future baseline, taking into account climate change, assuming that no other development is undertaken and that the ground remains predominantly undisturbed during this time. There would be no change in the sensitivity of the identified receptors as a consequence of future climate change.

6.9.5 Summary of Receptors and Sensitivity

Based on the baseline conditions described above, **Table 6.7** sets out a summary of the identified receptors and their sensitivity. This takes into account the location of the receptor and its relationship with the Proposed Development Site.

Table 6.7 : Summary of Receptor Sensitivity

Receptor	Sensitivity (Value)
Ground workers and construction workers	High
Future Site users	High
Adjacent land users	High
Controlled waters – groundwater (locally important)	Medium
Controlled waters – surface waters (Baldonnel Stream)	Medium
Buildings, utilities, and services	Low

6.9.6 Environmental Design and Management

6.9.6.1 Enabling Works and Construction Phase Effects of Proposed Development and Overall Project

Many of the enabling works and construction effects arising from the Proposed Development and Overall Project can be effectively managed by the application of good enabling works and construction techniques and practices implemented through a phase-specific Construction Environmental Management Plan (CEMP). The CEMP will include, but are not limited to, the following:

- the use of appropriate measures to prevent spillage of potentially polluting substances, including:
- appropriate storage and handling measures for all hydrocarbon fuels and lubricating oils, including the use of bunded storage areas, double-skinned storage tanks and/or impermeable surfacing;
- measures to mitigate against fugitive dust during earthworks, including the use of water bowsers to dampen down any areas of exposed soils;
- the use of drip trays for static plant and designated refuelling areas for mobile plant;
- the implementation of appropriate contingency measures, including the use of spillage kits, to prevent such spillages on the surface and groundwater regimes; and
- appropriate personnel awareness training of the potential environmental implications of all enabling works and construction work and existing sensitivities (including groundwater and nearby watercourses).

- toolbox talks will be undertaken to raise awareness of the risks during excavations and when encountering contaminated soils and groundwater. Safe working procedures will be implemented, high standards of personal hygiene will be observed, and appropriate PPE will be provided and worn; and
- hoarding or fencing will be secured at all times against unauthorised access for public safety.

Specific remediation was not considered to be required. Due to the low ground gas risk, incorporation of gas protection measures was not required.

6.10 Assessment of Potential Effects

6.10.1 Enabling Works and Construction Phase Effects of Proposed Development and Overall Project

Risks to Construction Workers and Adjacent Land Users

During the enabling and construction works, materials and soils are anticipated to be generated during ground reprofiling, drainage and foundation excavation. It is expected that the majority of material will be removed, although where possible, ground material will be reused (subject to contaminant concentrations and geotechnical properties).

Construction and ground workers and users of adjacent land are considered to represent high sensitivity receptors to sources of contamination. Based upon the Site history, and the findings of the 2021 Delta-Simons investigation, there is a low risk from soil/groundwater contaminant sources. The potential for localised, previously unidentified sources contaminants (such as metals and organics) and potential for unforeseen contamination exposure is considered greatest for construction and ground workers, who would be exposed to contaminated dust, soils and shallow groundwater encountered during excavation works. Owing to the ground excavations required, residual contaminants within the soils and dust may become mobilised via wind entrainment, during dry and windy conditions, temporarily resulting in potential exposure to residents adjacent to the site, construction and ground workers through inhalation or ingestion of dusts.

Adoption of safe working procedures, high standards of personal hygiene and appropriate PPE is such that the works are considered to have a likely **negligible short-term temporary effect** on construction workers, which is **not significant**.

As part of the CEMP, measures to mitigate fugitive dust emissions, including the use of water bowsers to dampen down any areas of exposed soils, will be applied during earthworks to reduce the risk to construction and ground workers, residents adjacent to the site. Furthermore, with the adoption of safe working practices, observance of good personal hygiene and provision and utilisation of appropriate PPE (also implemented as part of the CEMP), the risk to construction and groundworkers, residents adjacent to, and within the proposed Development and Overall Project, is considered likely to result in a **negligible short-term temporary effect**, which is **not significant**.

Risks to Controlled Waters

Several activities associated with the enabling works, and construction works have the potential to affect the quality of groundwater and surface waters, including:

- introduction of new potentially polluting activities during construction;
- release of sediment-laden runoff to surface waters during earthworks;
- introduction of new contaminant migration pathways via excavations;
- dewatering of excavations (if required) and appropriate disposal;

- removal of hardstanding increasing potential for mobilisation of contaminants from the Made Ground;
- leaching and/or contaminated runoff from stockpiles of potentially contaminated material (stockpiled materials and/or excavation arisings); and
- earthworks movements temporarily increasing the leaching of soluble contaminants within Made Ground.

Any 'Site-won' soils used in preliminary earthworks will be verified according to appropriate risk-based remedial targets. Consequently, the risk to controlled waters from these materials is considered likely to result in a **negligible short-term temporary effect**, which is **not significant**.

The ongoing construction works also have the potential to affect the quality of groundwater and surface waters via removal of areas of hardstanding resulting in increased infiltration in the short term, and potential mobilisation of previously unidentified contaminants into the groundwater regime via soil leaching, although this would be limited to those contaminants that are sufficiently water-soluble and thus mobile. However, the successful implementation of a CEMP would mitigate potential risks to groundwater and/or surface watercourses from contaminated runoff. Such effects are therefore considered to be **negligible short-term temporary** in nature, which are **not significant**.

The implementation of an agreed remediation strategy, where required, for previously unidentified contamination, will include the treatment or excavation/disposal, of any significant contamination (if encountered during excavations and addressed by hot-spot protocol) within the soils and, as such, there will be overall betterment with regard to potential risks to controlled waters. The overall betterment of potential controlled water risks is considered to represent a **permanent minor beneficial effect**, which is **not significant**.

6.10.2 Operational Phase Effects of Proposed Development and Overall Project

Risks to Site Users and Adjacent Land Users

Based upon the findings of the 2021 Delta-Simons investigation, the contaminant concentrations within Site soils tested are below stringent assessment criteria protective of human health receptors. The quality of groundwater below the Site is such that it is considered unlikely to pose a potential vapour risk to Site users, which is consistent with the history of the Site and its surroundings and the results of the soil analytical data.

Therefore, the risk from soil and groundwater contamination during the operational phase of the Proposed Development and Overall Project is considered to be a **negligible long-term permanent effect** on both Site users and adjacent land users, which is classed as **not significant**.

Risks to Controlled Waters

The Proposed Development and Overall Project may introduce potential sources of contamination, such as the storage of fuels, oils and chemicals, or spillages from vehicles, and there is therefore potential for groundwater and surface water to become contaminated should uncontrolled spillages and leaks from these sources occur. However, given the nature of the Proposed Development and Overall Project, the sources of these contaminants are considered to be in limited use at the Site; potential risks will be managed by the implementation of embedded mitigation measures such as use of storage facilities with secondary containment (bunded or double-skinned tanks) and incorporation of well-maintained petrol/oil interceptors into the surface water drainage system.

The likely effects on groundwater and surface watercourses are therefore considered to be **minor adverse long-term permanent** in nature, and **not significant**.

Risks to Buildings, Utilities and Services

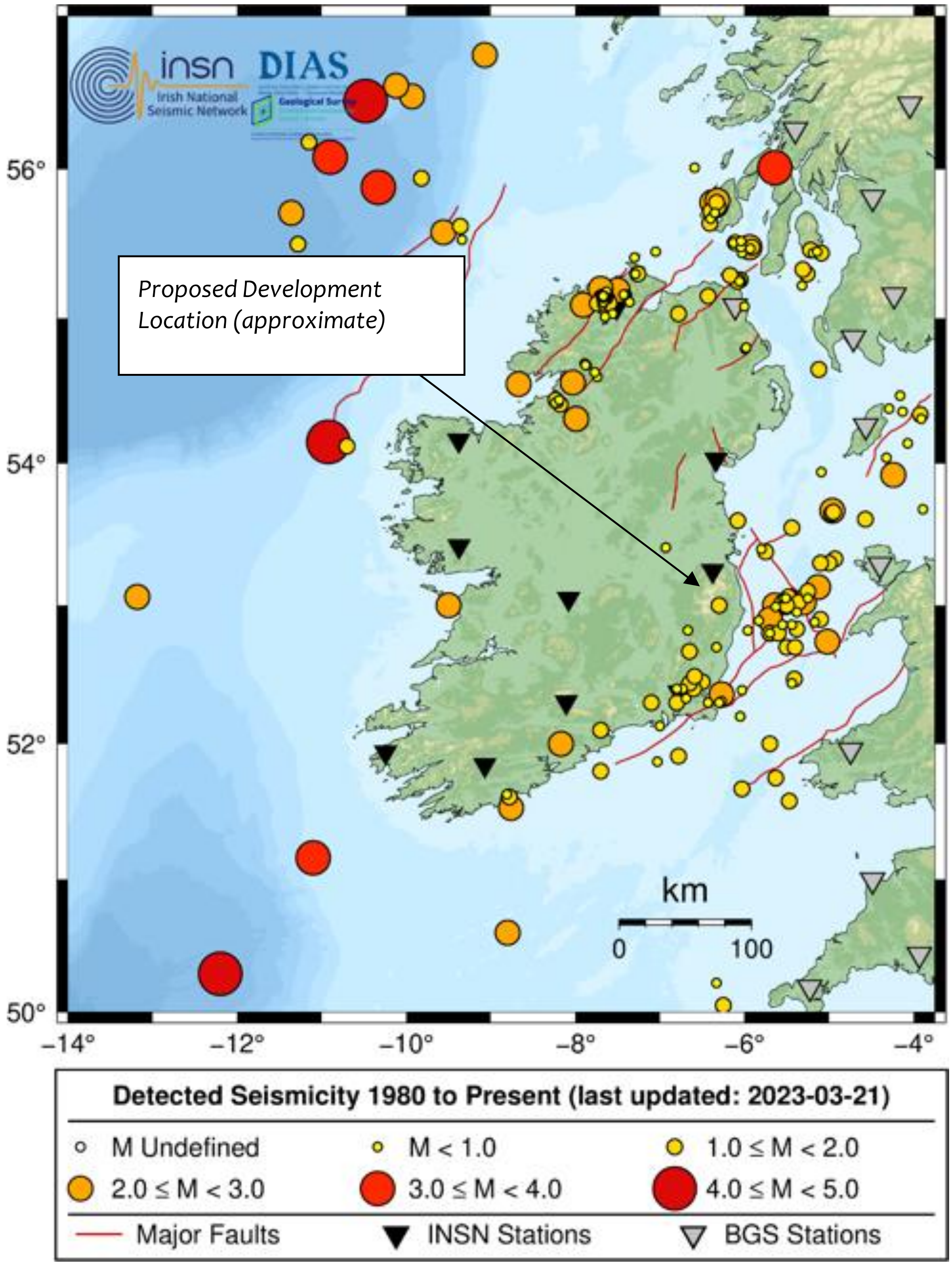
There is the potential for buried structures and services to be affected by the contaminated soil which has not previously been identified at the Site. Buried concrete structures may be susceptible to chemical attack from contaminants such as sulphates. Hydrocarbons, especially aromatics and chlorinated solvents, are known to permeate and corrode plastic water supply pipes.

However, it is anticipated that a range of standard measures typically adopted during the re-development of brownfield sites will be adopted. These include, though are not limited to, the removal of any previously un-identified contaminated soils which are encountered during excavations and addressed by hot-spot protocol. An appropriate specification should be produced for buried concrete and/or potable water supply pipes to mitigate against aggressive ground conditions. The Delta-Simons assessments in **Appendices 6.2** and **6.3** assessed the soils and groundwater at the site for aggressivity against concrete which indicated a Design Sulphate Class DS-2 and ACEC Class AC-2 would likely be appropriate depending on application. The use of 'clean' service corridors is also recommended. Based upon these measures, the effects to buildings, utilities, and services during enabling works and construction works are considered to be **negligible permanent** and **not significant**.

Risk of Major Accidents

Seismic Activity

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics, Dublin Institute for Advanced Studies, has been recording seismic events in Ireland since 1978, and Figure 6.9(www.dias.ie) illustrates historical and recorded seismic events since 1980.



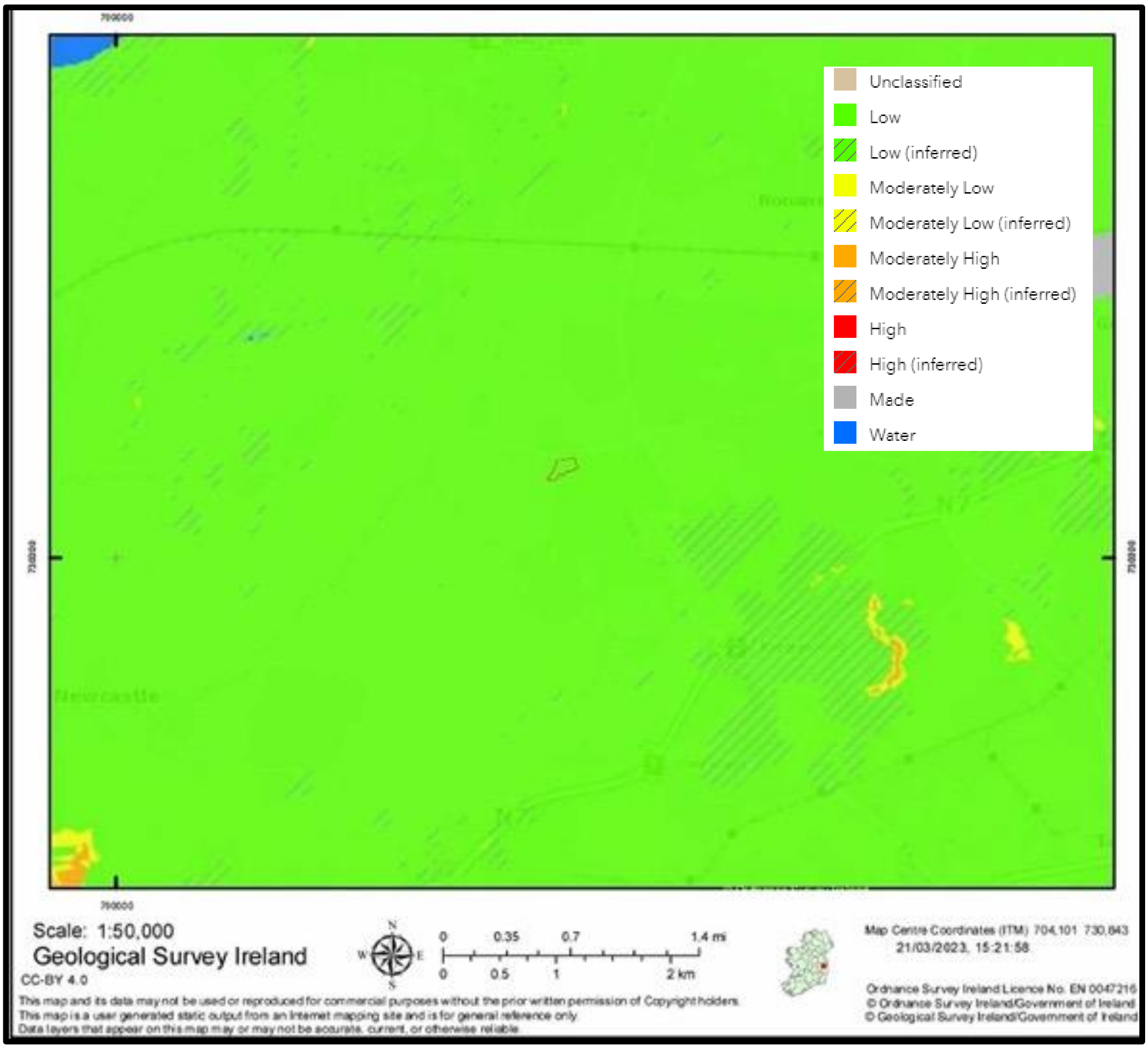
- ***Figure 6.9 Seismic Activity Map***

It can be seen in Figure that there is no significant seismic activity recorded in the vicinity of the proposed development. Therefore, the likelihood of seismic activity initiating a major accident at the proposed development are negligible; therefore, **not significant.**

Landslides

Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating the slope failure. Instability is often significantly increased by man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) and debris flows are a result.

In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff landslides and falls lead to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities.



- *Figure 6.10 Landslide Susceptibility Map (Site boundary in Red)*

It can be seen in Figure 6.10 that the area surrounding the proposed development has a low susceptibility of landslides. Therefore, the likelihood of a landslide initiating a major accident at the proposed development is negligible; therefore, **not significant.**

6.11 Mitigation, Monitoring and Residual Effects

6.11.1 Enabling Works and Construction Phase of Proposed Development and Overall Project

There are not considered to be any significant long term adverse effects likely to arise from the enabling works and construction phases, as summarised in **Table 6.7**, and therefore no additional mitigation or monitoring is considered to be required. The likely residual effects of the ground conditions and contamination not previously encountered are set out in **Table 6.7**.

6.11.2 Operational Phase of Proposed Development and Overall Project

There are not considered to be any effects likely to arise once the Proposed Development and Overall Project is complete and occupied, as summarised in **Table 6.7**, and therefore no additional mitigation or monitoring is considered to be required. The likely residual effects of the ground conditions and contamination not previously encountered are set out in **Table 6.7**.

Table 6.7 : Summary of Likely Residual Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact	Additional Mitigation and Monitoring	Residual Effect of the Permitted Development	Residual Effect of the Proposed Development	Residual Effect of the Overall Project
	During Enabling Works and Construction Phase							
Risks to Human Health	Enabling Works and Construction Workers (High)	Local	Short-Term Temporary	Very low	N/A on the basis a CEMP including hot spot protocol will be implemented	Negligible – not significant	Negligible – not significant	Negligible – not significant
	Adjacent Site Users (High)	Local	Short-Term Temporary	Very low	N/A on the basis a CEMP including hot spot protocol will be implemented	Negligible – not significant	Negligible – not significant	Negligible – not significant
Risks to Controlled Waters	Groundwater (Locally Important) (High)	Local	Short-Term Temporary	Very low	N/A on the basis a CEMP including hot spot protocol will be implemented	Negligible – not significant	Negligible – not significant	Negligible – not significant
Risks to Controlled Waters	Baldonnel Stream (Medium)	Local	Short-Term Temporary	Very low	N/A on the basis a CEMP including hot spot protocol will be implemented	Negligible – not significant	Negligible – not significant	Negligible – not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact	Additional Mitigation and Monitoring	Residual Effect of the Permitted Development	Residual Effect of the Proposed Development	Residual Effect of the Overall Project
Risks to Controlled Waters	Controlled Waters (Medium – Low)	Local	Permanent	Low	N/A on the basis that remediation, if required, will be implemented	Minor beneficial – not significant	Minor beneficial – not significant	Minor beneficial – not significant
	During Operational Phase							
Risks to Human Health	Future Site Users / Adjacent Site Users (High)	Local	Permanent	Low	N/A	Negligible – not significant	Negligible – not significant	Negligible – not significant
Risks to Controlled Waters	Groundwater (Locally Important) (High)	Local	Permanent	Low	N/A on the basis of embedded mitigation	Minor adverse – not significant	Minor adverse – not significant	Minor adverse – not significant
Risks to Controlled Waters	Baldonnel Stream (Medium)	Local	Permanent	Low	N/A on the basis of embedded mitigation	Minor adverse – not significant	Minor adverse – not significant	Minor adverse – not significant
Risks to Buildings, Utilities and Services	Buildings, Utilities and Services (Medium)	Local	Permanent	Very Low	N/A on the basis of appropriately designed and specified construction materials	Negligible – not significant	Negligible – not significant	Negligible – not significant

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact	Additional Mitigation and Monitoring	Residual Effect of the Permitted Development	Residual Effect of the Proposed Development	Residual Effect of the Overall Project

6.12 Decommissioning

6.12.1 Medium Term Option 1

Medium Term option: Decommission the OSPG plant – In the next 6-8 years the grid will be upgraded by ESBN and they may decide that there is sufficient capacity in the network to serve and support this development and an OSPG plant is no longer required.

In the Medium Term scenario where the OSPG plant is decommissioned within the next 6-8 years, this would result in **no adverse effect** which is **not significant**.

The OSPG represents a potential source of contamination by spillages during refuelling. Decommissioning the OSPG would remove the potential source of contamination. Regular maintenance and minor upgrade works will maintain the functional operation of the development over the medium to long term. Potential risks posed by spillages during decommissioning will be managed by the implementation of embedded mitigation measures such as use of storage facilities with secondary containment (bunded or double-skinned tanks) and incorporation of well-maintained petrol/oil interceptors into the surface water drainage system.

Potential risks associated with the decommissioning works can be effectively managed by the application of good enabling works and implementation of a decommissioning management plan which will include, but not limited to, the following:

- the use of appropriate measures to prevent spillage of potentially polluting substances, including:
- appropriate storage and handling measures for all hydrocarbon fuels and lubricating oils, including the use of bunded storage areas, double-skinned storage tanks and/or impermeable surfacing;
- measures to mitigate against fugitive dust during earthworks, including the use of water bowsers to dampen down any areas of exposed soils;
- the use of drip trays for static plant and designated refuelling areas for mobile plant;
- the implementation of appropriate contingency measures, including the use of spillage kits, to prevent such spillages on the surface and groundwater regimes;
- appropriate personnel awareness training of the potential environmental implications of all enabling works and construction work and existing sensitivities (including groundwater and nearby watercourses);
- toolbox talks will be undertaken to raise awareness of the risks during excavations and when encountering contaminated soils and groundwater. Safe working procedures will be implemented, high standards of personal hygiene will be observed, and appropriate PPE will be provided and worn;
- hoarding or fencing will be secured at all times against unauthorised access for public safety; and,
- Implementation of a contamination hotspot protocol, including the sample of contamination and subsequent assessment by an environmental consultant to determine the level of risk and remediation requirements, if necessary.

6.12.2 Medium Term Option 2

Medium Term option: Retain the OSPG with a grid connection after 6-8 years of full operation – ESBN could request that the plant is retained on a permanent basis and operate on the terms and requirements of the CRU in order to support the security of the new de-carbonised national grid. In this case, the Client would have a "flex" agreement with ESBN and would be required to operate the OSPG on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels. As the OSPG hours of operation is currently unknown for this option. The hours of operation have been estimated based on an existing/similar OSPG development that is currently in a flex agreement which operates for 500 hours of the year.

In the Medium Term scenario where the OSPG plant is retained after 6-8 years of full operation with a 'flex' agreement, this would result in **no adverse effect** which is **not significant**.

The OSPG represents a potential source of contamination by spillages during refuelling. Decommissioning the OSPG would remove the potential source of contamination. Regular maintenance and minor upgrade works will maintain the functional operation of the development over the medium to long term. Potential risks posed by spillages during decommissioning will be managed by the implementation of embedded mitigation measures such as use of storage facilities with secondary containment (bunded or double-skinned tanks) and incorporation of well-maintained petrol/oil interceptors into the surface water drainage system.

Potential risks associated with the decommissioning works can be effectively managed by the application of good enabling works and implementation of a decommissioning management plan which will include, but not limited to, the following:

- the use of appropriate measures to prevent spillage of potentially polluting substances, including:
- appropriate storage and handling measures for all hydrocarbon fuels and lubricating oils, including the use of bunded storage areas, double-skinned storage tanks and/or impermeable surfacing;
- measures to mitigate against fugitive dust during earthworks, including the use of water bowsers to dampen down any areas of exposed soils;
- the use of drip trays for static plant and designated refuelling areas for mobile plant;
- the implementation of appropriate contingency measures, including the use of spillage kits, to prevent such spillages on the surface and groundwater regimes;
- appropriate personnel awareness training of the potential environmental implications of all enabling works and construction work and existing sensitivities (including groundwater and nearby watercourses);
- toolbox talks will be undertaken to raise awareness of the risks during excavations and when encountering contaminated soils and groundwater. Safe working procedures will be implemented, high standards of personal hygiene will be observed, and appropriate PPE will be provided and worn;
- hoarding or fencing will be secured at all times against unauthorised access for public safety; and,
- Implementation of a contamination hotspot protocol, including the sample of contamination and subsequent assessment by an environmental consultant to determine the level of risk and remediation requirements, if necessary.

6.12.3 Long Term Option

Long Term option: Retain the OSPG with no grid connection - If the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre the proposed OSPG would remain operational for the long term (+15 years). This scenario has been assessed in the Climate Chapter of this EIAR.

In the Long Term scenario where the OSPG plant is retained, remaining operational for +15 years, this would result in **no adverse effect** which is **not significant**.

The OSPG represents a potential source of contamination by spillages during refuelling. Decommissioning the OSPG would remove the potential source of contamination. Regular maintenance and minor upgrade works will maintain the functional operation of the development over the medium to long term. Potential risks posed by spillages during decommissioning will be managed by the implementation of embedded mitigation measures such as use of storage facilities with secondary containment (bunded or double-skinned tanks) and incorporation of well-maintained petrol/oil interceptors into the surface water drainage system.

Potential risks associated with the decommissioning works can be effectively managed by the application of good enabling works and implementation of a decommissioning management plan which will include, but not limited to, the following:

- the use of appropriate measures to prevent spillage of potentially polluting substances, including:
- appropriate storage and handling measures for all hydrocarbon fuels and lubricating oils, including the use of bunded storage areas, double-skinned storage tanks and/or impermeable surfacing;
- measures to mitigate against fugitive dust during earthworks, including the use of water bowsers to dampen down any areas of exposed soils;
- the use of drip trays for static plant and designated refuelling areas for mobile plant;
- the implementation of appropriate contingency measures, including the use of spillage kits, to prevent such spillages on the surface and groundwater regimes;
- appropriate personnel awareness training of the potential environmental implications of all enabling works and construction work and existing sensitivities (including groundwater and nearby watercourses);
- toolbox talks will be undertaken to raise awareness of the risks during excavations and when encountering contaminated soils and groundwater. Safe working procedures will be implemented, high standards of personal hygiene will be observed, and appropriate PPE will be provided and worn;
- hoarding or fencing will be secured at all times against unauthorised access for public safety; and,
- Implementation of a contamination hotspot protocol, including the sample of contamination and subsequent assessment by an environmental consultant to determine the level of risk and remediation requirements, if necessary.

6.13 Cumulative Effects

6.13.1 Enabling Works and Construction Effects from Proposed Development and Overall Project

As discussed above, enabling works and construction of the Permitted Development is considered likely to have an overall permanent minor beneficial effect on controlled waters (the underlying locally important A Aquifer and Baldonnel Stream). It is possible that construction of cumulative schemes, including the existing surrounding commercial and industrial land uses (including petrol filling station to the north of the site) and future commercial and industrial land uses within the immediate surrounds of the site would result in the potential for contamination of controlled waters, resulting in a cumulative **minor adverse effect**, which is **not significant. T**he mitigation measures (CEMP, spill kits, interceptor construction) which will be implemented which will reduce the likelihood of a complete source – pathway – receptor pollutant linkage. Any contamination which enters the subsoil will be largely immobile due to the low subsoil permeability, reducing the migration potential to controlled waters (hydrology and hydrogeology).

Potential cumulative effects to adjacent land users during demolition and construction have been discounted on the basis that contamination has not been identified at the Site based upon the findings of the 20231 ground investigation and a range of mitigation measures (including the minimisation of areas of bare ground as far as reasonably practicable and the use of dust suppression measures) will be implemented during enabling works that will address previously unidentified/unencountered sources of contamination.

6.13.2 Operational Phase Effects from Proposed Development and Overall Project

In relation to the potential cumulative impacts from the operational stages of the Proposed Development and Overall Project, the following could result in a cumulative:

- Overall increase in hardstanding: Cumulatively these developments will result in a localised reduced surface infiltration to ground, reducing the potential for contaminant mobilisation (in the event of previously unidentified contaminant sources on the Site).
- Accidental releases from fuel storage/unloading could contaminate groundwater or soil environments by entering damaged drains. To prevent contaminants entering soil or water courses, harmful substances should be stored within double skin tanks or located within a bund or on a sump pallet with 110% capacity of the stored volume. Adequate provision of spill kits and their use will be provided to all workers at the Proposed Development. Incorporation of petrol/oil interceptors into the surface water drainage system will mitigate impact to surface watercourses receiving run-off from hard surfacing.

The volumes and nature of substances at the Permitted Development are anticipated to be small and low to medium magnitude. With appropriate measures, the Cumulative Impact from the Permitted Development is considered **minor adverse effect**, which is **not significant**.

6.13.3 Summary of Cumulative Effects

The operation of the Proposed Development and Overall Project is concluded to have a long-term, imperceptible significance with a neutral impact on soil and water quality. No land contamination which represents an unacceptable potential risk to human health and controlled waters receptors has been identified at the site. The absence of contamination on-site indicates that no contamination from off-site sources is currently migrating on-site which could create a detrimental cumulative effect.

Future developments will be assessed for land contamination by routine intrusive investigation and assessments with mitigation measures applied where unacceptable risks are present.

6.14 Climate Change

Not applicable to the subject of this chapter.

References

The following data sources were reviewed as part of this assessment:

Website http://map.geohive.ie/mapviewer.html (Viewing Historical Maps; Bedrock Aquifer classifications; Groundwater Vulnerability; and Limited Mining);

Website https://store.osi.ie/index.php/historic-map.html (Purchasing historical maps);

Website https://gis.epa.ie/EPAMaps/ (Superficial Deposits Aquifer Classification; Groundwater Vulnerability; Coal Mining; Regulatory Information; Ecological Sensitive Receptors; and Radon Maps);

Website http://www.epa.ie/radiation/radonmap/ (Radon Maps);

Website http://www.floodinfo.ie/ (Flood plans and maps);

Website https://heritagemaps.ie/WebApps/HeritageMaps/index.html (Heritage areas);

Website http://spatial.dcenr.gov.ie/ExplorationAndMining/SpatialViewer/index.html (Coal Mining);

Website http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple (Groundwater vulnerability (SPZ's & aquifer designations); Borehole information/Geotechnical Sites).

7 Water

The water chapter has been prepared by Shaun O'Reilly, Senior Associate With Pinnacle Consulting Engineers, qualified as a Pr Tech Civ Eng., with 40yrs experience in civil infrastructural projects, mainly in residential, commercial, retail, industrial and data centre sectors, both in Ireland and abroad.

Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Proposed Scheme), on the surface water environment during the Construction and Operational Phases.

The following attributes of each surface water body (receptor) are considered: hydrology, hydromorphology and water quality.

Hydrogeology is dealt with specifically in Chapter 6 Land, Soils, Geology and Hydrogeology.

During the Construction Phase, the potential surface water impacts associated with the development of the Proposed Scheme have been assessed, including potential impacts from construction runoff and watercourse disturbance due to utility diversions, road resurfacing and road realignments.

During the Operational Phase, the potential surface water impacts associated with changes in surface water runoff, increased hardstanding and watercourse disturbance have been assessed.

The assessment has been carried out according to best practice and guidelines relating to surface water assessment, and in the context of similar large-scale infrastructure projects.

Flooding has been assessed within a Site Specific Flood Risk Assessment (FRA) report as previously submitted.

The objectives of the Proposed Scheme are described in Chapter 1 (Introduction). The Proposed Scheme which is described in Chapter 2 (Proposed Scheme Description) has been designed to meet these objectives.

The design of the Proposed Scheme has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Scheme are attained.

7.1 Development Inputs

7.1.1 Water Supply

<u>Existing Water Main Network</u>

South Dublin County Council record drawings have identified an existing 6" (160mm) Ø main located along the western boundary of the property, within Falcon Avenue adjacent to the subject site. 2No. 160mm Ø capped connections with sluice valves, have been left off the aforementioned water main, in order to facilitate development of these lands.

The aforementioned record drawings formed part of the Confirmation of Feasibility (refer Appendix 7.2), which was issued by Irish Water in January '21. They were viewed by Shaun O'Reilly and this information was used as part of the preparation of the Engineering Planning Report, which was lodged as part of the planning submission, in circa June '21.

There is also an existing 700mm Ø trunk water main running parallel to the New Nangor Road adjacent to the northern boundary of the subject site.

As confirmed by Irish Water, there is adequate capacity within the existing watermain network to supply the proposed development.

<u>Proposed Water Mains</u>

It is intended to serve the proposed development via connection off the 150mm Ø network, as located in Falcon Avenue.

Hydrants will be installed in accordance with the Requirements of the Building Regulations and in accordance with the recommendations contained in the Technical Guidance Documents, Section B – Fire Safety, dated 2006, and these are detailed on our engineering drawings.

Water demand for the development has been based on Irish Water's criteria = 0.113 litres/second.

Avg. Demand = 0.141 litres/second

Peak Demand = 0.705 litres/second

The above is based on Irish Water's calculation of water usage as contained within their Code of Practice. Note that this consumption is only for an estimated Population Equivalent of 60.

Water meters, sluice valves and hydrants, in line with Irish Water requirements and specifications, as contained within Irish Water's current Code of Practice, dated July 2020, will be installed at the connections onto the aforementioned existing water mains, as required.

Irish Water Connection

A Confirmation of Feasibility, Ref. CDS20007552, has been received from Irish Water in respect of this development. This refers to potable water only - any connections to Irish Water infrastructure require a connection agreement and associated fees at the appropriate time.

7.2 Development Outputs

7.2.1 Surface Water

Existing Surface Water Drainage Networks

The topographical survey was carried out by Land Survey Services in Feb '21. The survey is reflected on the drainage layout for the scheme.

as carried out has identified a dry open ditch which forms the southern boundary of the site adjacent to Grange Castle Golf Club. This ditch network runs in an westerly direction. This ditch network is then drained via a tributary into the Camac River. The status of the ditch is obviously dependent on weather conditions, although this has always been referred to as an essentially dry ditch and was covered off as such in the Flood Risk Assessment, which was submitted as part of the original planning submission.

The aforementioned open ditch network has been identified as having capacity to accommodate the proposed discharge from the subject site. This was covered off in both the Flood Risk Assessment and Engineering Planning Report (both issued as part of the original planning submission) - essentially the site is being attenuated to Green field run-off rates, i.e. there is no additional run off into the ditch than that which currently exists.

Proposed Surface Water Drainage

Storm water from the proposed development has been designed in accordance with the GDSDS and ensures that Best Management Practice has been incorporated into the design. The Greater Dublin Strategic Drainage Study (GDSDS) is a document which is referred and designed to, in all planning applications lodged in and around the greater Dublin area. The following Local Authorities have all signed up to this document:-

- Wicklow County Council

- South Dublin County Council
- Meath County Council
- Kildare County Council
- Fingal County Council
- Dun Laoghaire Rathdown County Council
- Dublin City Council

It should be noted that the subject site currently comprises a greenfield site and the proposed surface water measures are aimed at improving the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge, etc.

Storm water from the roof areas of the proposed building units, will be directed via rain water pipes into an on-site reticulation system. The outflow from this system will be connected into the surface water drainage network collecting run-off from the road areas and will be ultimately discharged into stormwater storage ponds.

Based on the contributing area for this current application, i.e. circa 22,400m^2 (2.24Ha), the total attenuation volume required has been calculated as being circa 1,204m^3. This volume has been calculated based on the accepted Greenfield Qbar run-off calculation, which was appended to the Engineering Planning Report, as submitted as part of the original planning submission.

Storm water from all car park areas and access roads / delivery areas will be drained as follows:-

- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers
- Porous asphalt

Prior to discharging into the proposed pond, the storm water from the car park and access roads, which is drained via the methods as described above, will be directed through an appropriately sized Conder Separator (or similar approved) petrol interceptor.

The storm water drainage within the entire development has been designed to accommodate a 1:2 year storm frequency. The pond, attenuation tanks and porous asphalt areas have been designed to accommodate a 1:100 year storm event + 20% climate change.

The outflow from the proposed development, will be restricted by way of a Hydrobrake facility, which will limit the total discharge to 4.4l/s, which is the calculated QBAR greenfield run-off rate.

The surface water discharge for this application will incorporate the road areas, parking, service yard area and the roof water from the proposed data halls, which then ultimately feeds into the existing network as previously mentioned.

The various surface areas of this application are detailed below:-

- Access Road – Tarmac
- Data Hall Roof Area
- Yard Slab Area – Concrete
- Open Space / Landscaping
- Porous Asphalt & Parking Areas
- Concrete Footpath
- Standard Road Tarmac
- Gravel

Foul Water

Existing Foul Drainage Networks:

South Dublin County Council record drawings have identified 3 No. 150mm / 225mm Ø spur connections, located adjacent to the western boundary of the property & Profile Park. These spur connections were left out to facilitate development of these lands. These spur connections are joined into the reticulation network for Profile Park.

The network within Profile Park connects into the Grange Castle Pumping Station. Effluent is pumped from this pumping station and it is ultimately connected into the Ringsend WWTP, together with almost the entire catchment of Dublin City. The aforementioned pumping station is under the control of SDCC and not Irish Water.

As confirmed by Irish Water / SDCC, the existing foul sewer reticulation network has adequate capacity to cater for the proposed effluent discharge from the subject site.

Proposed Foul Water Drainage

It is proposed to discharge foul water from the proposed development, via a 225mm Ø gravity foul sewer outfall, laid from a discharge manhole at the end of a 100mm Ø pumped main and discharge into the existing 225mm Ø spur connection laid across Falcon Avenue, which is connected to the existing foul sewer network laid along the western edge of Falcon Avenue.

Based on Irish Water's Code of Practice of 150ltr/hd/day, the peak wastewater flow will not be in excess of circa 0.66l/s.

The proposed site network connects into the Profile Park reticulation network as indicated on the drainage layouts pertaining to the development. The internal foul sewer network within Profile Park is privately managed and ultimately connects into the Grange Castle Pumping Station.

All on-site foul sewers have been designed to be a minimum 225mm Ø diameter pipes, with gradients designed to achieve self-cleansing velocities.

7.3 Characteristics of the Construction and Operation Phases

Construction Phase

Water pollution will be minimised by the implementation of good construction practices. Such practices will include adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association provides guidance on the control and management of water pollution from construction sites in their publication Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors – C532 CIRIA Report (Masters-Williams *et al*, 2001), which provides information on these issues.

Pollutants can commonly include suspended solids, oil, chemicals, cement, cleaning materials and paints. These can enter controlled waters in various ways:

- directly into a watercourse
- via drains or public sewers
- via otherwise dry ditches
- in old field drains
- by seepage into groundwater systems
- through excavations into underlying aquifers
- by disturbance of an already contaminated site

The proximity of the site to streams, aquifers and water abstractions; potential sources, pathways and impacts of pollution; and the historical uses of the site and nearby areas should be taken account of in order to ensure that suitable redesign and mitigation measures are undertaken as necessary.

During construction, careful management and planning will help minimise water pollution. This may include adequate bunding of all oil tanks, wheel washers and dust suppression on haul roads, particular care to be taken near watercourses, and regular plant maintenance.

A contingency plan for pollution emergencies should also be developed and regularly updated, which would identify the actions to be taken in the event of a pollution incident. This plan will be formulated with the successful contractor appointed at construction stage.

The CIRIA document (2001), recommends that a contingency plan for pollution emergencies should address the following:

- containment measures
- emergency discharge routes
- list of appropriate equipment and clean-up materials
- maintenance schedule for equipment
- details of trained staff, location, and provision for 24-hour cover
- details of staff responsibilities
- notification procedures to inform the relevant environmental protection authority
- audit and review schedule
- telephone numbers of statutory water undertakers and local water company
- list of specialist pollution clean-up companies and their telephone numbers

Operational Phase

Once operational, the geology on site will be protected from the elements. Subsoil will either have a surface road dressing, building footprint or topsoil covering. Topsoil will be grassed to prevent erosion or surfaced with permeable paving. Planting and landscape of active and passive recreational areas will protect against erosion of soil.

The proposed development will increase the area of hard standing on the existing site, through the inclusion of data halls and paved areas. Unmitigated, this will lead to an increase in the volume of rainfall runoff generated on the site and a reduction in percolation to the groundwater table. As the site is currently green field, any developed area, roofs, roads etc., are all considered as hardstanding areas when compared to the original site.

The sources of pollution that could potentially have an effect on surface or groundwater during the operational phase of the development will be oil and fuel leaks from parked cars, service vehicles, HGV delivery's etc. It is not foreseen that any other elements will be using the designated road areas and as such, no additional potential sources of pollution are envisaged.

Hydrocarbon interceptors will be provided on storm water drainage sewers from car parking areas as required.

A drainage strategy has been developed for the site, which will reduce post-development runoff rates to greenfield rates, through the incorporation of Sustainable Drainage Systems (SuDS), including permeable paving and underground attenuation tanks. Full detail of the proposed drainage strategy, including the target greenfield runoff rate and design of the surface water network and proposed attenuation systems, are contained in the scheme Infrastructure Design Report.

The impacts of the operational phase of the proposed development are further addressed as appropriate in the relevant chapters of this EIAR.

As mentioned previously, a Flood Risk Assessment was submitted as part of the original planning submission and as such, it is not anticipated that flooding of the site will occur, due to the findings of the assessment and there being no historical data of any past flooding on this site.

7.4 Water Quality Mitigation Measures

Sediment control measures will be put in place to prevent suspended solids in runoff from entering the ditch network bordering the Site and ensure works are in line with the IFI guidelines. These measures will include the following:

- Silt traps will be placed on all outflows from the Site;
- A silt fence will be erected below along the south and east boundaries;
- Existing vegetation will be retained where possible;
- The working area will be clearly defined, and construction activities will be carefully planned to minimise ground disturbance; and,
- Runoff will be diverted away from stripped areas.

Figure 7.1: Proposed Silt Fence Locations during Construction

The following best practice guidelines will be followed, which are based on Inland Fisheries Ireland [20] and National Roads Authority [21] guidance documents:

- Construction stage works will be undertaken in accordance with an approved CEMP;
- Weather conditions will be considered when planning construction activities to minimise risk of runoff from Site;
- All materials shall be stored at the main contractor compound and transported to the works zone immediately prior to construction;
- Any chemical / oils to be stored onsite will be placed within a bund on an area of hardstanding to ensure there is no seepage of pollutants into groundwater or surface water;
- All bunds will have the capacity of the largest tank volume plus 10 percent, at a minimum, with additional capacity to hold 30mm of rainfall;

- Prior to any works commencing, all construction equipment will be checked to ensure that they are mechanically sound, to avoid leaks of oil, fuel, hydraulic fluids and grease;
- Preventative maintenance and relevant maintenance logs will be kept for all onsite plant and equipment;
- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows;
- Any pouring of concrete will only be carried out in dry weather. Washout of concrete trucks will not be permitted on the Site;
- Washouts of equipment used for concrete operations will be done either offsite or within a designated washout area, which will comprise a container that will capture the washout material / water for reused or disposal offsite;
- Any spillage of cementitious materials will be cleaned-up immediately;
- Steel tanks will be protected from corrosion;
- All drainage from bund areas must be directed to secure containment prior to suitable disposal;
- Fuel will be delivered onsite by a dedicated tanker or in a delivery bowser dedicated to that purpose;
- The Appointed Contactor will put in place a specific, step-by-step refuelling procedure which will be communicated to all relevant employees onsite;
- All valves should be of steel construction and the open and close positions should be clearly marked;
- Fuels, lubricants and hydraulic fluids for equipment used in the construction Site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice;
- Vehicle or equipment maintenance work will be carried out in a designated area on the Site. In the event that refuelling is required outside this area a spill tray will be employed during the refuelling operation;
- No surface water runoff will be discharged onto public roads, foul sewers or adjacent property;
- In order to prevent potential water pollution risk when drainage lines are in place but not fully commissioned, no discharges to the surface water drainage system at the Site will be made until all drains are fully connected to the proposed and approved petrol interceptor; and,
  - Measures will be implemented to minimise waste and ensure correct handling, storage and disposal of waste.

The proposed measures to remove the risk from potential contamination and emergency procedures to be implemented in the event of an accidental release or spill of potentially contaminating substances are outlined below.

These procedures will be communicated to all relevant Site staff. At a minimum the following measures will be in place:

- Adequate spill kits including absorbent booms and other absorbent material will be maintained onsite;
- Any spillage of cementitious materials will be cleaned-up immediately;
- All contractor workers will be appropriately trained in the use of spill kits; and,

- Any sediments impacted by contamination will be excavated and stored in appropriate sealed containers for disposal offsite in accordance with all relevant waste management legislation.

7.5 LIKELY EFFEECTS OF MAJOR ACCIDENTS AND DISASTERS TO HYDROLOGY

Introduction to Major Accidents

There are potential for significant effects on human health and the environment arising from the proposed development in the context of the risks of major accidents and/or disasters. This section seeks to determine:

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

Methodology - Major Accidents

The methodology for this assessment is based on the following requirements which is set out in Schedule 6 of the Planning and Development Regulations, 2001, as amended:

> *"a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met.*
>
> *Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events".*

Site Specific Major Risk Assessment Methodology

The site-specific risk assessment identifies and quantifies risks focusing on unplanned, but plausible events occurring due to the proposed development. The approach to identifying and quantifying risks associated with the proposed development by means of a sites specific risk assessment is derived from the EPA Guidelines on information to be contained in EIAR (EPA, 2022).

The criteria for categorising impact is derived from the EPAs Guidance on Assessing and Costing Environmental Liabilities (2014). In this guidance, the risk assessment methodology commences with the establishment of risk classification criteria followed by risk analysis based on these criteria. Risk classification tables are required in order to evaluate and rank the risks compared with each other. They form the basis for rating the likelihood of an event occurring and the consequence of impact if the event occurs. The likelihood and consequence ratings are combined to form a risk score for risk evaluation.

Risk Classification - Likelihood [1]

Rating	Category	Description

[1] EPA (2014) Guidance on Assessing and Costing Environmental Liabilities

1	Very low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High chance of hazard occurring
5	Very high	Very high chance of hazard occurring

Risk Classification - Consequence[2]

Rating	Category	Description
1	Trivial	No impact of negligible change to the environment
2	Minor	Minor impact/localised or nuisance occurring
3	Moderate	Moderate impact to environment of hazard occurring
4	Major	Severe impact to environment
5	Massive	Massive impact to a large area, irreversible in medium term

The risks are then ranked according to their own risk score (1-5) in a colour coded matrix table which allows risks to be easily displayed and prioritised. The colour codes are as follows and indicated in Figure 16.1 below:

- Red – high level risks requiring priority action (overall risk scores of 15-25);
- Yellow – medium-level risks requiring action, but not as critical as red-coded risks (overall risk scores of 8-12); and
- Green (light and dark) – low-level risks requiring continuing awareness and monitoring on a regular basis (overall risk scores of 1-6).

		Consequence				
		Trivial	**Minor**	**Moderate**	**Major**	**Massive**
Likelihood	**Very High**	**Low**	**Medium**	**High**	**High**	**High**
	High	**Low**	**Medium**	**Medium**	**High**	**High**
	Medium	**Low**	**Low**	**Medium**	**Medium**	**High**
	Low	**Low**	**Low**	**Low**	**Medium**	**Medium**
	Very Low	**Low**	**Low**	**Low**	**Low**	**Low**

[2] EPA (2014) Guidance on Assessing and Costing Environmental Liabilities

7.6 ASSESSMENT OF SIGNIFICANT EFFECTS – MAJOR ACCIDENTS

Application of COMAH Regulations

The Seveso III Directive (2012/18/EU) requires Member States to apply land-use or other relevant policies to ensure that appropriate distances are maintained between residential areas, areas of substantial public use and the environment, including areas of particular natural interest and sensitivity and hazardous establishments. For existing establishments, Member States are required to implement, if necessary, additional technical measures so that the risk to persons or the environment is maintained at an acceptable level.

The HSA is the Competent Authority in Ireland as defined by Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015, (COMAH Regulations 2015) which implement the Seveso III Directive in Ireland. The HSA is responsible for ensuring that the impacts of facilities which fall within the remit of this legislation are taken into account with respect to land use planning. This is achieved through the provision of technical advice to planning authorities.

Potential Major Accidents or Disasters

Notwithstanding that the proposed development is not a COMAH site, Table 7.1 sets out the potential major accidents and disasters which have been considered in the context of the proposed development. In the scoping phase for this EIAR the potential for impacts to human health and impacts to the environment.

Table 7.1 Summary of Major Accidents

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
A	Extreme heat or cold weather	Extremities could result structural damage and/or pollution to soils, groundwater or surface waters	Demolition/ Construction/	Human health, biodiversity, soils and geology, hydrology and hydrogeology	2	The proposed development will be demolished, constructed, and operated in accordance with all relevant planning, building and environmental licencing codes.	1	The generator oil tanks are not considered to be at risk during storms or during extreme heat or cold event, any more so than other significant buildings or structures.	2
B	Storm events	Storm events could result structural damage and/or pollution to soils, groundwater or surface waters	Demolition/ Construction/	Human health, biodiversity, soils and geology, hydrology and hydrogeology	2	As above	1	As above	2
C	Flooding	Project could be at risk of flooding or give rise to flooding at downstream locations	Demolition/ Construction/	Flooding	2	A Flood Risk Assessment was prepared in accordance with 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities' issued by the Department of Environment, Heritage and Local Government in November 2009. The demolition or proposed works at the proposed development do not increase	1	The flood risk assessment concluded that the proposed development is not at risk of fluvial or coastal flooding.	2

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
						the flood risk of the catchment.			
D	Pollution to soils / groundwater / surface waters	Pollution to soils, groundwater or surface waters	Demolition/ Construction	Human health, biodiversity, soils and geology, hydrology and hydrogeology	2	In order to mitigate potential impacts during the demolition / construction phase, best practice construction methods will be implemented in order to prevent water (surface water and groundwater) pollution In order to mitigate potential impacts during the operational phase, the following has been implemented: - SuDS measures incorporated. - A hydrobrake mechanism has been installed to restrict the outflow into the existing network. - Water quality is maintained as the outflow passes through Petrol Interceptors	1	The demolition / construction phase of the proposed development will be carried out in accordance with good practice construction methodologies, all relevant health and safety guidance and legislation, as well as the provisions of the CEMP, as detailed in this EIAR.	2

Mitigation And Monitoring Measures

The proposed development has been designed in line with good industry practice, and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design and in accordance with planning and legislative requirements.

Cumulative Effects

This section describes other development projects within the subject lands area which could have a cumulative effect with the proposed development. In terms of Major accidents, there has been a planning application submitted (SDCC Ref: SD23A/0039) for an establishment to which the COMAH regulations apply. This establishment is located *ca.* 400m from the proposed development. The Land Use Planning assessment contained within the planning documents associated with this planning application have shown that the major accidents are not likely to trigger any major accidents at proposed development and, as such, there are no likely cumulative effects under the Seveso Directive.

8. Noise and Vibration

8.1 Introduction

This chapter presents an assessment of the likely effects in respect of environmental noise and vibration due to the proposed development on noise-sensitive locations in the vicinity, for the construction and operational phases. A cumulative noise assessment is also included.

Permission is being sought for modifications to the permitted data centre and generator yard granted under SDCC Reg. Ref. SD21A/0186 and the construction of an On-site Power Generation (OSPG) compound comprising 10 no. gas-fired electricity generating turbines, and associated site works.

Chapter 2 provides a full description of the proposed development. Figure 8.1 shows the site location in the context of the surrounding area.

Figure 8.1 ***Site Location and Context (Background Imagery (c) Google Earth)***

This chapter was prepared by Mike Simms (Principal Acoustic Consultant), who holds a Bachelor of Mechanical Engineering and Master of Engineering Science from University College Dublin he also holds a Diploma in Acoustics and Noise Control from the University of Ulster at Jordanstown. He has 20 years' experience in the field of environmental acoustics, in particular using computer-based noise modelling for environmental noise assessments.

Fieldwork for this assessment was carried out by Alex Ryan of AWN Consulting, who holds a BA, BAI and MAI in Mechanical and Manufacturing Engineering from Trinity College Dublin. At master's level, he specialised in aircraft noise reduction using aeroacoustic simulations. He is an associate member of the Institute of Acoustics. He has experience in the measurement and assessment of environmental noise including the preparation of noise and vibration impact assessments and Noise and Vibration chapters of EIARs. Furthermore, he has experience in acoustic measurement relating to environmental projects, infrastructure projects, wind farms and building acoustics.

8.2 METHODOLOGY

8.2.1 Proposed Approach

This Chapter has been prepared with reference to the following guidance documents:

EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (2022), and;

Reference has also been made to the following documents, which are specific to noise and vibration:

- Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016);
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 – Noise (2014);
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration (2014);
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration (1993);
- BS 6472: Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz) (1992);
- ISO 9613: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. (1996);
- BS 4142: 2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound (2019);
- Design Manual for Roads and Bridges LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2, Highways England (2020);
- ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels (2017), and;
- Transport Infrastructure Ireland (TII) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2014).

The following is an outline of the methodology which has been adopted for this assessment; each section is described in detail in the subsequent sections.

- Review appropriate guidance, typical local authority planning conditions, etc. in order to identify appropriate noise and vibration criteria for the construction, operational and decommissioning phases;
- Carry out noise monitoring at a number of locations (e.g. in the vicinity of nearest sensitive properties/boundaries) to identify existing levels of noise in the vicinity of the development;
- Development of a detailed 3D noise model to consider the proposed development, and;
- Comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).
- As the site will not generate any significant vibration off-site criteria for off-site vibration are not set. Construction vibration is discussed in section 8.2.4.

In respect of this site, planning permission has been granted for a data centre building and ancillary services. The current planning application seeks permission for the construction of an OSPG compound and also for modifications to the permitted data centre. This chapter includes an assessment of the Permitted Development (the 'Do Nothing' option), which is the data centre as permitted, and also an Overall Project ('Do Something' option), where the OSPG compound and data centre with modifications are constructed as in the Proposed Development and operated together, (i.e. the Overall Project).

Appendix 8.1 of this document presents a glossary of the acoustic terminology used throughout this document. In the first instance it is considered appropriate to review some basic fundamentals of acoustics.

8.2.2 Fundamentals of Acoustics

In order to provide a broader understanding of some of the technical discussion in this report, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.

A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

The audible range of sounds expressed in terms of Sound Pressure Levels is 0dB (for the threshold of hearing) to 120dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3dB.

The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPL's measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 8.2.

The 'A' subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

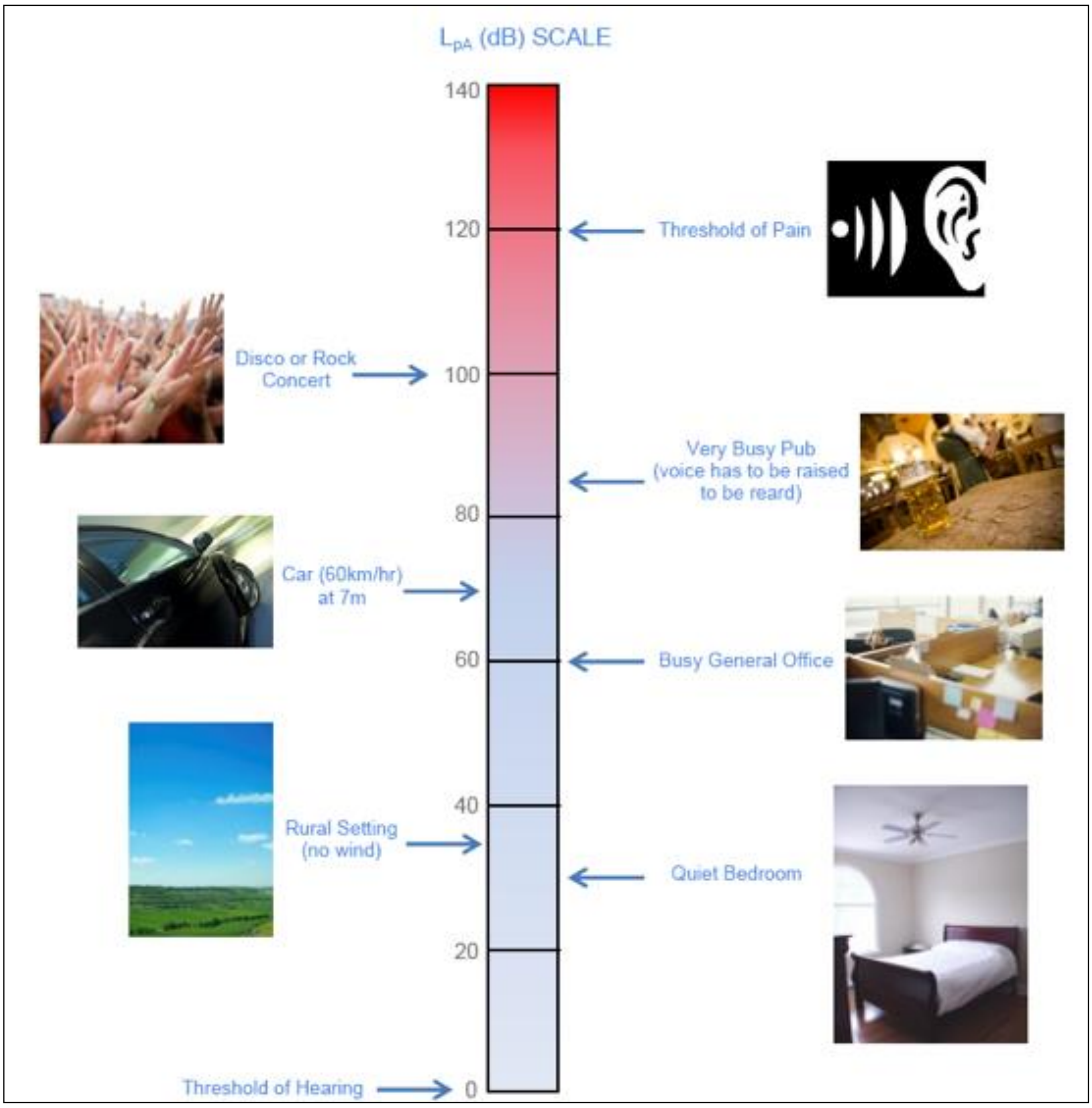


Figure 8.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016))

8.2.3 Significance of Impacts

The significance of noise and vibration impacts has been assessed in accordance with the EPA Guidelines EIA Reports (2022); see Tables 8.1 to 8.3 below. As these guidelines do not quantify the impacts in decibel terms, significance equivalences are derived from the documents '*Guidelines for Environmental Noise Impact Assessment*' produced by the Institute of Environmental Management in 2014 and *Design Manual for Roads and Bridges* (DMRB) (Highways England 2020).

With regard to the quality of the impact, ratings may have positive, neutral or negative applications where:

Quality of Impact	*Definition*
Negative	***A change which reduces the quality of the environment (e.g. by causing a nuisance).***
Neutral	***No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.***
Positive	***A change that improves the quality of the environment (e.g. by removing a nuisance).***

Table 8.1: Quality of Effects

The significance of an impact on the receiving environment are described as follows:

Significance of Impact on the Receiving Environment	*Description of Effect*
Imperceptible	*An effect capable of measurement but without significant consequences.*
Not Significant	*An effect which causes noticeable changes in the character of the environment but without significant consequences.*
Slight	*An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.*
Moderate	*An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.*
Significant	*An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.*
Very Significant	*An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.*

Table 8.2: Significance of Effects

The duration of effects as described in the EPA Guidelines are:

Duration of Effect	*Definition*
Momentary	*Effects lasting from seconds to minutes*
Brief	*Effects lasting less than a day*
Temporary	*Effects lasting one year or less*
Short-term	*Effects lasting one to seven years*
Medium-term	*Effects lasting seven to fifteen years*
Long-term	*Effects lasting fifteen to sixty years*
Permanent	*Effects lasting over sixty years*
Reversible	*Effects that can be undone, for example through remediation or restoration*

Table 8.3: Duration of Effects

8.2.4 Construction Phase Guidance

Construction Noise at Residential Receptors

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities or An Bord Pleanála normally control construction activities by imposing limits on the hours of operation and/or applying noise limits for construction noise at noise-sensitive locations.

In the absence of specific noise limits, criteria relating to permissible construction noise levels for a development of this scale are taken from the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise Annex E Section E.3.2.*[3]

The approach adopted in BS 5228-1, referred to here as the 'ABC Method' calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded

[3] Although this application is within South Dublin County, for reference, the use of BS 5228 is supported by Dublin City Council's guidance document 'Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition'

at this location, indicates a likely significant noise impact is associated with the construction activities.

The BS 5228-1 document sets out guidance on permissible noise levels relative to the existing noise environment. Table 8.4 sets out the values which, when exceeded, signify a likely significant effect at the facades of residential receptors as recommended by *BS 5228-1*. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Assessment category and threshold value period (L_{Aeq})	***Threshold value, in decibels (dB)***		
	Category A Note A	***Category B Note B***	***Category C Note C***
Night-time (23:00 to 07:00hrs)	***45***	***50***	***55***
Evenings and weekends Note D	***55***	***60***	***65***
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	***65***	***70***	***75***

Table 8.4: Example Threshold of Likely Significant Effect at Dwellings

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate periods (i.e. daytime, evening and night time) the ambient noise level is determined and rounded to the nearest 5dB. Baseline monitoring carried out at the nearest noise sensitive locations and considered in this assessment indicate that Category A, as detailed in Table 8.5 is appropriate in this instance.

Period	***Baseline Noise Category***	***Construction Noise Threshold Value $L_{Aeq,T}$ (dB)***
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	***A***	***65***
Evening (19:00 to 23:00hrs)	***A***	***55***
Night time (23:00 to 07:00hrs)	***A***	***45***

Table 8.5: Rounded Baseline Noise Levels and Associated Categories

Construction Noise at Commercial Properties

When considering non-residential receptors, such as those to the north of the development, BS 5228-1 gives several examples of acceptable limits for construction noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

> *"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."*

Paragraph E.2 goes on to state: -

> *"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 areas away from main road traffic and industrial noise;*

- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas".*

Proposed Construction Threshold Noise Levels

Taking into account the documents outlined above and making reference to the baseline noise environment monitored around the development site (see Section 9.3), BS 5228-1:2009+A1:2014 has been used to inform the assessment approach for construction noise.

The following Construction Noise Threshold (CNT) levels are proposed for the construction stage of this development:

As per Table 8.5, for residential NSLs, given the baseline monitoring carried out, it would indicate that Category A are appropriate using the ABC method. This sets a CNT of 65 dB $L_{Aeq,12hr}$ during daytime periods.

For non-residential NSLs it is considered appropriate to adopt the 75 dB $L_{Aeq,T}$ CNT, given the urban/industrial environment in which the proposed development is located, in line with BS5228-1 Annex E2.

Interpretation of the CNT

In order to assist with interpretation of CNTs, Table 8.6 includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of DMRB: Noise and Vibration and adapted to include the relevant significance effects from the EPA Guidelines (EPA 2022).

Construction Noise Level	***Magnitude of Impact (DMRB)***	***EPA Significance of Effect***
Below or equal Baseline Noise Level	***Negligible***	***Not Significant***
Above Baseline and below or equal to CNT	***Minor***	***Slight – Moderate***
Above threshold and below or equal to CNT + 5dB	***Moderate***	***Moderate – Significant***
Above CNT + 5dB	***Major***	***Significant – Very Significant***

Table 8.6: Description of the magnitude of impacts. Adapted from DMRB Table 3.16

Based on the above the following construction noise criteria are proposed for the site, for weekdays between 07:00 hrs and 19:00 hrs and Saturdays between 07:00 – 13:00:

65dB $L_{Aeq,1hr}$ at a noise sensitive location
75dB $L_{Aeq,1hr}$ at a commercial property

See Sections 8.5.1 and 8.5.2 for the assessment in relation to the proposed development. The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely impacts during the construction stages.

Criteria for Rating Vibration Impacts

There are two aspects to the issue of vibration that are addressed in the standards and guidelines: the risk of cosmetic or structural damage to buildings; and human perception of vibration. In the case of this development, vibration levels used for the purposes of evaluating building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are referenced here in relation to cosmetic or structural damage to buildings:

British Standard BS 5228-2 *Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration* (BSI 2014); and

British Standard BS 7385-2 *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* (BSI 1993)

BS 5228-2 and BS 7385-2 define the following thresholds for cosmetic damage to residential or light commercial buildings: PPV should be below 15 mm/s at 4 Hz to avoid cosmetic damage. This increases to 20 mm/s at 15 Hz and to 50 mm/s at 40 Hz and above. At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded. This is summarised in Table 8.7.

Type of building	***Peak component particle velocity in frequency range of predominant pulse***	
	4 Hz to 15 Hz	***15 Hz and above***
Reinforced or framed structures Industrial and heavy commercial buildings.	***50 mm/s at 4Hz and above***	
Unreinforced or light framed structures. ***Residential or light commercial buildings.***	***15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz***	***20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above***

Table 8.7: Allowable Vibration during Construction Phase

Note 1: Values referred to are at the base of the building.

Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

Furthermore, BS 5228-2 and BS 7385-2 state that minor structural damage can occur at vibration magnitudes greater than twice those in Table 8.7 and major structural damage can occur at vibration magnitudes greater than four times those in Table 8.7.

BS 5228-2 also provides guidance relating to the human response to vibration. Guidance is again provided in terms of PPV in mm/s since this parameter is routinely measured when monitoring the structural effects of vibration. The potential human response at different vibration levels, as set out in BS 5228-2, is summarised in Table 8.8.

Vibration level Note A) B) C) (mm/s)	***Effect***
0.14	***Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.***
0.3	***Vibration might be just perceptible in residential environments.***
1.0	***It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.***
10	***Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.***

Table 8.8: Guidance on human response to vibration levels.

A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of likely effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

Construction Phase Traffic

Vehicular movement to and from the construction site for the Proposed Development will make use of the existing road network. In order to assess the likely impact of additional traffic on the human perception of noise, the following two guidelines are referenced *Design Manual for Roads and Bridges* (DMRB) (Highways England 2020) and the *EPA Guidelines* (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB document.

Table 8.9 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents.

Change in Sound Level (dB)	*Subjective Reaction*	*DMRB Magnitude of Impact (Short-term)*	*EPA Significance of Effect*
Less than 1 dB	***Inaudible***	***Negligible***	***Imperceptible***
1 – 2.9	***Barely Perceptible***	***Minor***	***Not Significant***
3 – 4.9	***Perceptible***	***Moderate***	***Slight, Moderate***
≥ 5	***Up to a doubling of loudness***	***Major***	***Significant***

Table 8.9: Classification of magnitude of traffic noise changes in the short-term

In accordance with the DMRB Noise and Vibration Guidance, construction noise and construction traffic noise effects shall constitute a significant effect where it is determined that a major or moderate magnitude of effect will occur for a duration exceeding:

- Ten or more days or night in any 15 consecutive day or nights,
- A total number of days exceeding 40 in any six consecutive months.

8.2.5 Operational Phase – Plant Noise Guidance

<u>Previous Planning Permissions on this Site</u>

Reference is made to noise conditions from the permitted data centre, planning reference SD21A/0186, Condition 14 of which states:

Operational Noise.

(a) *Noise due to the normal operation of the proposed development, expressed as Laeq over 15 minutes at the façade of a noise sensitive location, shall not exceed the daytime background level by more than 10 dB(A) and shall not exceed the background level for evening and night time. Clearly audible and impulsive tones at noise sensitive locations during evening and night shall be avoided irrespective of the noise level.*

(b) *Following commencement of the development the applicant/developer is required to submit an Acoustic Verification report to South Dublin County Council. The report must confirm whether the development complies with Council's standard noise criteria: Noise due to the normal operation of the proposed development, expressed as Laeq over 15 minutes at the façade of a noise sensitive location, shall not exceed the daytime background level by more than 10 dB(A) and shall not exceed the background level for evening and night time.*

(i) *This Acoustic Verification report should comprise of noise monitoring data at any noise sensitive locations. It should also include the cumulative noise level whereby the existing noise levels are included in the assessment of the developments overall impact.*

(ii) *Acoustic design criteria or performance specifications acoustic report as prepared by Damian Kelly of AWN Consulting, dated the 14th of June 2021* *reference 'DK/20/11952NR02' or any subsequent acoustic assessment into the proposed use shall be finalised and verified by a suitably qualified acoustic consultant.*

(iii) *Following completion of all verification testing, measurement and reporting, a final acoustic compliance report referencing all testing, verification, noise measurement results and reports undertaken is to be submitted to the Environmental Health Department of South Dublin County Council. The report is to include a clear statement certifying that the development or proposed use is fully capable of complying with all the design criteria and operating within the requirements of the noise control conditions and criteria as set out within the planning consent.*

REASON: In the interest of public health by the prevention of unacceptable levels of noise pollution which could interfere with normal sleep and rest patterns and/or when people could reasonably expect a level of quietness, and to uphold the Council's amenity policies set out in the South Dublin County Council Development Plan.

The noise criteria in paragraph 14(a) above are incorporated into the noise assessment presented here. The guidance in the report referred to in paragraph 14(b) is presented below:

<u>EPA – NG4</u>

An assessment of noise under the EPA NG4 guidance requires a noise survey of baseline conditions and then derives appropriate criteria for noise from the operational proposed development. The criteria apply at the façades of the noise-sensitive locations.

The first part of selecting the noise criteria is to carry out a 'quiet area' screening on the location of the site. To be considered a 'quiet area', the following three criteria are tested:

The site must be located **at least 3km from an urban area with a population of more than 1,000 people**: in this instance the site is on the edge of the Dublin agglomeration and this criterion is not met.

The site must be **at least 3 km away from any local industry**: there are a number of existing industrial sites within 3km of the development site, therefore this criterion is not met.

The site must be **at least 5km away from any National Primary Route**: the N3 road is approximately 1.5 km southwest of the site and the N2 road is approximately 2.5 km from the site therefore this criterion is not met.

In this instance, none of the above criteria are met and therefore the site is not considered to be in a 'quiet area'.

Having confirmed that the site is not in a 'quiet area', the next part of the derivation of Noise criteria according to NG4 is to test whether the site meets the criteria for an 'area of low background noise'.

For a noise-sensitive location in the vicinity of the site to considered an 'area of low background noise', the noise levels measured at that location during the environmental noise survey need to satisfy <u>all three</u> of the following criteria:

Arithmetic Average of L_{A90} During Daytime Period ≤40 dB L_{A90}, and;
Arithmetic Average of L_{A90} During Evening Period ≤35 dB L_{A90}, and;
Arithmetic Average of L_{A90} During Night-time Period ≤30 dB L_{A90}.

Finally, depending on whether each noise-sensitive location is considered an 'area of low background noise', Table 8.10 below outlines the noise emission limit criteria detailed in the NG4 document.

Scenario	*Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)*	*Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)*	*Night Noise Criterion, dB L_{Aeq} (23:00 to 07:00hrs)*
Areas of Low Background Noise	*45 dB*	*40 dB*	*35 dB*
All Other Areas	*55 dB*	*50 dB*	*45 dB*

Table 8.10: NG4 Approach for Determining Appropriate Noise Criteria

The noise levels measured during the baseline noise surveys are presented in section 8.3.7; in all cases, noise levels exceed the criteria for areas of low background noise.

As the proposed development would operate continuously (i.e. on a '24/7' basis), the night-time noise criterion is critical to the assessment. As these nearest noise-sensitive locations are not identified as areas of low background noise as per the NG4 guidance, a 45 dB $L_{Aeq,T}$ night time criterion applies. Note if plant noise were designed to this level, plant noise would be clearly audible source of noise at a number of noise sensitive locations in the vicinity of the development.

<u>Other Guidance – BS 4142</u>

BS 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound is the industry standard method for analysing building services plant sound emissions to residential receptors. BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. It should also be noted that the EPA NG4 document indicates that the BS 4142 assessment methodology should be used in the assessment of complaints associated with a sites' operations.

For an appropriate BS 4142 assessment it is necessary to compare the measured external background sound level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where sound emissions are found to be tonal, impulsive, intermittent or to have other sound characteristics that are readily distinctive against the residual acoustic environment, BS 4142 advises that penalties be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal sound characteristics outlined in BS 4142 recommends the application of a 2dB penalty for a tone which is just perceptible at the receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible. In relation to intermittency, BS 4142 recommends that *If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.* The following definitions as discussed in BS 4142 as summarised below:

"*ambient sound level, $L_{Aeq,T}$*" equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at any given time, usually from many sources near and far, at the assessment location over a given time interval, T.

"*residual sound level, $L_{Aeq,T}$*" equivalent continuous A-weighted sound pressure level of the residual sound (i.e. ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound) at the assessment location over a given time interval, T.

"specific sound level, $L_{Aeq,T}$"	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
"rating level, $L_{Ar,T}$"	specific sound level plus any adjustment for the characteristic features of the sound.
"background sound level, $L_{A90,T}$"	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

In order to establish an *initial estimate* of impact, BS 4142 states the following:

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following.

a. Typically, the greater this difference, the greater the magnitude of the impact.
b. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The assessment methodology described above (i.e. comparison of rated sound level to background sound level) is quoted in BS 4142 as representing a methodology to '*obtain an initial estimate*' of impact. It is important to note that BS 4142 also comments that *'Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration'*. BS 4142 provides a list of potential pertinent factors that can influence the *'initial estimate'*. The plant noise assessment conducted in the following sections has been carried out with consideration of the guidance contained in BS 4142 as summarised above.

<u>Commercial Properties</u>

A number of commercial / industrial properties are located in the vicinity of the site. In terms of noise emissions from the site it is considered that an appropriate noise criterion at these locations is 55dB $L_{Aeq,15min}$, as this level corresponds to the noise criterion for daytime periods in NG4.

<u>Emergency Operation</u>

In order to provide continuity of service a number of stand-by generators are integral to of the current proposal. These generators will only operate in a situation where there is a failure in the electricity supply from the national grid and will be tested routinely. Routine testing will be conducted during regular weekday daytime periods only. Section 4.4.1 of the Environmental Protection Agency (EPA) document "*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities*" (NG4 - 2016) contains the following comments in relation to emergency plant items:

'In some instances, …sites will have certain items of emergency equipment (e.g. standby generators) that will only operate in urgent situations (e.g. grid power failure). Depending

upon the context, it may be deemed permissible for such items of equipment to give rise to exceedances in the noise criteria/limits during limited testing and emergency operation only. If such equipment is in regular use for any purposes other than intermittent testing, it is subject to the standard limit values for the site'.

As generators will only run if there is a loss of power to the site, or for scheduled testing. Testing of generators will occur once per week for a maximum of 1 hour each, one generator at a time, sequentially during daytime periods. As all testing will occur between 8am and 5pm, weekdays only, the noise criterion of 55dB $L_{Aeq,15min}$ for generator testing is proposed. Generators will be designed and mitigated in order to achieve this design goal at nearby residential noise sensitive locations (See Section 8.5.4 for details of the assessment) .

Golf Couse Boundary

The adjacent golf course would be considered noise-sensitive and it is recommended that noise limits associated with the operations of the data centre would not exceed 55 dB $L_{Aeq,15min}$ along the common boundary between the two sites. As this aligns with the daytime criterion of noise in NG4, it is considered that with this noise level limit, the recreational amenity of the golf course is protected.

Assessment of Significance

The '*Guidelines for Environmental Noise Impact Assessment*' produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in order to categorise the likely effect of changes in the ambient noise levels during the operational phases of the proposed development.

The guidelines state that for any assessment, the likely significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 8.11 below is based on an example scale within the IEMA guidelines. The corresponding significance of effect from in the EPA's EIA Report Guidelines (2022) is also presented.

Noise Level Change dB(A)	*Subjective Response*	*Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)*	*Effect Guidelines on the Information to be contained in EIARs (EPA)*
0	*No change*	*None*	*Imperceptible*
0.1 – 2.9	*Barely perceptible*	*Minor*	*Not Significant*
3.0 – 4.9	*Noticeable*	*Moderate*	*Slight, Moderate*
5.0 – 9.9	*Up to a doubling or halving of loudness*	*Substantial*	*Significant*
10.0 or more	*More than a doubling or halving of loudness*	*Major*	*Profound*

Table 8.11: Noise Effect Scale

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels and have been used to assess the impact of operational noise.

Recommended Criteria

Following review of relevant guidance, the current planning permission and the measured night-time baseline noise levels, the following noise criteria are proposed for the proposed development:

Day to Day Operation (Noise Sensitive Daytime) – 55 dB $L_{Aeq,15min}$
Day to Day Operation (Noise Sensitive Evening) – 50 dB $L_{Aeq,15min}$
Day to Day Operation (Noise Sensitive Night) – 37 to 40 dB $L_{Aeq,15min}$
Day to Day Operation (Commercial) – 55 dB $L_{Aeq,15min}$
Day to Day Operation (Grange castle Golf Couse Boundary) – 55 dB $L_{Aeq,15min}$
Emergency Operation (Noise Sensitive) – 55 dB $L_{Aeq,15min}$
Emergency Operation (Commercial) – 65 dB $L_{Aeq,15min}$

Note plant noise emissions are to be designed such that they are not tonal and do not have impulsive characteristics at the nearest noise sensitive locations. The criteria proposed here Hve been chosen so that the resulting noise levels comply with the planning permission mentioned above.

8.2.6 Operational Phase – Traffic Noise Guidance

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, during the operational phase, Table 8.12 offers guidance as to the likely impact associated with any particular change in traffic noise level based on the DMRB LA 111 Noise and Vibration (UKHA 2020) and the EPA Guidelines (EPA, 2022).

Change in Sound Level (dB)	*Subjective Reaction*	*DMRB Magnitude of Impact (Short-term)*	*EPA Significance of Effect*
0	***Inaudible***	***No Change***	***Neutral***
0.1 – 2.9	***Barely Perceptible***	***Negligible***	***Imperceptible***
3 – 4.9	***Perceptible***	***Minor***	***Slight***
5 – 9.9	***Up to a doubling of loudness***	***Moderate***	***Moderate***
10+	***Doubling of loudness and above***	***Major***	***Significant***

Table 8.12: Classification of magnitude of traffic noise changes in the long term

8.2.7 Operational Phase – Vibration Guidance

It should be noted that as there are no significant vibration sources within the development, and indeed as the equipment within the development is sensitive to vibration, the proposed development will not give rise to any significant levels of vibration off site and therefore no vibration criteria are specified for the operational phase.

8.2.8 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise.*

Prediction calculations for plant noise have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.* See Appendices 8.2 and 8.3 for further details of the noise modelling parameters.

Changes in road traffic noise on the local road network have been considered using prediction guidance contained within *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.

8.3 RECEIVING ENVIRONMENT

8.3.1 Nearest Noise-sensitive Locations

In the first instance it is considered appropriate to define a noise sensitive location. In this context is considered prudent to give consideration to definition supplied by the Environmental Protection Agency (EPA) which states the following (EPA NG4, Appendix 1):

> *"NSL – any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels."*

The nearest noise sensitive locations to the site are highlighted on Figure 8.3. Table 8.12 reviews the various noise sensitive locations identified in the figure.

Location	***Description***
NSL 01	***Existing derelict single storey residence some 350m west of the site.***
NSL 02	***Existing double storey residence some 160m west of the site. It is understood this building will be demolished as part of development Ref SD22A/0420 seeking permission. It is not considered a long term residential noise sensitive location.***
NSL 03	***Golf tee associated with the adjacent Grangecastle Golf Club some 35m from the north eastern corner of the site.***
NSL 04	***Golf green associated with the adjacent Grangecastle Golf Club some 25m from the southern boundary of the site.***
NSL 05	***Golf green associated with the adjacent Grangecastle Golf Club some 25m from the south western corner of the site.***
NSL 06	***Commercial NSL: Profile Park Marketing suite located some 130m to the south of the development site.***
NSL 07	***Existing Nangor Lea residential dormer bungalows located some 50m north on the far side of the Nangor Road.***
NSL 08	***Commercial offices associated with Kilcarbery Business Park some 85m from the north western corner of the site.***

Table 8.13: Noise-sensitive Locations

Figure 8.3 Noise-sensitive Locations (Background Imagery (c) Google Earth)

8.3.2 Background Noise Survey

Baseline noise monitoring has been completed at a number of representative locations in the vicinity of the development and is reviewed here to inform a preliminary discussion of the existing noise environment. Details of the baseline noise survey are given in the following sections.

8.3.3 Choice of Measurement Locations

Figure 8.4 illustrates the approximate location of the noise monitoring locations being considered here.

Figure 8.4 Noise Survey Locations (Background Imagery (c) Google Earth)

Location A	Located to the north of the site, at a house (NSL07) the adjacent to a filling station. Noise levels measured here are considered representative of locations NSL01, NSL02, NSL03, NSL07 and NSL08.
Location B	Located to the south site in the vicinity the Profile Park Marketing Suite. Noise levels measured here are considered representative of location NSL05.
Location C	Located to the east of the site in the vicinity of the boundary with the Grangecastle golf course. Due to the proximity to the golf course, this location would be considered to be representative of noise levels that would be experienced on the golf course itself. Noise levels measured here are considered representative of location NSL06.
Location D	Located to the south of the site. The location would be considered to be representative of noise levels at properties along the Baldonnel Road, some 150 m to the south.

8.3.4 Measurement Periods

Noise measurements were conducted during weekday day, evening and night-time periods. The night survey represents the time of night that provides a measure of existing background noise levels during a period where people are attempting to go to sleep or are sleeping. Due to the fact that the units in question here will operate on a 24-hour basis their likely impact during night-time periods is the critical issue. The survey was conducted during the following periods:

Surveys were completed during the following periods:

Daytime 10:30 hrs to 14:25 hrs on 2 March 2021;
Evening 21:34 hrs to 22:47 hrs on 2 March 2021, and;
Night 22:53 hrs on 2 March 2021 to 01:21 hrs on 3 March 2021.

Weather conditions were dry and calm during all periods with temperatures of the order of 10°C during the daytime period, 5°C during the evening and 3°C during the night.

8.3.5 Instrumentation

A Brüel & Kjær Type 2250 Sound Level Meter (S/N 2818091) was used for all survey periods. Before, after and during each survey period, the measurement instrument was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

8.3.6 Measurement Procedure

Measurements were conducted at the locations noted above. Sample periods for the noise measurements were typically 15 minutes. The results were noted onto a Survey Record Sheet immediately following each sample and were also saved to the instrument memory for later analysis if required. Survey personnel noted the primary noise sources contributing to noise build-up.

8.3.7 Survey Results

This section documents the typical background noise levels measured at the noise measurement locations in Figure 8.4. Table 8.14 presents the measured noise levels at Locations A, B, C and D.

Location	*Period*	*Time*	*Sound Pressure Level (dB)*	
			$L_{Aeq,15min}$	$L_{AF90,15min}$
A	*Day*	*10:31 – 10:46*	64	55
		11:52 – 12:07	63	50
		13:06 – 13:21	63	51
		Average	63	52
	Evening	*21:34 – 21:49*	58	42
	Night	*22:55 – 23:10*	59	41
		00:12 – 00:27	52	37
		Average	57	39
B	*Day*	*10:53 – 11:08*	54	52
		12:10 – 12:25	52	48
		13:49 – 14:04	51	47
		10:53 – 11:08	54	52
	Evening	*21:56 – 22:09*	45	42
	Night	*23:15 – 23:30*	44	41
		00:31 – 00:46	42	40
		Average	43	40
C	*Day*	*11:14 – 11:29*	49	46
		12:29 – 12:44	48	45
		13:31 – 13:46	51	45
		Average	50	45
	Evening	*22:14 – 22:29*	42	40
	Night	*23:32 – 23:47*	42	39
		00:48 – 01:03	40	37
		Average	41	38
D	*Day*	*11:32 – 11:47*	46	45
		12:47 – 13:03	45	43
		14:07 – 14:23	45	42
		Average	45	43

Location	Period	Time	Sound Pressure Level (dB)	
			$L_{Aeq,15min}$	$L_{AF90,15min}$
	Evening	22:32 – 22:47	40	38
	Night	23:50 – 00:05	40	37
		01:06 – 01:21	40	37
		Average	40	37

Table 8.14 Noise Monitoring Results

Note 1 Average L_{Aeq} are logarithmic averages, Average L_{A90} values are arithmetic averages.

8.4 CHARACTERISTICS OF THE DEVELOPMENT

For a description of the proposed development please see Chapter 2.

When considering a development of this nature, the likely noise and vibration impact on the surroundings must be considered for each of two distinct stages:

construction and decommissioning phases, and
operational phase.

The construction phase will involve excavation, rock breaking, general site preparation over the development site and the erection of new buildings over a phased construction period. An assessment will also be presented in the following sections in relation to noise from construction traffic on local roads.

The primary sources of outward noise in the operational context are deemed long term and will involve:

building services noise;
emergency site operations, and;
additional vehicular traffic on public roads.

These issues are discussed in detailed in the following sections.

8.5 LIKELY IMPACTS OF THE DEVELOPMENT

8.5.1 Construction Phase – Proposed Development

The largest noise and vibration impact of the Proposed Development will occur during the construction phase due to the operation of various plant machinery and HGV movement to, from and around the site. Based on information in Chapter 12 *Traffic and Transport*, the construction phase is expected to last for 2 years, therefore it can be classed as a short-term phase.

The nearest residential NSL is NSL07 at a distance of approximately 80 m from the proposed buildings; the nearest commercial location is NSL08 at a distance of 115 m.

BS 5228-1 contains noise level data for various construction machinery. The noise levels relating to site clearance, ground excavation and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB $L_{Aeq,T}$ at a distance of 10 m. For this assessment, it is assumed that 3 no. such items, each with a sound pressure level (SPL) of 81 dB at 10 m are operating simultaneously along the closest works boundary. This results in a total noise level of 86 dB at 10 m. This assumption is made for developments of this size, on the basis that it is unlikely that more than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other. Table 8.15 presents the results of construction noise calculations at a range of distances from the sources. The calculations assume the ‘on-time’ of the machinery is 66%, i.e. that machines will run for 8 hours in a 12-hour day, and that screening offering a noise reduction of 5dB is in place.

Description of Noise Source	Total Sound Pressure Level at 10 m (dB(A))	Calculated noise levels at varying distances, (dB $L_{Aeq,1hr}$)				
		50 m	60 m	75 m	100 m	120 m
3 no. items each with SPL of 81 dB at 10 m operating simultaneously.	86	65	63	61	59	57

Table 8.15 Likely construction noise levels at varying distances

The calculated noise levels in Table 8.15 show that there is predicted noise levels are within the adopted construction noise criteria of 65 dB $L_{Aeq,12hr}$ (See section 8.2.4).

The daytime baseline noise levels measured at the nearest residential NSL were in the range 63 to 64 dB $L_{Aeq,15min}$. According to the scale in Table 8.6, the construction noise effects are negative, slight to moderate and short-term.

Construction Vibration

Potential for off-site vibration impacts during the construction phase programme is limited to excavation and piling works to be used for foundations. For the purposes of this assessment the expected vibration levels during piling assuming augured or bored piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2: Vibration, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

0.54 mm/s at a distance of 5m, for auguring;
0.22 mm/s at a distance of 5m, for twisting in casing;
0.42 mm/s at a distance of 5m, for spinning off, and;
0.43 mm/s at a distance of 5m, for boring with rock auger.

Considering the low vibration levels at very close distances to the piling rigs, and the vibration criteria in Table 8.7, vibration levels at the nearest buildings are not expected to pose any significance in terms of cosmetic or structural damage. In addition, with reference to Table 8.8, the range of vibration levels is typically below a level which would cause any disturbance to occupants of nearby buildings. This indicates that construction vibration effects are negative, not significant and short-term.

Construction Traffic

In terms of the additional construction traffic on local roads that will be generated as a result of the Proposed Development the following comment is presented:

With reference to Table 12.8 in Chapter 12 *Traffic and Transport*, the AM and PM number of vehicle trips is 102 during the construction period. In the context of baseline traffic flows of 2886 vehicles for the peak AM hour and 2523 for the peak PM hour, the indicative noise level increase is of the order of 0.2 dB. With reference to Table 8.5, the associated effect is neutral, imperceptible and short-term.

8.5.2 Construction Phase – Permitted Development

This section discusses the construction phase noise impacts which would apply if the proposed development were not to be constructed.

Construction of the permitted data centre would result in similar activies to the permitted development, at similar distances to the residential NSL07. The impact remains negative, slight to moderate and short-term.

8.5.3 Decommissioning Phase

Decommissioning of the Permitted Development or Overall Project would occur at the end of the planning permission for the development. Decommissioning of the OSPG may occur under Medium Term Option 1 as discussed in section 8.5.4.

In relation to the decommissioning works, similar overall noise levels as those calculated for the construction phase would be expected, as similar tools and equipment will be used. The noise and vibration effect associated with the decommissioning of the site are considered to be comparable to those outlined in relation to the construction of the Overall Project (as per Section 8.5.1). There is no item of plant that would be expected to give rise to noise levels that would be considered out of the ordinary or in exceedance of the levels outlined in Section 8.2.4.

In all aspects of the construction and decommissioning the predicted noise levels are expected to be below the appropriate Category A value (i.e. 65dB $L_{Aeq,T}$) at current noise sensitive locations for the decommissioning phase; this indicates that decommissioning noise effects are negative, slight to moderate and short-term.

8.5.4 Operational Phase

The primary sources of outward noise from the proposed development in the operational context are deemed long term and will involve:

- building services noise;
- emergency site operations, and;
- additional vehicular traffic on public roads.

These issues are assessed in detailed in the following sections. See Appendices 8.2 and 8.3 for details of the noise modelling undertaken for this assessment and associated input information.

As described in Chapter 2 Section 2.5.1, there are a number of mid-term and long-term options for the use of the gas-powered OSPG. The purpose of the OSPG is to supply electricity to the data centre in advance of a suitable connection to the national electricity grid, which may be realised in 6-8 years. Once the grid connection is established, there are two possible scenarios.

- Medium Term Option 1: Decommission the OSPG;
- Medium Term Option 2: Retain the OSPG to provide grid support to ESB Networks “at times when renewable energy supply to the grid is at low levels”;

Noise due to decommissioning works is discussed in Section 8.5.3.

However, it is also a possibility that the upgraded connection is not realised during the lifetime of the proposed development, therefore there remains the Long Term Option of retaining the OSPG as the power source for the data centre. (Option 3 in Chapter 2 Section 2.5.1)

Six scenarios have been developed to consider the noise impact of the proposed operations. These are as follows:

- Scenario A: Permitted Development - Day to Day Operations;
- Scenario B: Permitted Development - Emergency Operations with diesel generators;

Scenario C: Permitted Development - Diesel Generator Testing.
Scenario D: Overall Project - Day to Day Operations;
Scenario E: Overall Project - Emergency Operations with diesel generators;
Scenario F: Overall Project- Diesel Generator Testing.

The following comments apply to Scenarios A, B and C, which relate to the permitted development, where the data centre is operated in its permitted configuration and there is no OSPG:

Scenario A is considered to be the most representative of the day to day operation. Scenario B is representative of emergency situation when a power outage or issue with supply from the national grid has occurred and is therefore required to keep the data centres operation on electricity from the emergency generators. It should be noted that such an event is an extremely rare occurrence.

Scenario C considers the impact associated with the testing of emergency generators. Testing of generators will occur once per week for a maximum of 1 hour each, one generator at a time, sequentially during daytime periods. The predicted noise level for Scenario C presented here assume that the closest generator to existing residential noise sensitive locations is being tested. It should be noted that the testing of generators shall take place only between 09.00 and 17.00hrs.

The following comments in respect of Scenarios D, E and F apply:

Scenario D includes the normal operational data centre plant, along with the OSPG. It does not include the diesel generators. Scenario D therefore covers normal operations under the Medium Term Option 2 and the Long-term Option. In respect of the Medium Term Option 2, as the support periods cannot be known, it is assumed that the OSPG could potentially be required at any time of day or night. Once it is demonstrated that the noise levels for Scenario D are within the criteria, compliance with the criteria is therefore demonstrated for the Medium Term Option 2 and the Long Term Option. Similarly, if noise levels for Scenario D are compliant, then the Medium Term Option 1 is also compliant, as the OPSG will be decommissioned and lower noise levels will result.

Scenario E includes the normal operational data centre plant, the OSPG and the diesel generators. It is a scenario unlikely to occur but is included here for completeness.

Scenario F includes the normal operational data centre plant, the OSPG, and one diesel generator as in Scenario C. This scenario will occur under either the Medium Term Option 2 or Long Term Options.

Permitted Development: Building Services Noise / Emergency Site Operation

This section presents the assessment of the 'Do Nothing' situation, where the permitted data centre is operating, i.e. without the OPSG.

For Scenario A, the results of the iterations of the noise model are presented and are compared to the relevant noise criteria as adopted for this assessment in Table 8.15.

Noise contours are also presented for the stated scenarios in order to demonstrate the noise impact of the Permitted Development scenarios over a wider area in Figures 8.5, 8.6 and 8.7.

Ref	Permitted Development Scenario A	Period	Adopted Criterion dB $L_{Aeq,T}$	Complies?
NSL01	29	Day	55	✓
		Evening	50	✓
		Night	39	✓
NSL02	34	Day	55	✓
		Evening	50	✓
		Night	40	✓
NSL03	38	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL04	53	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL05	43	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL06	42	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL07	37	Day	55	✓
		Evening	50	✓
		Night	37	✓
NSL08	33	Day	55	✓
		Evening	50	✓
		Night	N/A	✓

Table 8.16 Review of Predicted Noise Levels: Permitted Development, Scenario A

In Scenario B, the Scenario A plant is running, along with all diesel generators associated with the data centre building, including the Front-of-House generator. Table 8.14 reviews the predicted noise levels against the design criteria adopted for this assessment.

Ref	Permitted Development Scenario B	Adopted Criterion dB $L_{Aeq,T}$	Complies?
NSL 01	39	55	✓
NSL 02	44	55	✓
NSL 03	52	55	✓
NSL 04	53	55	✓
NSL 05	44	55	✓
NSL 06	43	55	✓
NSL 07	53	55	✓
NSL 08	49	55	✓

Table 8.17 Review of Predicted Noise Levels: Permitted Development, Scenario B

Based on emergency operations, the modelling indicates the predicted noise levels from the site satisfy the adopted criterion at the eight locations assessed.

In Scenario C, one generator is assumed to be tested at a time during daytime periods. For the purposes of this assessment the external generator closest to NSL07 is used to represent a worst-case for this scenario, as this generator is at the shortest distance to an NSL, at 80 m. Table 8.17 reviews the predicted noise levels against the design criteria adopted for this assessment.

Ref	Permitted Development Scenario B	Adopted Criterion dB $L_{Aeq,T}$	Complies?
NSL 01	33	55	✓
NSL 02	37	55	✓
NSL 03	45	55	✓

Ref	Permitted Development Scenario B	Adopted Criterion dB $L_{Aeq,T}$	Complies?
NSL 04	53	55	✓
NSL 05	43	55	✓
NSL 06	42	55	✓
NSL 07	47	55	✓
NSL 08	40	55	✓

Table 8.18 Review of Predicted Noise Levels: Permitted Development, Scenario C

Based on generator testing operations the modelling indicates the predicted noise levels from the site satisfy the adopted criterion at the locations assessed.

Overall Project: Building Services Noise / Emergency Site Operation

This section presents the assessment of the 'Do Something' situation, where in addition to the permitted data centre operating, the OPSG compound is running with ten generators.

For Scenario D, the results of the iterations of the noise model are presented and are compared to the relevant noise criteria as adopted for this assessment in Table 8.18.

Noise contours are also presented for the stated scenarios in order to demonstrate the noise impact of the proposed development over a wider area in Figures 8.8, 8.9 and 8.10.

Ref	Overall Project Scenario A	Period	Adopted Criterion dB L_{AeqT}	Complies?
NSL01	34	Day	55	✓
		Evening	50	✓
		Night	39	✓
NSL02	40	Day	55	✓
		Evening	50	✓
		Night	40	✓
NSL03	38	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL04	53	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL05	47	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL06	43	Day	55	✓
		Evening	50	✓
		Night	N/A	✓
NSL07	37	Day	55	✓
		Evening	50	✓
		Night	37	✓
NSL08	40	Day	55	✓
		Evening	50	✓
		Night	N/A	✓

Table 8.19 Review of Predicted Noise Levels: Overall Project, Scenario D

In Scenario D, the Scenario E plant is running, along with all diesel generators associated with the data centre building, including the Front-of-House generator. Table 8.19 reviews the predicted noise levels against the design criteria adopted for this assessment.

Ref	*Overall Project Scenario B*	*Adopted Criterion dB $L_{Aeq,T}$*	*Complies?*
NSL 01	42	55	✓
NSL 02	47	55	✓
NSL 03	55	55	✓
NSL 04	54	55	✓
NSL 05	47	55	✓
NSL 06	44	55	✓
NSL 07	55	55	✓
NSL 08	51	55	✓

Table 8.20 Review of Predicted Noise Levels: Overall Project, Scenario E

Based on emergency operations, the modelling indicates the predicted noise levels from the site satisfy the adopted criterion at the eight locations assessed.

In Scenario F, one generator is assumed to be tested at a time during daytime periods. For the purposes of this assessment the external generator closest to NSL07 is used to represent a worst-case for this scenario. Table 8.20 reviews the predicted noise levels against the design criteria adopted for this assessment.

Ref	*Overall Project Scenario C*	*Adopted Criterion dB $L_{Aeq,T}$*	*Complies?*
NSL 01	36	55	✓
NSL 02	42	55	✓
NSL 03	46	55	✓
NSL 04	53	55	✓
NSL 05	47	55	✓
NSL 06	44	55	✓
NSL 07	47	55	✓
NSL 08	44	55	✓

Table 8.21 Review of Predicted Noise Levels: Overall Project, Scenario F

Based on generator testing operations the modelling indicates the predicted noise levels from the site satisfy the adopted criterion at the locations assessed.

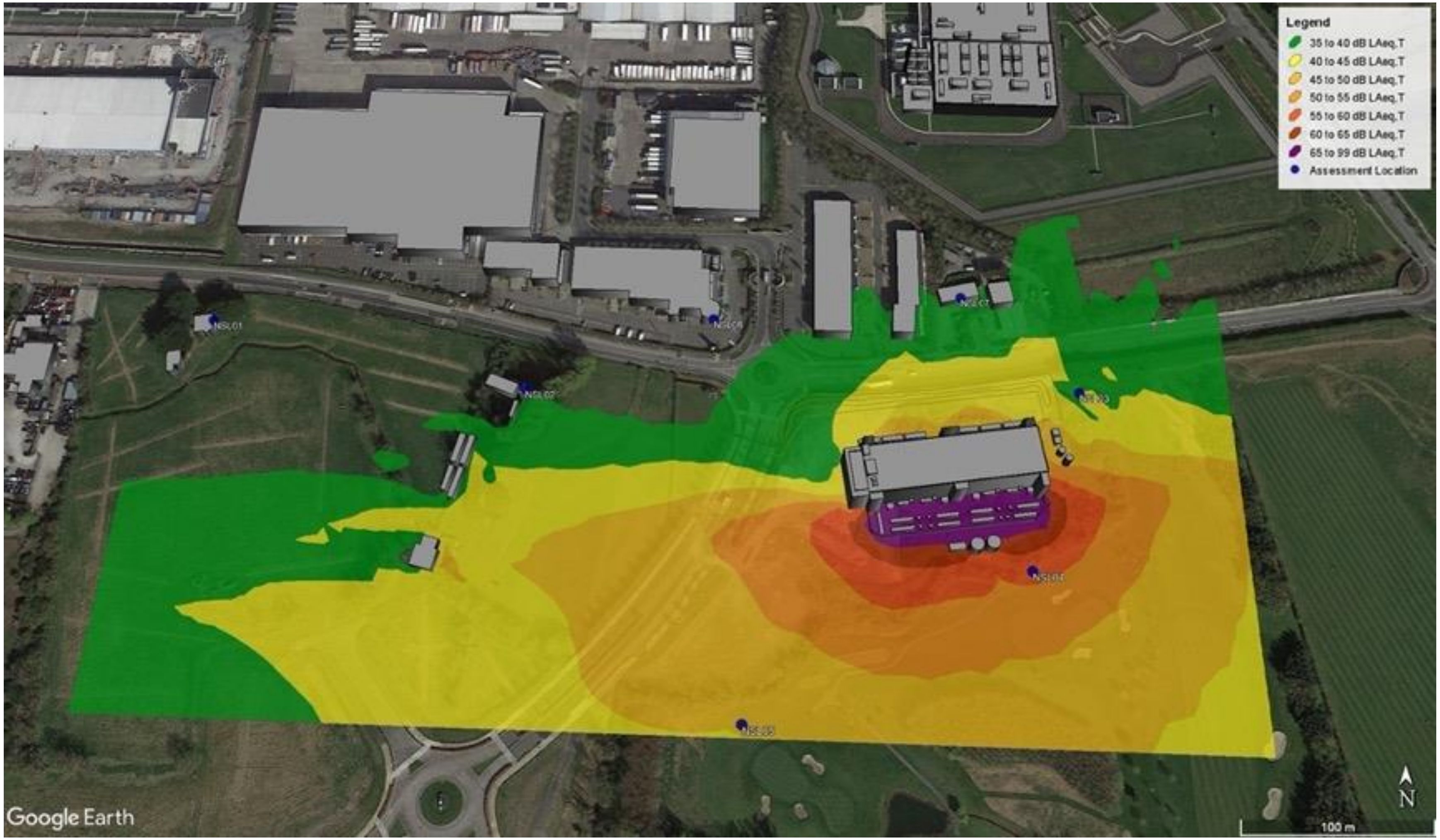


Figure 8.5 Permitted Development – Scenario A – Day to Day Noise Contour

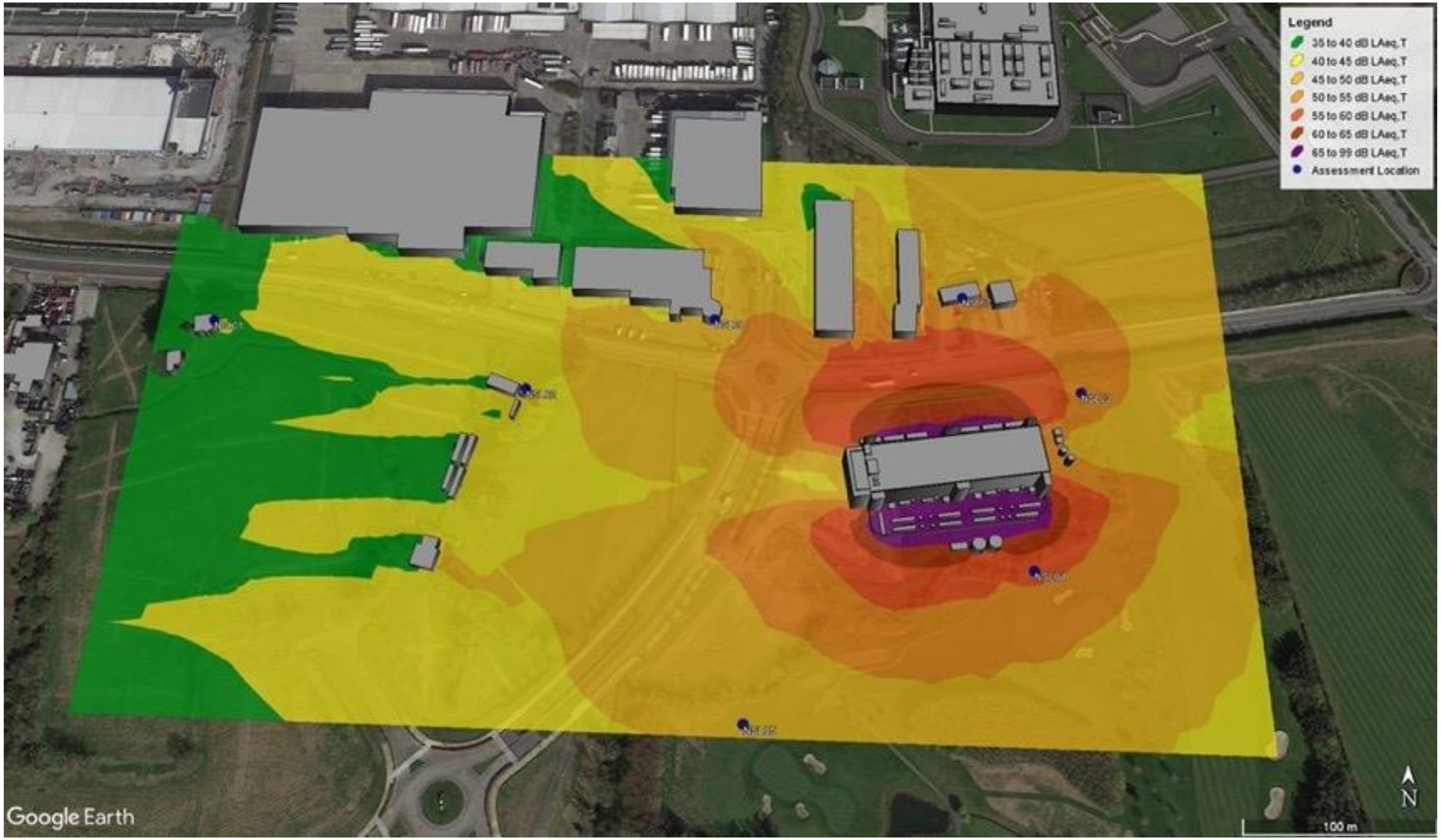


Figure 8.6 Permitted Development – Scenario B – Emergency Operation Noise Contour

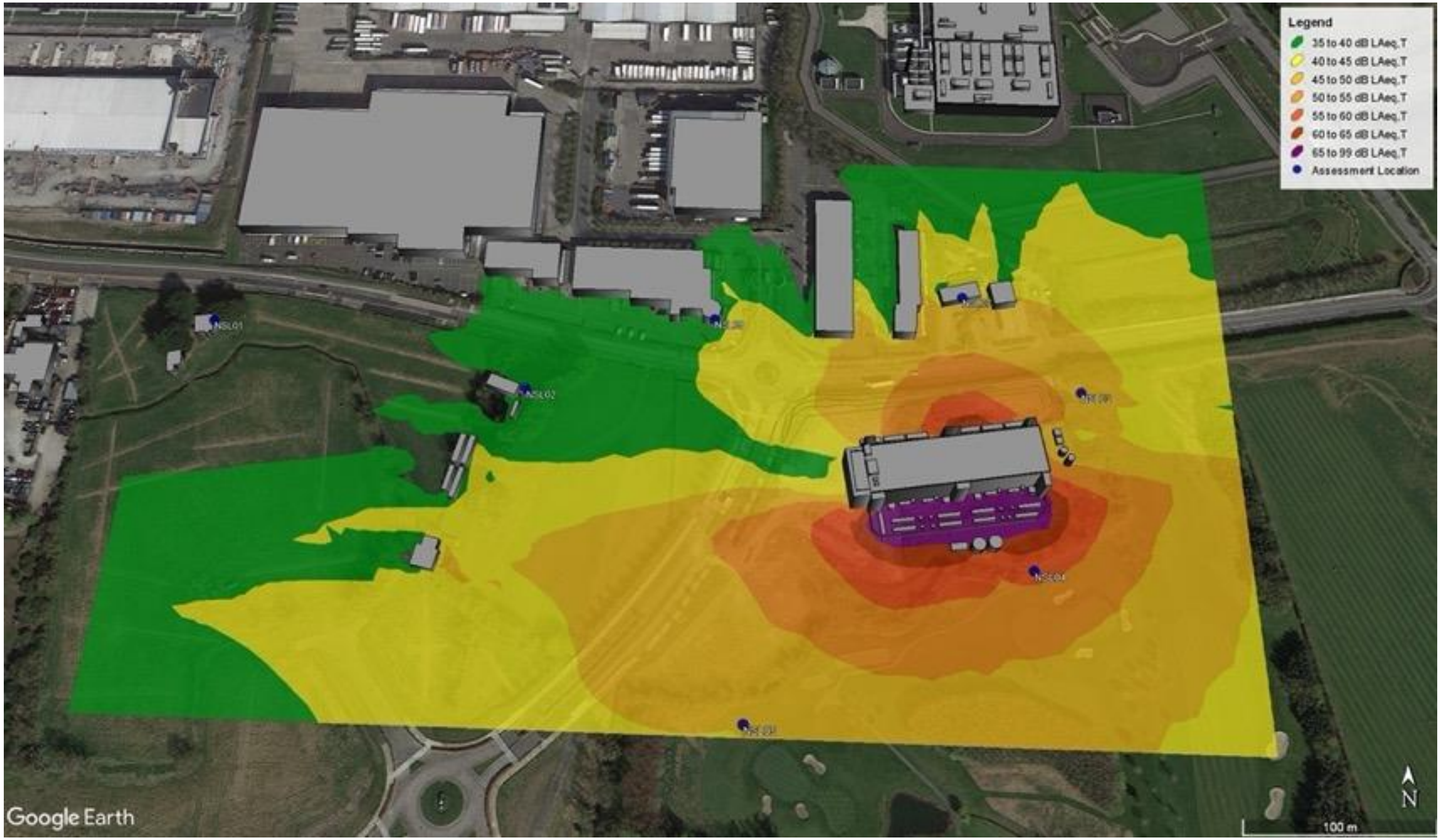


Figure 8.7 Permitted Development – Scenario C – Generator Testing Noise Contour

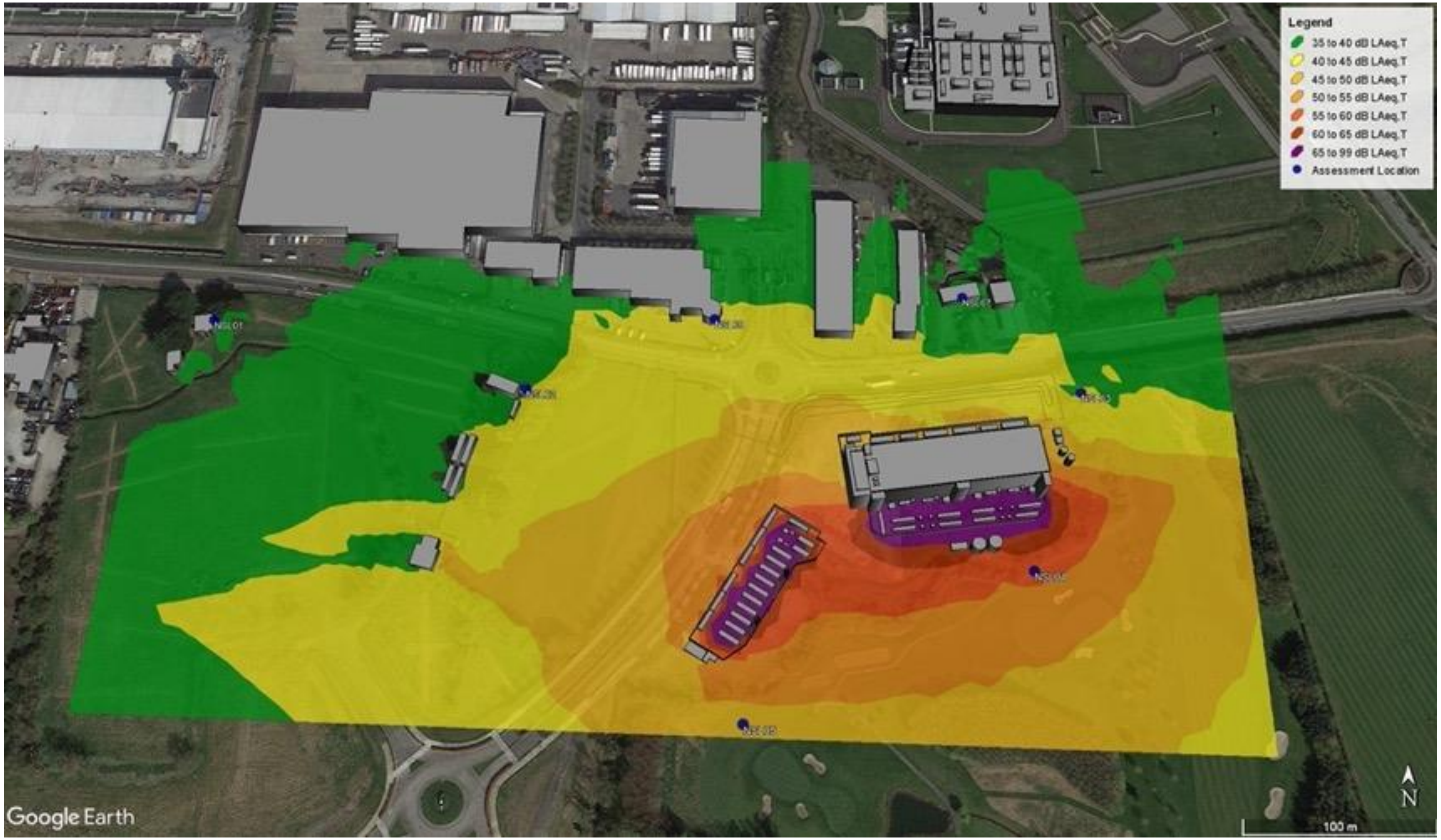


Figure 8.8 Overall Project - Scenario D - Day to Day Noise Contour

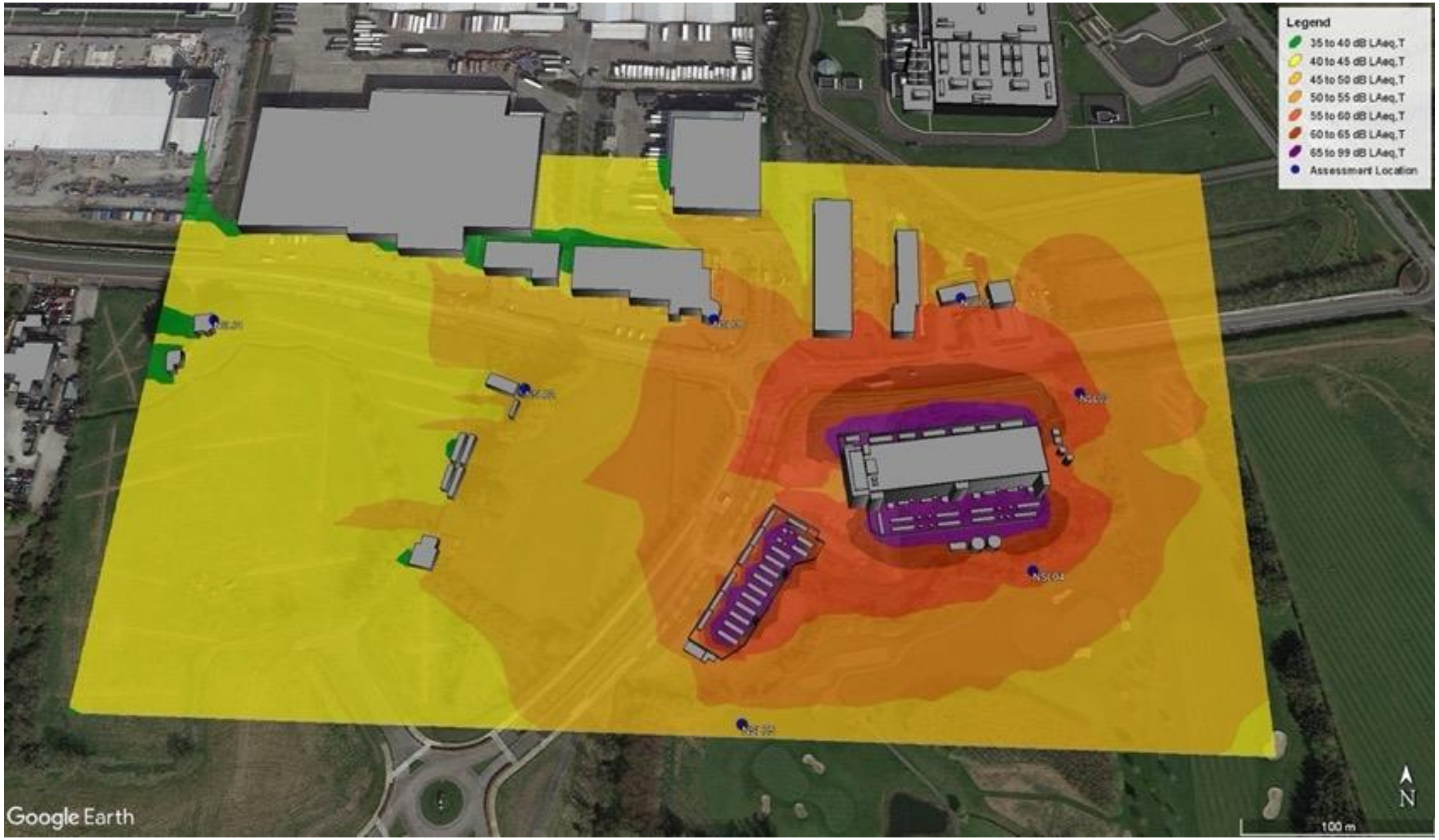


Figure 8.9 Overall Project – Scenario E – Emergency Operation Noise Contour

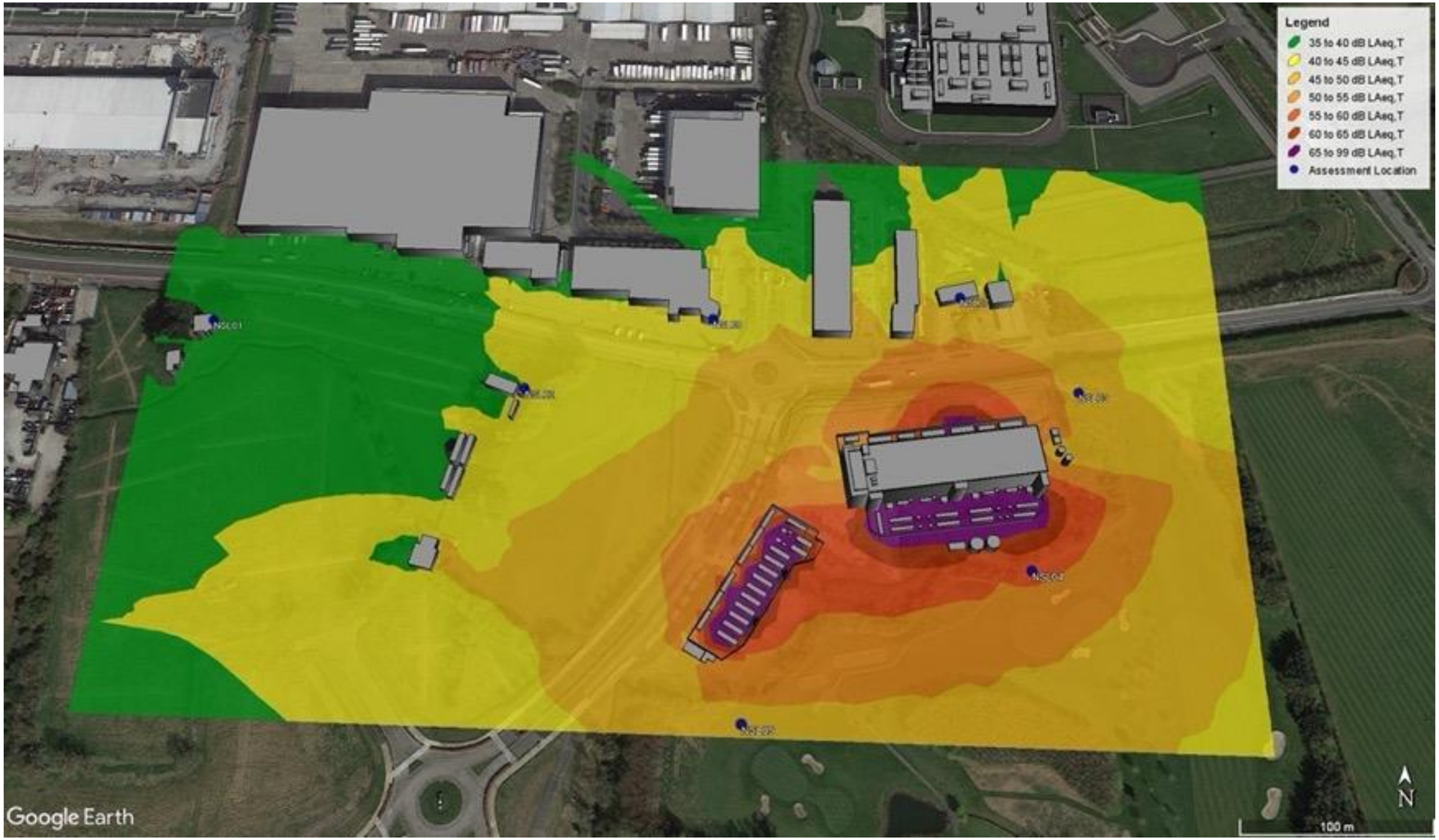


Figure 8.10 Overall Project - Scenario F – Generator Testing Noise Contour

Review of Increases in Noise Level (Overall Project)

Table 8.22 presents the predicted changes in noise level associated with the development at the nearest residential noise sensitive locations to the site, i.e. NSL01, NSL02 and NSL07.

Loc.	Scenario A – Typical Operation Daytime				
	Predicted dB $L_{Aeq,T}$	Background Level dB $L_{A90,T}$	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Effects
NSL01	34	52	52.1	0.1	Not Significant
NSL02	40	52	52.3	0.3	Not Significant
NSL07	37	52	52.1	0.1	Not Significant
Loc.	Scenario A – Typical Operation Evening time				
	Predicted dB $L_{Aeq,T}$	Background Level dB $L_{A90,T}$	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Effects
NSL01	34	42	42.6	0.6	Imperceptible
NSL02	40	42	44.1	2.1	Not Significant
NSL07	37	42	43.2	1.5	Not Significant
Loc.	Scenario A – Typical Operation Night Time				
	Predicted dB $L_{Aeq,T}$	Background Level dB $L_{A90,T}$	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Effects
NSL01	34	39	40.2	1.2	Not Significant
NSL02	40	39	42.5	3.5	Slight
NSL07	37	37	40.0	3.0	Slight

Table 8.22 Review of Predicted Changes in Existing Noise Levels (Overall Project)

Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is 'not significant' at all locations for Scenario E – Typical Operation during daytime and evening periods. A 'not significant' to 'slight' impact is noted during night-time periods.

Summary

The noise criteria adopted for the assessment are re-iterated here:

Day to Day Operation (Noise Sensitive Daytime) – 55 dB $L_{Aeq,15min}$
Day to Day Operation (Noise Sensitive Evening) – 50 dB $L_{Aeq,15min}$
Day to Day Operation (Noise Sensitive Night) – 37 to 40 dB $L_{Aeq,15min}$
Day to Day Operation (Commercial) – 55 dB $L_{Aeq,15min}$
Day to Day Operation (Grange castle Golf Couse Boundary) – 55 dB $L_{Aeq,15min}$
Emergency Operation (Noise Sensitive) – 55 dB $L_{Aeq,15min}$
Emergency Operation (Commercial) – 65 dB $L_{Aeq,15min}$

Scenario D is representative of the typical day to day operations envisioned for the site. Review of the predicted noise levels and associated noise contours confirms that the noise levels for the Overall Project comply with the noise criterion adopted for this assessment and are compliant with those typically espoused by South Dublin County Council and applied to the permitted development.

Scenario E is representative of emergency situations such as a power outage on the national grid. Review of the predicted noise levels (See Table 8.20) and associated noise contours confirm that the noise levels for the Overall Project comply with the noise criterion that has been adopted for these situations following review of relevant guidance.

Scenario F is representative of the intermittent testing of generator units. Review of the predicted noise levels (See Table 8.21) and associated noise contours confirm that the noise levels for the

Overall Project comply with the relevant daytime noise criterion relevant to these proposed activities.

Comparison of 'Permitted Development' and 'Overall Project'

For comparison purposes, Tables 8.23, 8.24, and 8.25 present a comparison of noise levels between the Permitted Development and Overall Project situations. (Note that the noise effects of the overall project i.e. the predicted noise levels compared to the existing noise levels are presented in Table 8.22)

Ref	*Permitted Development Scenario A*	*Overall Project Scenario E*	*Difference*
NSL 01	*29*	*34*	*+5*
NSL 02	*34*	*40*	*+6*
NSL 03	*38*	*38*	*--*
NSL 04	*53*	*53*	*--*
NSL 05	*43*	*47*	*+4*
NSL 06	*42*	*43*	*+1*
NSL 07	*37*	*37*	*--*
NSL 08	*33*	*33*	*--*

Table 8.23 Comparison of Permitted Development and Overall Project noise levels, Normal Operations

Ref	*Permitted Development*	*Overall Project*	*Difference*
NSL 01	*39*	*42*	*+3*
NSL 02	*44*	*47*	*+4*
NSL 03	*52*	*55*	*+3*
NSL 04	*53*	*54*	*+1*
NSL 05	*44*	*47*	*+3*
NSL 06	*43*	*44*	*+1*
NSL 07	*53*	*55*	*+2*
NSL 08	*49*	*51*	*+2*

Table 8.24 Comparison of Permitted Development and Overall Project noise levels, Emergency Operations

Ref	*Permitted Development*	*Overall Project*	*Difference*
NSL 01	*33*	*36*	*+3*
NSL 02	*37*	*42*	*+5*
NSL 03	*45*	*46*	*+1*
NSL 04	*53*	*53*	*--*
NSL 05	*43*	*47*	*+4*
NSL 06	*42*	*44*	*+2*
NSL 07	*47*	*47*	*--*
NSL 08	*40*	*44*	*+4*

Table 8.25 Comparison of Permitted Development and Overall Project noise levels, Generator Testing

It is re-iterated that all predicted noise levels are within the criteria for each scenario.

Additional Vehicular Traffic on Public Roads

During the operational phase of the proposed development, there will be a small increase in vehicular traffic on surrounding roads associated with the site and other planned developments. Details of the traffic assessment are included in Chapter 12 of this EIAR.

For the purposes of assessing likely noise impacts, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads surrounding the subject site with and without development. Using the information on morning and evening peak hours presented in Chapter 12, the impact from the increase in traffic from the proposed development has been assessed for the year of 2025 relative to the baseline scenario.

Link	*AM Peak Hour*		*PM Peak Hour*	
	% Change in Traffic Flow	*Change in Noise Level*	*% Change in Traffic Flow*	*Change in Noise Level*
Kilcarbery Park Access Road	*1.40%*	*0.1*	*2.14%*	*0.1*
R134 New Nangor Road (Eastern Arm)	*1.40%*	*0.1*	*1.87%*	*0.1*
Profile Park Road	*53.42%*	*1.9*	*156.25%*	*2.9*
R134 New Nangor Road (Western Arm)	*1.40%*	*0.1*	*1.95%*	*0.1*

Table 8.26 Predicted change in noise level associated with vehicular traffic – AM and PM Peak Hours

The predicted increase in traffic flows associated with the development in the year 2025 will result in an increase less than 1dB along all roads receiving traffic from the proposed development, with the exception of Profile Park Road, where the increase in noise levels is less than 3dB. The effect if therefore negative, imperceptible to not significant and long-term. No mitigation measures are required in respect of traffic noise.

8.6 REMEDIAL AND MITIGATION MEASURES

In order to sufficiently mitigate the likely noise impact, a schedule of noise control measures has been formulated for both construction and operational phases associated with the proposed development.

8.6.1 Construction Phase

With regard to construction activities, reference is made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be applied during the construction of the proposed development, including:

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration;
- Monitoring levels of noise and/or vibration during critical periods and at sensitive locations; and
- All site access roads will be kept even so as to mitigate the potential for vibration from lorries.

- Furthermore, a variety of practicable noise control measures will be employed. These will include:
    - Selection of plant with low inherent potential for generation of noise and/ or vibration;

- Erection of barriers around the site perimeter, and if necessary to comply with construction noise criteria section 8.2.4, around items such as generators or high duty compressors; and

- Situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

During any rock breaking or similar vibration-generating works, vibration from construction activities to off-site residences will be limited to the values set out in Table 8.7 through monitoring of vibration at the site boundary or at noise-sensitive locations. It should be noted that these limits in Table 8.7 are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%, as stated in BS5228.

Note - Appendix 8.4 presents an indicative construction noise and vibration management plan that will be implemented in terms during the construction period. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place (e.g. rock breaking) that have an increased potential noise and vibration generation.

8.6.2 Operational Phase

Building Services Noise / Emergency Site Operation

Noise from external plant will be controlled by adhering to the sound power levels of plant items and the application of attenuators and barriers as presented in Appendix 8.2. With due consideration as part of the detailed design process, this approach will result in the site operating within the constraints of the noise criteria that have been adopted as part of this detailed assessment.

The noise mitigation measures are summarised as follows:

- Adherence to the maximum sound power levels in Tables 2 and 5 of Appendix 8.2;
- Additional attenuation on with the insertion loss values in Table 3 of Appendix 8.2, on items as described in Table 2 of Appendix 8.2.
- A 3.5m high solid acoustic screen around the chiller compound to the south of the data centre building;
- A 4.5m high solid acoustic screen around the generator compound to the north of the data centre building;
- A 5.0m high solid acoustic screen around the OSPG compound.

With the implementation of these acoustic mitigation measures, predicted noise levels are within the criteria, as described in Table 8.19, Table 8.20, and Table 8.21.

Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

8.7 PREDICTED IMPACTS OF THE DEVELOPMENT

This section summarises the likely noise and vibration impact associated with the proposed development, taking into account the mitigation measures.

8.7.1 Construction Phase

During the construction phase of proposed development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e. as per Table 8.4, 8.5 and Section 8.2.4), along with implementation of appropriate noise and vibration control measures (as summarised in Section 8.6.1), will ensure that noise and vibration impact is kept to a minimum. Also it is reiterated that any construction noise effects will be ***negative, not significant*** and ***short-term*** in nature.

8.9.2 Operational Phase

Building Services Noise / Emergency Site Operation

Proprietary noise and vibration control measures have been employed including plant selection and acoustic screening, in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions will be broadband in nature and will not contain any tonal or impulsive elements. The resultant noise effect is ***negative, not significant*** *to* ***slight*** and ***long-term***.

Additional Vehicular Traffic on Public Roads

Any change in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is expected to be ***imperceptible to not significant***. The resultant noise effect is ***neutral, imperceptible*** and ***long term.***

8.8 RESIDUAL EFFECTS

The construction noise assessment has shown that in accordance with the 'significance' thresholds presented in the British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise there is not a significant impact at noise-sensitive locations in terms of ambient noise levels subject to appropriate management of the issues on the site.

The robust operational noise assessment of fixed plant associated with the proposed plant has shown that in accordance with the scale in the EPA EIA Report Guidelines 2022 there will be a ***negative, not significant*** *to* ***slight, long term*** effect at the closest residences identified on Figure 8.3. That aside, the predicted change in background noise level due to current application is the order of 1.0dB during daytime periods between 1 to 4dB during night-time periods as shown in Table 8.22, while remaining within the criteria, as shown in Table 8.18. Ambient noise levels are and will continue to be dictated by road traffic noise in the area while a low level of plant noise is expected to be audible during lulls in other sources (e.g. distant traffic noise).

It is reiterated that the predictions presented here assume that day to day plant is operating at full/high duty which is a conservative assumption. In all likelihood the actual noise levels on the ground will be lower than those presented here.

The operational noise assessment of vehicle movements associated with the site has shown that in accordance with the scale in the EPA EIA Report Guidelines 2022 there will be an imperceptible impact off site noise sensitive locations considering existing traffic volumes on the local road network. See Chapter 13 Traffic and Transportation for the traffic impact assessment.

8.9 CUMULATIVE EFFECTS

Construction

During the construction phase of the Proposed Development and permitted developments, there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. During permitting of all developments the planning authority will apply noise and vibration limits and hours of operation to limit noise and vibration to the levels proposed in Section 8.2.4 of the EIAR. Management of noise and vibration in accordance with planning conditions will ensure that the cumulative impact is slight, negative, and short term in nature.

Operation

An assessment of the cumulative effects of the operation of the permitted development and Proposed Development has been presented in this Chapter. The assessment shows that the noise emissions from operation of the data centre and OPSG compound will not exceed the adopted criterion at the façade of any nearby noise sensitive locations, as stated in Section 8.2.5 of the EIAR, under subheading Recommended Criteria.

Once the mitigation measures outlined in Section 8.6 are implemented there will be no significant cumulative effects as a result of the permitted development and the Proposed Development operating together.

In order to address any further possible cumulative effects, a review of other developments and noise conditions of known developments in the wider area, (shown in Figure 8.11) has been undertaken and is summarised below. These developments are considered the most relevant because of their proximity to the site and the residential noise-sensitive location.

Figure 8.11 Other development with potential for cumulative impacts

SD21A/0167 Profile Park

This development consists of a of a gas fired power plant with an electrical output of up to 125MW. The planning condition for outward operational noise associated with this development is as follows, from Condition 16:

Environmental Health 1. Noise due to the normal operation of the proposed development, expressed as L_{Aeq} over 15 minutes at the façade of a noise sensitive location, shall not exceed the daytime background level by more than 10 dB(A) and shall not exceed the background level for evening and night time. Clearly audible and impulsive tones at noise sensitive locations during evening and night shall be avoided irrespective of the noise level.

SD22A/0420

This development consists of two-storey data center with plant at roof level and associated ancillary development including emergency generators. A decision has not yet been issued by SDCC on this planning application.

Cumulative Assessment

NSL07 is the nearest residential noise-sensitive location to the proposed development, thus it is the focus of this cumulative assessment. Each of the planning applications above contains a noise assessment which includes a receiver corresponding to NSL07. The predicted noise levels for each development are presented in Table 8.22 below, along with predicted noise levels for the Proposed Developments, taken from their respective EIARs:

Location	***Predicted Noise Level, dB $L_{Aeq,T}$***			
	Proposed OSPG, and Permitted DC with modifications as in the Proposed Development.	***SD21A/0167***	***SD22A/0420***	***Cumulative***
NSL07	*37*	*38*	*37*	*42*

Table 8.27 Cumulative Noise Levels at NSL07

The predicted cumulative noise level is 42 dB $L_{Aeq,T}$. In respect of the existing background noise level of 37 dB L_{A90}, a +5dB change, if realised, would correspond to a 'moderate' effect in terms of the scale in Table 8.11. However, the cumulative noise level of 42 dB $L_{Aeq,T}$ is within the typical EPA NG4 night-time noise criterion of 45 dB $L_{Aeq,T}$. which is commonly applied to sites of this nature. Finally, it is re-iterated at the proposed development, i.e. the modified data centre and the OSPG, satisfy the planning condition which currently applies to the permitted data centre development.

REFERENCES

Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (January 2016).

EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (2022);

EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015);

BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 – Noise (2014);

BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration (2014);

BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration (1993);

BS 6472: Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz) (1992);

ISO 9613: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. (1996);

BS 4142: 2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound (2019);

Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014);
Design Manual for Roads and Bridges LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2, Highways England (2020);
ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels (2017);
Transport Infrastructure Ireland Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (2014).

9. Air Quality

9.1 INTRODUCTION

This chapter evaluates the impacts which the Proposed Development (OSPG) may have on Air Quality as defined in the EPA EIA Report Guidelines 2022. The assessment has been undertaken for the Permitted Development (data centre), the Proposed Development (OSPG) and the Overall Project – data centre and OSPG.

This chapter has been prepared by AWN Consulting Limited – Dr Edward Porter (BSc PhD C Chem MRSC MIAQM). Dr. Edward Porter is Director with responsibility for Air Quality with AWN Consulting. He holds a BSc from the University of Sussex (Chemistry), and a PhD in Environmental Chemistry (Air Quality) in UCD where he graduated in 1997 and is a Full Member of the Royal Society of Chemistry (MRSC CChem) with 25 years' experience. He specialises in the fields of air quality, odour and air dispersion modelling.

Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulated model AERMOD. The AERMOD model has USEPA regulatory status and is one of the advanced models recommended within the air modelling guidance document '*Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)*' published by the EPA in Ireland (EPA, 2020). Further information on the background of the AERMOD model can be found in Appendix 9.1. The modelling of air emissions from the site was carried out to assess concentrations of nitrogen dioxide (NO_2) at a variety of locations beyond the site boundary.

In relation to the Overall Project – data centre and OSPG, the Proposed Development will have 10 gas generators on the OSPG facility whilst the Permitted Development has 9 no. diesel generators (8 main generators and one front-of-house generator) associated with the DB8 data centre, with a maximum of 7 no. main diesel generators in operation at any one time, which will provide power to the site when power from the OSPG is not available. In addition, a front-of-house (FOH) generator will also be in operation.

The dispersion modelling study consisted of the following components:

- Review of emissions data and other relevant information needed for the modelling study;
- Review of background ambient air quality in the vicinity of the facility as shown in Figure 9.2;
- Air dispersion modelling of significant substances released from the site;
- Identification of predicted concentrations of released substances beyond the site boundary;
- Evaluation of the environmental significance of these predicted concentrations, including consideration of whether these concentrations are likely to exceed relevant ambient air quality standards and guidelines.

9.2 METHODOLOGY

9.2.1 Criteria for Rating of Impacts

9.2.1.1 *Ambient Air Quality Standards*

In order to reduce the risk to health from poor air quality, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 9.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland are:

- the Air Quality Standards Regulations 2022, which incorporate European Commission

Directive 2008/50/EC which has set limit values for the pollutants NO_2, PM_{10}, and $PM_{2.5}$ relevant to this assessment.
- Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and also includes ambient limit values relating to $PM_{2.5}$.

Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3 NO_2
		Annual limit for protection of human health	40 µg/m^3 NO_2
		Critical limit for protection of vegetation	30 µg/m^3 NO + NO_2
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 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
$PM_{2.5}$	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$
		Indicative Annual limit for protection of human health	20 µg/m^3 $PM_{2.5}$

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Table 9.1 Air Quality Standards Regulations 2022 (based on EU Council Directive 2008/50/EC)

9.2.1.2 *Dust Deposition Guidelines*

The concern from a health perspective is focused on particles of dust which are less than 10 microns and the EU ambient air quality standards outlined in section 9.2.1.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m^2/day averaged over a one year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled '*Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (EPA, 2006). The document recommends that the Bergerhoff limit of 350 mg/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the Proposed Development and Overall Project.

9.2.1.3 *Gothenburg Protocol*

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% below 2005 levels), 65 kt for NO_X (49% reduction), 43 kt for VOCs (25%

reduction), 108 kt for NH_3 (1% reduction) and 10 kt for $PM_{2.5}$ (18% reduction).

European Commission Directive 2001/81/EC and the 2021 National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. The NECD has updated by Directive 2016/2284 which repealed Directive 2001/81/EC. A National EPA Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005. The data available from the EPA in 2021 indicated that Ireland complied with the emissions ceiling for SO_2 in recent years but failed to comply with the ceilings for NH_3, NO_X and NMVOCs. Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020-29 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 10.9 kt (85% below 2005 levels) for SO_2, 40.7 kt (69% reduction) for NO_X, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH_3 and 11.2 kt (41% reduction) for $PM_{2.5}$.

9.2.2 Construction Phase

For the purpose of the qualitative air quality assessment of the construction phase, the combined impact of concurrent construction of all buildings at the site has been assumed to occur together.

The current assessment thus focused firstly on identifying the existing baseline levels of NO_2, PM_{10} and $PM_{2.5}$ in the region by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the Proposed Development and Overall Project.

9.2.3 Operational Phase

Air dispersion modelling was carried out by AWN using the United States Environmental Protection Agency's regulated model AERMOD (Version 22112). AERMOD is recommended as an appropriate model for assessing the impact of air emissions from industrial facilities in the EPA Guidance document "Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)" (EPA, 2020).

The modelling of air emissions from the site was carried out to assess the concentrations of Nitrogen Dioxide (NO_2) beyond the site boundary and the consequent impact on human health. The assessment was undertaken in order to quantify the impact of the Proposed Development and the Overall Project on ambient air quality concentrations.

To obtain all the meteorological information required for use in the model, data collected during 2017 - 2021 from Casement Aerodrome has been incorporated into the modelling. The air dispersion modelling input data consisted of information on the physical environment, design details for all emission points on-site and five full years of meteorological data. Using this input data, the model predicted ambient concentrations beyond the site boundary for each hour of the meteorological year. This study is based on continuous operation of the facility at the maximum emission concentration which is an approach which will lead to an over-estimation of the actual levels that will arise.

AERMOD is a "new-generation" steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement of the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources. Details of the model are given in Appendix 9.1. Fundamentally, the model has made significant advances in simulating the dispersion process in the boundary layer. This will lead to a more accurate reflection of real-world processes and thus considerably enhance the reliability and accuracy of the model particularly under those scenarios which give rise to the highest ambient concentrations.

Due to the proximity to surrounding buildings, the EPA approved building downwash programme, the PRIME Building Downwash Program (BPIP Prime) has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered.

The AERMOD model incorporated the following features:

Three receptor grids were created at which concentrations would be modelled. Receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. The receptor grids were based on Cartesian grids with the site at the centre. An outer grid measured 10 x 10 km with the site at the centre and with concentrations calculated at 500m intervals. A middle grid measured 5 x 5 km with the site at the centre and with concentrations calculated at 250m intervals. A smaller denser grid measured 1.5 x 1.5 km with the site at the centre and concentrations calculated at 125m intervals. Boundary receptor locations were also placed along the boundary of the site, at 25m intervals, giving a total of 4,072 calculation points for the model.

<u>All on-site buildings and significant process structures</u> were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.

<u>Hourly-sequenced meteorological information</u> has been used in the model covering the years 2017 – 2021 from Casement Aerodrome as shown in Figure 9.1. AERMOD incorporates a meteorological pre-processor AERMET which allows AERMOD to account for changes in the plume behaviour with height using information on the surface characteristics of the site. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convective boundary layer (CBL) height, stable boundary layer (SBL) height, and surface heat flux (see Appendix 9.2).

<u>Terrain</u> has been mapped out in the model as using SRTM (Shuttle Radar Topography Mission) data with 30m resolution. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP.

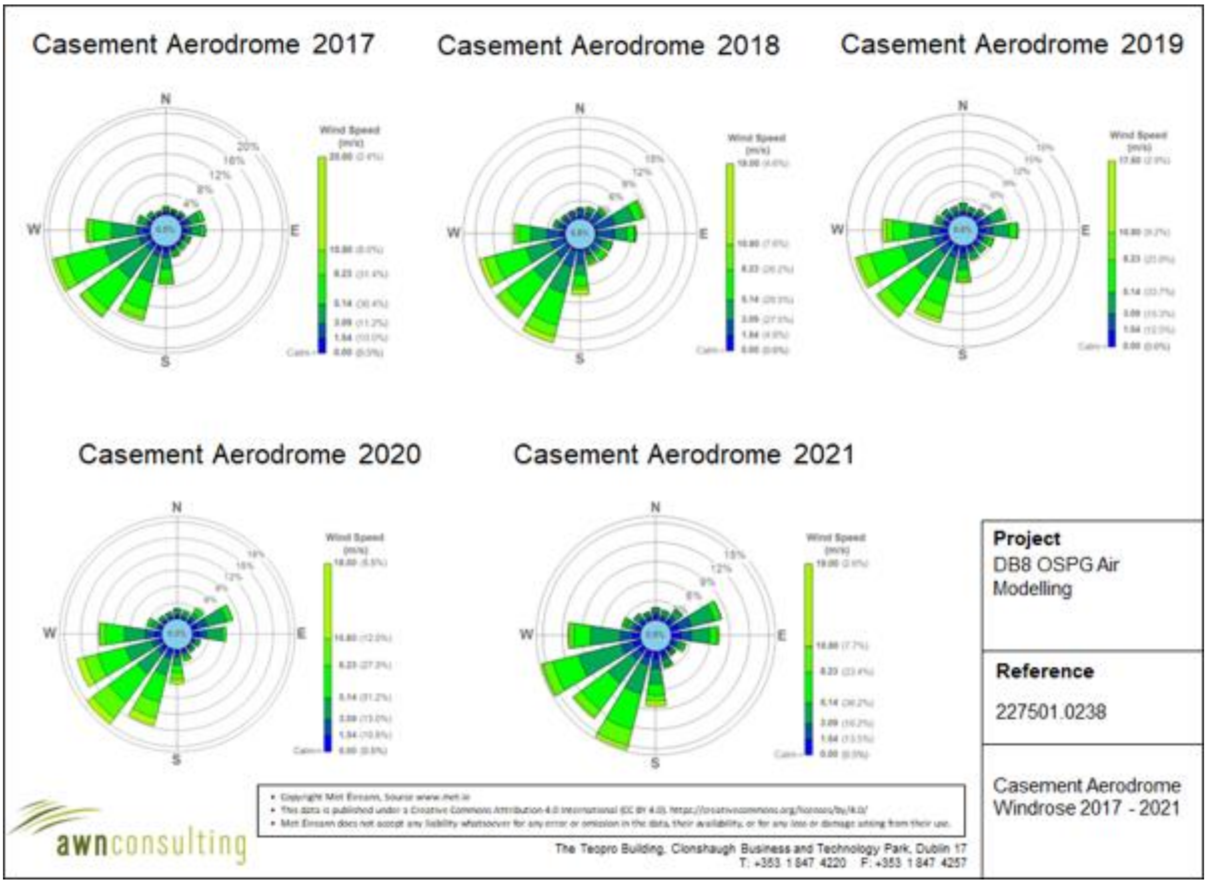


Figure 9.1 Casement Aerodrome Windrose 2017 - 2021

Process Emissions

In relation to the Overall Project – data centre and OSPG, the Proposed Development will have 10 gas generators on the OSPG facility whilst the Permitted Development has 9 no. diesel generators (8 main generators and one front-of-house generator) associated with the DB8 data centre, with a maximum of 7 no. main diesel generators in operation at any one time, which will provide power to the site when power from the OSPG is not available. In addition, a front-of-house (FOH) generator will also be in operation. The scenario modelled for this assessment includes batch testing once per week of all 8 back-up generators on site at 100% load for a maximum of 1-hour each, one generator at a time, sequentially. All testing will only occur between 8am and 5pm, Monday to Friday.

The modelling has considered the batch testing of the back-up generators once per week at 25% load, however, in reality, testing will occur once per month at a very low load. Thus, the approach used in this study will lead to an over-estimation of the actual levels that will arise.

USEPA Guidance suggests that for emergency operations, an average hourly emission rate should be used rather than the maximum hourly rate (USEPA, 2011). For modelling purposes only, a figure of 72 hours in total per year of operation has been applied to the assessment. However, in reality, and based on recent experience over the past number of years of the electricity network (Eirgrid, 2022), generators are rarely used other than during testing and maintenance described above. As a result, the maximum hourly emission rates from the back-up generators were reduced by a factor of (72/8760) to give an average hourly emission rate (in line with USEPA protocol) and the generators were modelled over a period of one full year.

A second methodology for modelling back-up generators has been published by the UK Environment Agency. The consultation document is entitled "Diesel Generator Short-Term NO_2 Impact Assessment" (UK EA, 2016). The methodology is based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value (18 exceedances are allowable per year before the air standard is deemed to have been exceeded). The assessment assumes a hypergeometric distribution to assess the likelihood of exceedance hours coinciding with the operational hours of the back-up generators. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined. The guidance suggests that the 95th percentile confidence level should be used to indicate if an exceedance is likely. More recent guidance (UK EA, 2019) has recommended this probability should be multiplied by a factor of 2.5 and therefore, the 98th percentile confidence level should be used to indicate if an exceedance is likely. The guidance suggests that the assessment should be conducted at the nearest residential receptor or at locations where people are likely to be exposed and that there should be no running time restrictions on these generators when providing power on site during an emergency.

Both the methodology advised in the USEPA guidance as well as the approach described in the UK EA guidance have been applied in this study to ensure a robust assessment of predicted air quality impacts from the gas generators and back-up diesel generators. The Plume Volume Molar Ratio Method (PVMRM) was used to model ambient NO_2 concentrations. The PVMRM is a regulatory option in AERMOD which assumes that the amount of NO converted to NO_2 is proportional to the ambient ozone concentration (USEPA, 2017). The PVMRM uses both plume size and ozone (O_3) concentration to derive the amount of O_3 available for the reaction between NO and O_3. NO_X moles are determined by emission rate and travel time through the plume segment. The concentration is usually limited by the amount of ambient O_3 that is entrained in the plume. Thus, the ratio of the moles of O_3 to the moles of NO_X gives the ratio of NO_2/NO_X that is formed after the NO_X leaves the stack. In addition, it has been assumed that 10% of the NO_X in the stack gas is already in the form of NO_2 (NO_2/NO_X in-stack ratio of 0.1) before the gas leaves the stack (in reality the levels will be lower). The model has also assumed a final equilibrium ratio for NO_2/NO_X of 0.90 which again is pessimistic and more likely to be in the range 0.7 - 0.8. The equation used in the algorithm to derive the ratio of NO_2/NO_X is:

$$NO_2/NO_X = (\text{moles } O_3/ \text{ moles } NO_X) + 0.10$$

A background ozone level of 55 µg/m^3 has been used in the model based on a review of EPA data for similar Zone A locations. For gas generators, a NO_2/NO_X ratio of 0.20 has been used which reflects the higher initial percentage of NO_2 which is released from gas engines (EPRI, 2020).

The gas generators will operate continually for a full year based on eight in operation at 100% load. Emission details for the gas generators can be seen in Table 9.2.

In addition, the diesel generators at the adjacent DB8 data centre will operate in an emergency scenario when there is an interruption to the operation of the gas generators. In addition, testing of the generators at reduced load will be required. It has been assumed that this will occur weekly with one generator tested within any one hour. In reality, testing will be of less frequency than this.

Stack Reference	Height Above Ground Level (m)	Exit Diameter (m)	Cross Sectional Area (m^2)	Temp (K)	Volume Flow Rate (Nm^3/hr at 15% Ref. O_2)	Exist Velocity (m/sec actual)	NO_X Concentration (mg/Nm^3 at 15% O_2 Ref.)	NO_X Mass Emission (g/s)
Gas generators	14	0.4	0.126	707.15	14,790	50.4	95	0.38
Diesel generators – Testing	20	0.6	0.28	736.15	19,396	20.8	1,355	7.30
Diesel generators – Emergency Operations	20	0.6	0.28	736.15	19,396	20.8	1,355	7.30 Note 2 / 0.167 Note 3
Front of House generator	20	0.5	0.20	778.25	10,062	11.4	510	1.42

Note 1 For the purposes of this assessment normalised conditions are 273.15 K, 101.3 Pa, dry gas and 15% O_2

Note 2 Maximum emission rate used to model the hypergeometric distribution at the 98^{th}%ile confidence level

Note 3 Reduced emission rates based on USEPA protocol used to model emissions during emergency operation based on 72 hours of operation

Table 9.2 Summary of Process Emission Information for all Buildings associated with the Permitted Development, Proposed Development And Overall Project

9.3 RECEIVING ENVIRONMENT

9.3.1 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "*Air Quality in Ireland 2021*" (EPA 2022) details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes as outlined within the EPA document titled 'Air Quality in Ireland 2021' (EPA 2022). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, the site is within Zone A as explained with the EPA document titled 'Air Quality in Ireland 2021' (EPA, 2022a).

In 2020 the EPA reported that Ireland was compliant with EU legal air quality limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions (EPA, 2021). The EPA report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, data from 2016- 2019 and 2021 has been used to determine the baseline air quality in the region of the site.

9.3.1.1 NO_2

With regard to NO_2, continuous monitoring data from the EPA (EPA 2022), at suburban Zone A background locations in Rathmines, Dun Laoghaire, Swords and Ballyfermot show that levels of NO_2 are below both the annual and 1-hour limit values (see Table 9.3), with annual average levels ranging from 11 - 20 µg/m^3 over the period 2016 - 2021 (see Table 9.3). The station at Swords is at a similar distance outside the M50 and therefore provides a suitable indication of background NO_2 concentrations in the region. Ballyfermot is within the M50 and located close to roadside traffic and thus is not a suitable background location. Annual average results at the Swords site range from 11 – 16 µg/m^3 over the five-year period (2016 – 2019, 2021), with an average of 14 µg/m^3 (EPA, 2022a). Based on these results, an estimate of the background NO_2 concentration in the region is 15 µg/m^3. It is expected that background levels of pollutants will remain at a similar level in the opening year.

In relation to the annual average background, the ambient background concentration was added directly to the process concentration with the short-term peaks assumed to have an ambient background concentration of twice the annual mean background concentration (see Section 9.7.2).

Station	Averaging Period	Year					
		2016	2017	2018	2019	2020	2021
Rathmines	Annual Mean NO_2 (µg/m^3)	20	17	20	22	13	14
	99.8th%ile 1-hr NO_2 (µg/m^3)	88	86	87	102	81	69
Swords	Annual Mean NO_2 (µg/m^3)	16	14	16	15	11	11
	99.8th%ile 1-hr NO_2 (µg/m^3)	96	79	85	80	65	63
Ballyfermot	Annual Mean NO_2 (µg/m^3)	17	17	17	20	12	13
	99.8th%ile 1-hr NO_2 (µg/m^3)	90	112	101	101	83	73

Note 1 Annual average limit value of 40 µg/m^3 and hourly limit value of 200 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011)

Note 2 2020 data shown for representative purposes only, not used in determining background concentrations

Table 9.3 Trends In Suburban Dublin (Zone A) Air Quality - Nitrogen Dioxide (µg/m^3)

9.3.1.2 *PM_{10}*

Continuous PM_{10} monitoring carried out at the suburban background locations of Ballyfermot, Dun Laoghaire and Tallaght all showed annual mean concentrations ranging from 11 – 16 µg/m³ over the period 2016-2021, with a maximum of 7 exceedances of the daily limit value of 50 µg/m³ (35 exceedances are permitted per year in accordance with the *Air Quality Standards Regulations 2011* outlined in section 9.2.1.1 of this EIAR) (see Table 9.4). PM_{10} results from the urban background location in the Phoenix Park show similarly low levels over the period of 2016 – 2021 with concentrations ranging from 9 – 11 µg/m³. Based on this historical data, an appropriate estimate of the background PM_{10} concentration in the region in the opening year is 14 µg/m³. It is expected that background levels of pollutants will remain at a similar level in the opening year.

Station	Averaging Period	Year					
		2016	2017	2018	2019	2020	2021
Ballyfermot	Annual Mean PM_{10} (µg/m³)	11	12	16	14	12	12
	24-hr Mean > 50 µg/m³ (days)	0	1	0	7	2	0
Dún Laoghaire	Annual Mean PM_{10} (µg/m³)	13	12	13	12	12	11
	24-hr Mean > 50 µg/m³ (days)	0	2	0	2	0	0
Tallaght	Annual Mean PM_{10} (µg/m³)	14	12	15	12	10	10
	24-hr Mean > 50 µg/m³ (days)	0	2	1	3	0	0
Rathmines	Annual Mean PM_{10} (µg/m³)	15	13	15	15	11	12
	24-hr Mean > 50 µg/m³ (days)	3	5	2	9	2	0
Phoenix Park	Annual Mean PM_{10} (µg/m³)	11	9	11	11	10	10
	24-hr Mean > 50 µg/m³ (days)	0	1	0	2	0	0

Note 1 2020 data shown for representative purposes only, not used in determining background concentrations

Table 9.4 Trends In Suburban Dublin (Zone A) Air Quality – PM_{10} (µg/m³)

9.3.1.3 *$PM_{2.5}$*

Continuous $PM_{2.5}$ monitoring carried out at the Zone A location of Rathmines showed an average concentration of 10 µg/m³ in 2019. Based on this information, the ratio of $PM_{2.5}$ to PM_{10} is estimated to be in the region of 0.7 with a representative background concentration of 10 µg/m³ estimated for the region based on the level of 14 µg/m³ for PM_{10} and the ratio 0.7 for the $PM_{2.5}$ to PM_{10} ratio.

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

9.4.1 Construction Phase

The Proposed Development will comprise construction of an energy centre and associated ancillary development. The key civil engineering works which will have a potential impact on air quality during construction are summarised below:

(i) During construction, an amount of soil will be generated as part of the site preparation works and during excavation for installation of foundations, drainage services and ancillary infrastructure;

(ii) Following completion of the building shell, commissioning of the mechanical and electrical equipment is undertaken;

(iii) Infilling and landscaping will be undertaken. Spoil generated during site preparation will be re-used where possible;

(iv) Temporary storage of construction materials and fuels; and

(v) Construction traffic accessing the site will emit air pollutants during transport.

As outlined in Section 9.6, dust mitigation measures will be implemented for the construction phase of the Proposed Development to ensure no dust nuisance occurs at nearby sensitive receptors as shown in Figure 9.2.

9.4.2 Operational Phase

The key works which will have a potential impact on air quality during operation of the Proposed Development (OSPG) and the Overall Project – Data Centre and OSPG are summarised below. Other works such as low levels of site traffic will have an insignificant impact on climate:

(i) The operation of the gas generators in the energy centre and the scheduled testing of the back-up generators in the data storage facilities will release air pollutant emissions (primarily NO_x emissions);

(ii) The infrequent emergency operation of the back-up generators for the data storage facilities in the event of a power outage would release air pollutant emissions (primarily NO_x emissions). A review of power outages in Ireland (Eirgrid, 2022) indicates that it is highly unlikely that the back-up generators would be used for emergency operations for more than 24 - 48 hours per year. This is an over-estimation of the actual usage;

(iii) Road traffic accessing the site will emit air pollutants. However, the operational phase is not expected to contribute a significant volume of additional traffic on the local road network (see Chapter 13). Therefore, no local air quality assessment of the traffic impact is required for this development; and

9.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

9.5.1 Construction Phase

The greatest potential impact on air quality during the construction phase of the Proposed Development and the Overall Project is from construction dust emissions as a result of excavation works, infilling and landscaping activities and storage of soil in stockpiles. This leads to the potential for nuisance dust. While construction dust tends to be deposited within 350m of a construction site, the majority of the deposition occurs within the first 50m (IAQM, 2014). The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.

Fuels will be stored in sealed containers and emissions to air are likely to be minimal. Therefore, there is unlikely to be an impact to air quality as the result of the temporary storage of fuels for the construction phase.

Initial commissioning activities will involve testing of the back-up generators on site in a similar manner to the operational phase testing, i.e. the first testing sequence will be commissioning of the standby generators. The operational modelling, as shown in Section 107.2, has considered testing of the generators on a weekly basis, and this does not result in a significant impact to air quality. Therefore, it is predicted that the construction phase and initial commissioning tests will result in an ***imperceptibly negative*** impact to air quality in the ***short-term*** and thus have a ***not significant*** impact.

9.5.2 Operational Phase

The potential impact to air quality during the operational phase of the Proposed Development and the Overall Project is a breach of the ambient air quality standards as a result of air emissions from the gas engines and back-up generators. However, as outlined in Section 9.6, an iterative stack height determination was undertaken as part of the air dispersion modelling study to ensure that an adequate release height was selected for all emission points to aid dispersion of the plume and ensure compliance with the ambient air quality limit values at all locations beyond the site boundary. Thus, the operational phase of the development will remain in compliance with the ambient air quality standards.

9.5.3 Do Nothing Scenario – Construction Phase

Under the Do Nothing Scenario no construction works will take place and the previously identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area, changes in road traffic, etc. Therefore, this scenario can be considered ***neutral*** in terms of air quality.

9.5.4 Do Nothing Scenario – Operational Phase

The Do Nothing Scenario comprises the operation of the backup generators operating for 72 hours per year which involves the emergency operation of 7 of the 8 generators (the remaining generator serving as a "catcher" generator). The scenario also included weekly testing of all 8 generators. The process emissions used for the Do Nothing are outlined in Table 9.5.

<u>USEPA Methodology</u>

The NO_2 modelling results at the maximum location at and beyond the site boundary are detailed in Table 9.5 based on the operation of the backup generators operating for 72 hours per year in addition to the scheduled weekly testing and annual load-banking of all back-up generators from the Do Nothing Scenario.

The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 80% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 64% of the annual limit value at the maximum off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Do Nothing Scenario are illustrated as concentration contours in Figures 9.2 and 9.3.

The operational phase impact of the Do Nothing Scenario, based on the EPA EIAR Guidelines (EPA, 2022b), is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Pollutant / Year	**Background Concentration (µg/m^3)**	**Averaging Period**	**Process Contribution NO_2 (µg/m^3)**	**Predicted Environmental Concentration NO_2 (µg/m^3)**	**Limit Value (µg/m^3)**
NO_2 / 2017	30	99.8th%ile of 1-hr means	130.5	160.5	200
	15	Annual Mean	10.4	25.4	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	113.9	143.9	200
	15	Annual Mean	8.3	23.3	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	124.6	154.6	200

	15	Annual Mean	9.1	24.1	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	123.4	153.4	200
	15	Annual Mean	9.0	24.0	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	116.0	146.0	200
	15	Annual Mean	8.4	23.4	40

Table 9.5 NO_2 Dispersion Model Results – Do Nothing Scenario

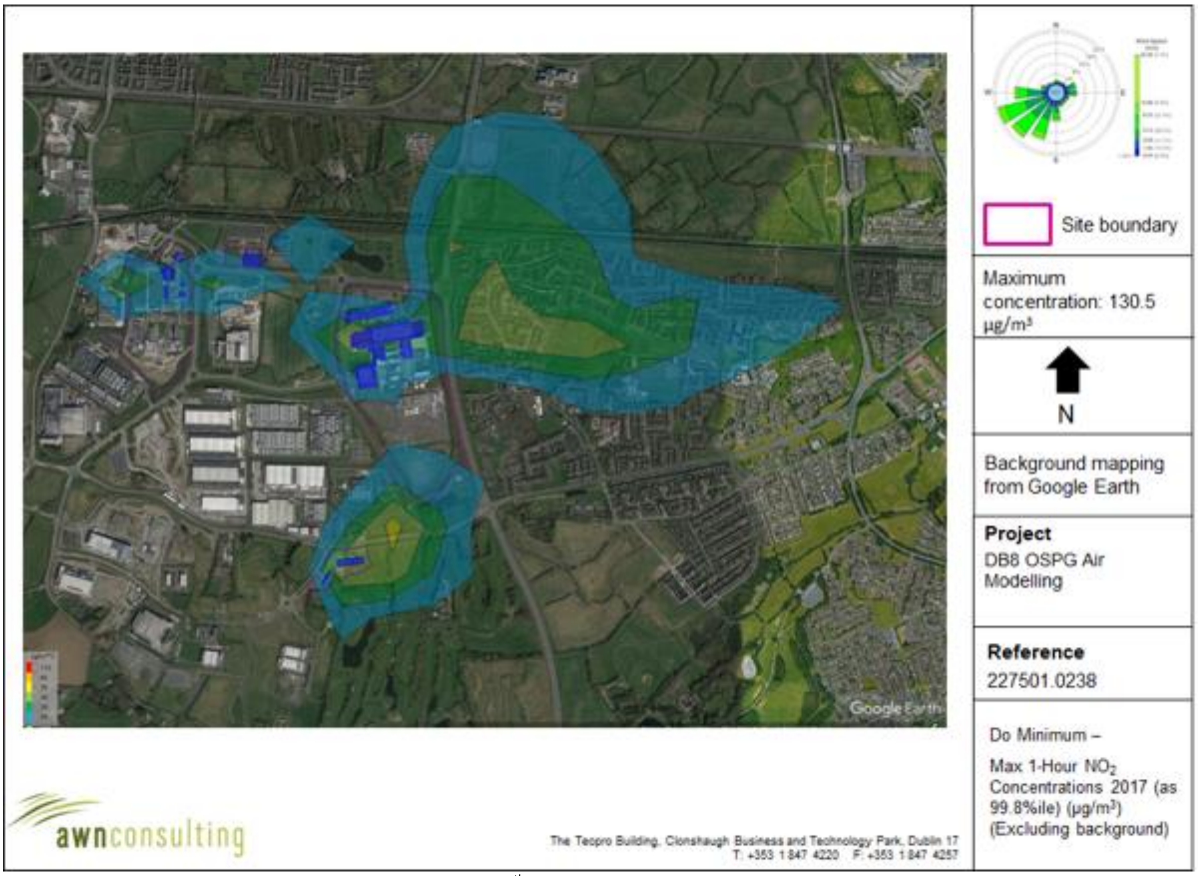


Figure 9.2 Do Nothing Scenario – Predicted NO_2 99.8th Percentile 1-Hour Concentrations

Figure 9.3 Do Nothing Scenario – Predicted NO_2 Annual Mean Concentrations

<u>UK Environment Agency Methodology</u>

The methodology, based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value assuming a hypergeometric distribution, has been undertaken at the maximum residential receptor for the Do Nothing Scenario. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 9.6. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the back-up generators. The results indicate that in the maximum year, the emergency generators for the Existing Development can operate for up to 1,950 hours per year before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). Figure 9.4 shows the statistical distribution predicted for the 98th percentile (based on 1,950 hours of operation per year). However, the UK guidance recommends that there should be no running time restrictions placed on back-up generators which provide power on site only during an emergency power outage.

Pollutant / Meteorological Year	**Hours of operation (Hours) (98th%ile) Allowed Prior To Exceedance Of Limit Value**	**UK Guidance – Probability Value = 0.02 (98th%ile)$^{Note\ 1}$**
NO_2 / 2017	3,500	**0.02**
NO_2 / 2018	6,500	
NO_2 / 2019	2,110	
NO_2 / 2020	3,250	
NO_2 / 2021	1,950	

Note 1 Guidance Outlined In UK EA publication "Diesel Generator Short-term NO_2 Impact Assessment" (EA, 2016)

Table 9.6 Hypergeometric Statistical Results at Maximum Residential Receptor – NO_2, Do Nothing Scenario

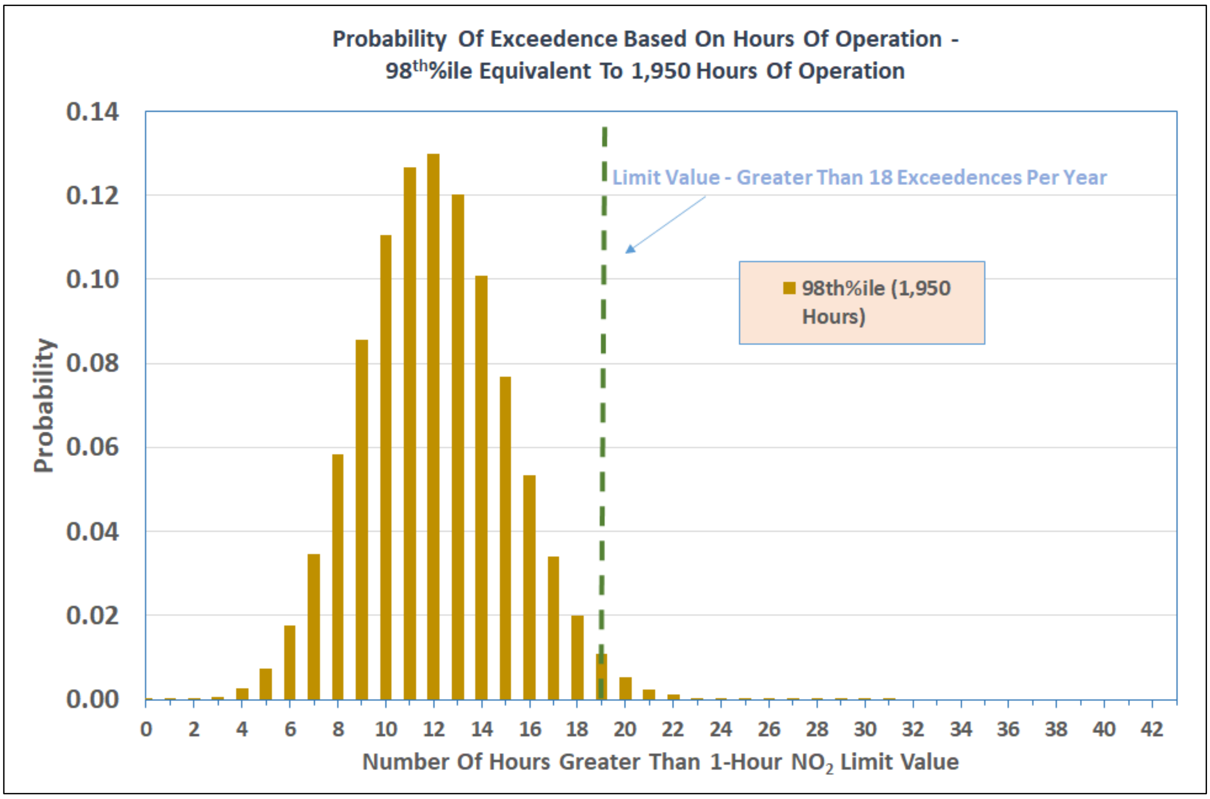


Figure 9.4 Probability of Exceedance of 1-Hour NO_2 Ambient Air Quality Limit Value based on Hours of Operation for Emergency Generators for Do Nothing Scenario

9.6 MITIGATION MEASURES

9.6.1 Construction Phase

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA based on the following publications:

- 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014);
- 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996);
- 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002);
- 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003);
- 'Fugitive Dust Technical Information Document for the Best Available Control Measures' (USEPA, 1997); and
- 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).

9.6.1.1 Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 for the windrose for Casement Aerodrome). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent will monitor the contractors' performance to ensure that the proposed mitigation measures are implemented, and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board will also include head/regional office contact details;
- Community engagement shall be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- The procedures put in place will be reviewed at regular intervals and monitoring conducted and recorded by the principal contractor. Reviews will be conducted on a monthly basis as a minimum.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

9.6.1.2 Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;

- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and

- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

9.6.1.3 Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust; and

- During periods of very high winds (gales), activities likely to generate significant dust emissions shall be postponed until the gale has subsided.

9.6.1.4 Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions;

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles shall be located downwind of sensitive receptors;

- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK Office of Deputy Prime Minister, 2002); and

- Hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

9.6.1.5 Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;

- At the main site traffic exits, a wheel wash facility shall be installed. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

9.6.1.6 Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The identification of the site management responsibilities for dust issues;

- The development of a documented system for managing site practices with regard to dust control;

- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and

- Measures to deal with any complaints received.

9.6.2 Operational Phase

The stack heights of the gas engines at 14m above local ground level and back-up generators at a stack height of 20m above local ground level have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations). No additional mitigation measures are proposed for the operational phase of the development.

9.7 RESDIUAL EFFECTS OF THE PROPOSED DEVELOPMENT

9.7.1 Construction Phase: Proposed Development - OSPG

Dust and Particulate Matter
When the dust mitigation measures detailed in the mitigation section (section 9.6.1) of this report are implemented, fugitive emissions of dust and particulate matter from the Construction Phase of the Proposed Development - OSPG will be ***negligible***, ***short-term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

Impacts on Human Health
Best practice mitigation measures are proposed for the c Construction Phase of the Proposed Development - OSPG which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place 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. Therefore, the impact of Construction Phase of the Proposed Development - OSPG is likely to be ***negligible***, ***short-term*** and ***not significant*** in nature with respect to human health.

9.7.2 Construction Phase – Overall Project – Data Centre & OSPG

Dust and Particulate Matter
When the dust mitigation measures detailed in the mitigation section (section 9.6.1) of this report are implemented, fugitive emissions of dust and particulate matter from the Construction Phase of the Overall Project – Data Centre & OSPG will be ***negligible***, ***short-term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

Impacts on Human Health
Best practice mitigation measures are proposed for the c Construction Phase of the Proposed Development - OSPG which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place 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. Therefore, the impact of Construction Phase of the Overall Project – Data Centre & OSPG is likely to be ***negligible***, ***short-term*** and ***not significant*** in nature with respect to human health.

9.7.3 Operational Phase: Proposed Development - OSPG

The Proposed Development – OSPG comprises the gas engine emission points running on gas for the full year. The process emissions used for the Proposed Development – OSPG are outlined in Table 9.2.

USEPA Methodology

The NO_2 modelling results at the maximum location at and beyond the site boundary are detailed in Table 9.7 based on the operation of the gas engines running on gas for the full year.

The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 39% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 44% of the annual limit value at the maximum off-site receptor. Concentrations decrease with distance from the site boundary.

The operational phase impact of the Proposed Development - OSPG, based on the EPA EIAR Guidelines (EPA, 2022b), is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Pollutant / Year	Background Concentration (µg/m^3)	Averaging Period	Process Contribution NO_2 (µg/m^3)	Predicted Environmental Concentration NO_2 (µg/m^3)	Limit Value (µg/m^3)
NO_2 / 2017	30	99.8th%ile of 1-hr means	46.4	76.4	200
	15	Annual Mean	2.5	17.5	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	48.0	78.0	200
	15	Annual Mean	2.0	17.0	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	46.3	76.3	200
	15	Annual Mean	2.2	17.2	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	47.6	77.6	200
	15	Annual Mean	2.4	17.4	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	37.5	67.5	200
	15	Annual Mean	1.7	16.7	40

Table 9.7 NO_2 Dispersion Model Results – Proposed Scenario

9.7.4 Operational Phase – Overall Project – Data Centre & OSPG

The Overall Project – Data Centre & OSPG Scenario comprises the gas engine emission points running on gas for the full year in addition to the operation of the backup generators operating for 72 hours per year which involves the emergency operation of 7 of the 8 generators (the remaining generator serving as a "catcher" generator). The scenario also included weekly testing of all 8 generators. The process emissions used for the Proposed Scenario are outlined in Table 9.2.

USEPA Methodology

The NO_2 modelling results at the maximum location at and beyond the site boundary are detailed in Table 9.8 based on the operation of the gas engines running on gas for the full year in addition to the operation of the backup generators operating for 72 hours per year in addition to the scheduled weekly testing and annual load-banking of all back-up generators from the Overall Project – Data Centre & OSPG Scenario.

The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 82% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 70% of the annual limit value at the maximum off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Overall Project – Data Centre & OSPG Scenario are illustrated as concentration contours in Figures 9.5 and 9.6.

The operational phase impact of the Overall Project – Data Centre & OSPG Scenario, based on the EPA EIAR Guidelines (EPA, 2022b), is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Pollutant / Year	Background Concentration ($\mu g/m^3$)	Averaging Period	Process Contribution NO_2 ($\mu g/m^3$)	Predicted Environmental Concentration NO_2 ($\mu g/m^3$)	Limit Value ($\mu g/m^3$)
NO_2 / 2017	30	99.8th%ile of 1-hr means	134.8	164.8	200
	15	Annual Mean	12.8	27.8	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	115.7	145.7	200
	15	Annual Mean	10.4	25.4	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	128.2	158.2	200
	15	Annual Mean	11.3	26.3	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	123.7	153.7	200
	15	Annual Mean	11.3	26.3	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	118.8	148.8	200
	15	Annual Mean	10.0	25.0	40

Table 9.8 NO_2 Dispersion Model Results – Proposed Scenario

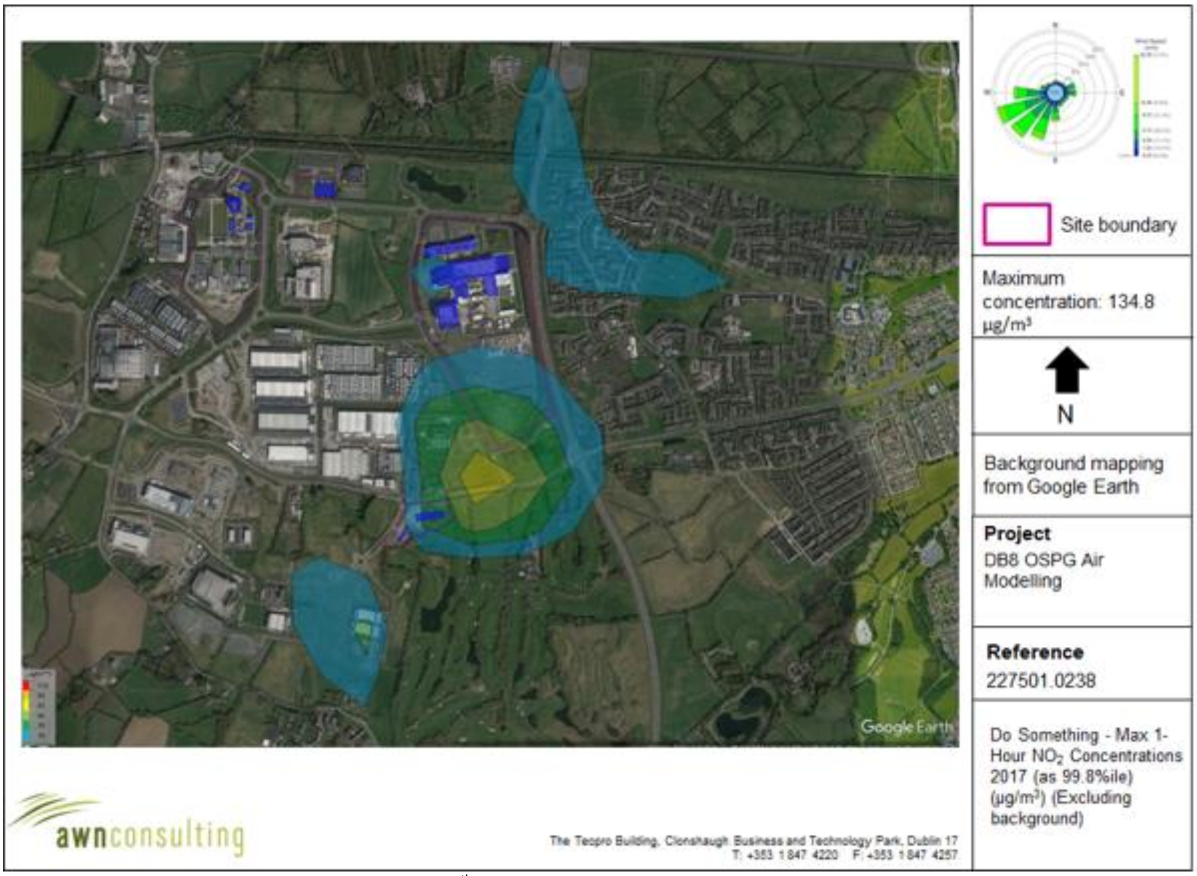


Figure 9.5 Proposed Scenario – Predicted NO_2 99.8th Percentile 1-Hour Concentrations

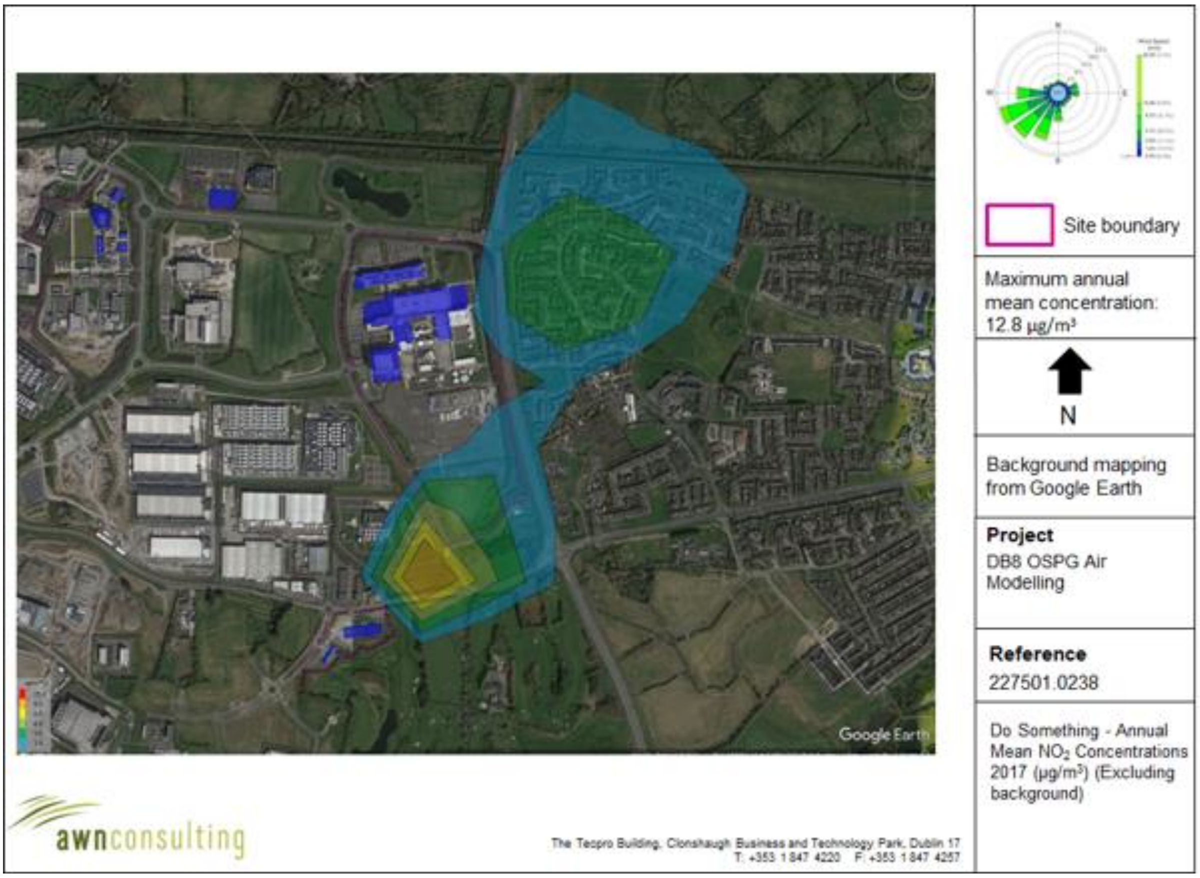


Figure 9.6 Proposed Scenario – Predicted NO_2 Annual Mean Concentrations

UK Environment Agency Methodology

The methodology, based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value assuming a hypergeometric distribution, has been undertaken at the maximum residential receptor for the Proposed Scenario. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 9.9. The results have been compared to the 98^{th} percentile confidence level to indicate if an exceedance is likely at various operational hours for the back-up generators. The results indicate that in the maximum year, the emergency generators for the Overall Project – Data Centre & OSPG Scenario can operate for up to 1,950 hours per year before there is a likelihood of an exceedance of the ambient air quality standard (at a 98^{th} percentile confidence level). Figure 9.7 shows the statistical distribution predicted for the 98^{th} percentile (based on 1,950 hours of operation per year). However, the UK guidance recommends that there should be no running time restrictions placed on back-up generators which provide power on site only during an emergency power outage.

Pollutant / Meteorological Year	Hours of operation (Hours) (98^{th}%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98^{th}%ile)[Note 1]
NO_2 / 2017	3,500	0.02
NO_2 / 2018	6,500	
NO_2 / 2019	2,110	
NO_2 / 2020	3,250	
NO_2 / 2021	1,950	

Note 1 Guidance Outlined In UK EA publication "Diesel Generator Short-term NO_2 Impact Assessment" (EA, 2016)

***Table* 9.9** Hypergeometric Statistical Results at Maximum Residential Receptor – NO_2, Proposed Scenario

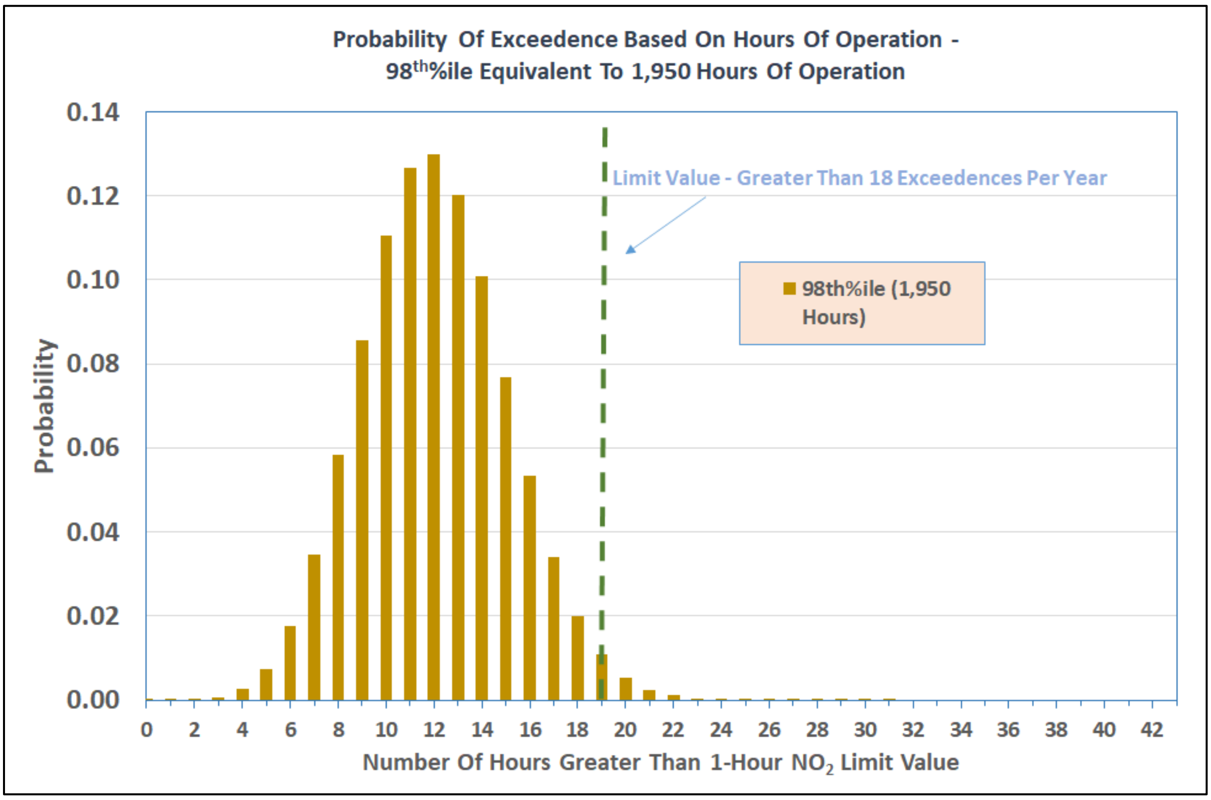


***Figure* 9.7** Probability of Exceedance of 1-Hour NO_2 Ambient Air Quality Limit Value based on Hours of Operation for Emergency Generators for Overall Project

9.7.5 *Summary of Modelling Assessment*

The modelling assessment has found that ambient NO_2 concentrations as a result of the Permitted Development – Data Centre Scenario are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 80% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 64% of the annual limit value at the maximum off-site receptor.

The modelling assessment has found that ambient NO_2 concentrations as a result of the Proposed Development – OSPG Scenario are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 39% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 44% of the annual limit value at the maximum off-site receptor.

The modelling assessment has found that ambient NO_2 concentrations as a result of the Overall Project – Data Centre and OSPG Scenario are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 82% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 70% of the annual limit value at the maximum off-site receptor.

Thus, the impact of the Proposed Development – OSPG Scenario is to lead to an increase in the ambient NO_2 concentration of 2% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 6% of the annual limit value at the maximum off-site receptor.

Thus, the impact to air quality from the operation of the Proposed Development – OSPG Scenario is therefore deemed ***long-term*** and ***slight*** in terms of significance and ***negative*** in terms of quality.

9.7.6 Regional Air Quality

Directive (EU) 2016/2284 "*On The Reduction Of National Emissions Of Certain Atmospheric Pollutants And Amending Directive 2003/35/EC And Repealing Directive 2001/81/EC*" was published in December 2016. The Directive will apply the 2010 National Emission Ceiling Directive limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3 and $PM_{2.5}$ as detailed in Section 9.2.1.3.

In order to assess the impact of the facility in terms of Ireland's obligations under Directive (EU) 2016/2284, the emissions of NO_X, SO_2, NMVOC and $PM_{2.5}$ have been quantified and compared to the Ireland's 2030 targets.

For the Permitted Development – Data Centre Scenario, based on the generation of 6.03 MW, the NO_X emissions based on electricity from the National Grid over the course of one year (i.e. 52.8 GWh based on 6.03 MW for 8,760 hours per annum will equate to 11 tonnes per annum which is 0.03% of the National Emission Ceiling limit for Ireland in 2030. Similarly, SO_2 emissions associated with this electricity use over the course of one year (52.8 GWh) will equate to 4 tonnes per annum which is 0.04% of the National Emission Ceiling limit for Ireland in 2030. Additionally, NMVOC emissions associated this electricity over the course of one year (52.8 GWh) will equate to 0.6 tonnes per annum which is 0.001% of the National Emission Ceiling limit for Ireland in 2030. Additionally, $PM_{2.5}$ emissions associated this electricity over the course of one year (52.8 GWh) will equate to 0.5 tonnes per annum which is 0.004% of the National Emission Ceiling limit for Ireland in 2030. Thus, the NO_X, SO_2, NMVOC and $PM_{2.5}$ indirect emissions associated with the operation of the Permitted Development – Data Centre Scenario based on electricity from the national grid are ***indirect*, *long-term, negative*** and ***slight*** with regards to regional air quality.

For the Proposed Development – OSPG Scenario, based on the generation of 0.2 MW, the NO_X emissions based on natural gas over the course of one year (i.e. 3.9 GWh based on 0.2 MW for 8,760 hours per annum will equate to 0.8 tonnes per annum which is 0.002% of the National Emission Ceiling limit for Ireland in 2030. Similarly, SO_2 emissions associated with this natural gas use over the course of one year (3.9 GWh) will equate to 0.3 tonnes per annum which is 0.003% of the National Emission Ceiling limit for Ireland in 2030. Additionally, NMVOC emissions associated this natural gas use over the course of one year (3.9 GWh) will equate to 0.04 tonnes per annum which is 0.0001% of the National Emission Ceiling limit for Ireland in 2030. Additionally, $PM_{2.5}$ emissions associated this natural gas use over the course of one year (3.9 GWh) will equate to 0.04 tonnes per annum which is 0.0003% of the National Emission Ceiling limit for Ireland in 2030. Thus, the NO_X, SO_2, NMVOC and $PM_{2.5}$ emissions associated with the operation of the Permitted Development – Data Centre Scenario based on natural gas are ***direct***, ***long-term*** and ***negligible*** with regards to regional air quality.

For the Overall Project – Data Centre and OSPG Scenario, based on the generation of 6.23 MW, the NO_X emissions based on natural gas over the course of one year (i.e. 121.3 GWh based on 6.23 MW for 8,760 hours per annum and 45% gas engine efficiency will equate to 25 tonnes per annum which is 0.06% of the National Emission Ceiling limit for Ireland in 2030. Similarly, SO_2 emissions associated with this natural gas use over the course of one year (121.3 GWh) will equate to 9 tonnes per annum which is 0.08% of the National Emission Ceiling limit for Ireland in 2030. Additionally, NMVOC emissions associated this natural gas use over the course of one year (121.3 GWh) will equate to 1.3 tonnes per annum which is 0.002% of the National Emission Ceiling limit for Ireland in 2030. Additionally, $PM_{2.5}$ emissions associated this natural gas use over the course of one year (121.3 GWh) will equate to 1.1 tonnes per annum which is 0.010% of the National Emission Ceiling limit for Ireland in 2030. Thus, the NO_X, SO_2, NMVOC and $PM_{2.5}$ emissions associated with the operation of the Overall Project – Data Centre and OSPG Scenario based on natural gas are ***direct***, ***long-term, negative*** and ***slight*** with regards to regional air quality.

9.7.7 Human Health

Air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, emissions from the site, assuming scheduled testing as well as emergency operation of the back-up generators, are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

9.7.8 Thermal Plume Assessment

A thermal plume assessment was undertaken using the CERC ADMS5 air dispersion model to assess the impact of the Overall Project – Data Centre & OSPG Scenario in terms of oxygen level, temperature and vertical velocity of the plume. As outlined in Appendix 9.3, the maximum extent of the risk zone due to oxygen level, temperature and vertical velocity of the plume is 9.0m above stack top. Thus, in conclusion, the spatial extent of the risk zone from the facility is very small and limited to 9m above stack top.

<u>Conclusion</u>

Once the mitigation measures outlined in Section 9.6 are implemented, the residual impacts on air quality from the construction of the Overall Project – Data Centre & OSPG Scenario will be ***short-term*** and ***imperceptibly negative*** and for the operational phase of the Overall Project – Data Centre & OSPG Scenario will be ***long-term, negative*** and ***slight.*** Thus, in terms of air quality, both the construction phase and operational phase will be ***not significant***.

Interactions are addressed in Chapter 16 of this EIA Report.

9.8 CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

9.8.1 Construction Phase

When the dust mitigation measures detailed in the mitigation section (section 9.6.1) of this report are implemented, cumulative fugitive emissions of dust and particulate matter from the Overall Project – Data Centre & OSPG Scenario and nearby facilities undergoing construction will be ***negligible***, ***short-term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

9.8.2 Operational Phase

The cumulative impact scenario for the operational phase of the Overall Project – Data Centre & OSPG Scenario assessed the combined impact of the facility as outlined above (Section 9.7.2) as well as scheduled testing emissions associated with standby diesel generators in the neighbouring (defined as within 1km of the facility) proposed and operational data storage facilities obtained from relevant planning permission applications (ADSIL, Cyrus One, Google Ireland, Interxion, Edgeconnex, Echelon, Microsoft, Digital Reality Trust and Vantage Data Centres Dub 11 Ltd) as well as proposed energy centres (Greener Ideas Limited and Vantage Data Centres Dub 11 Ltd). Emissions from nearby IED licensed sites including Pfizer, Takeda and Grange Backup Power were also included in the cumulative modelling. These emission points emit air pollutants on an essentially continuous basis over the course of a year. Nearby data storage facilities have emission points (standby diesel generators) which are classified as potential emission points as these will only operate under exceptional circumstances and thus will not be in operation on a day-to-day basis. The data storage facilities do not have licenced main emission points and do not have a licence issued by the EPA in contrast to the IED Licenced facilities. Thus, the emergency operations emission points associated with other nearby data storage facilities were not considered for the purpose of this assessment. This approach is in line with the methodology of AG4 (EPA, 2020). Testing of the standby diesel generators from these facilities has been included in the cumulative impact scenario.

<u>USEPA Methodology</u>

The NO_2 cumulative modelling results at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario at and beyond the site boundary are detailed in Table 9.9 based on the operation of the gas engines running on gas for the full year in addition to the operation of the backup generators operating for 72 hours per year in addition to the scheduled weekly testing and annual load-banking of all back-up generators from the Overall Project – Data Centre & OSPG Scenario and including the nearby facilities.

The results indicate that the ambient ground level concentrations at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site and nearby facilities lead to an ambient NO_2 concentration (including background) which is 86% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 75% of the annual limit value at the maximum off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Cumulative Scenario are illustrated as concentration contours in Figures 9.8 and 9.9.

The cumulative operational phase impact of the Overall Project – Data Centre & OSPG Scenario is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Pollutant / Year	Background Concentration (µg/m³)	Averaging Period	Process Contribution NO_2 (µg/m³)	Predicted Environmental Concentration NO_2 (µg/m³)	Limit Value (µg/m³)
NO_2 / 2017	30	99.8th%ile of 1-hr means	141.8	171.8	200
	15	Annual Mean	14.9	29.9	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	123.5	153.5	200
	15	Annual Mean	11.8	26.8	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	128.1	158.1	200
	15	Annual Mean	13.8	28.8	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	139.1	169.1	200
	15	Annual Mean	13.5	28.5	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	124.3	154.3	200
	15	Annual Mean	12.5	27.5	40

Table 9.9 NO_2 Dispersion Model Results – Cumulative Scenario

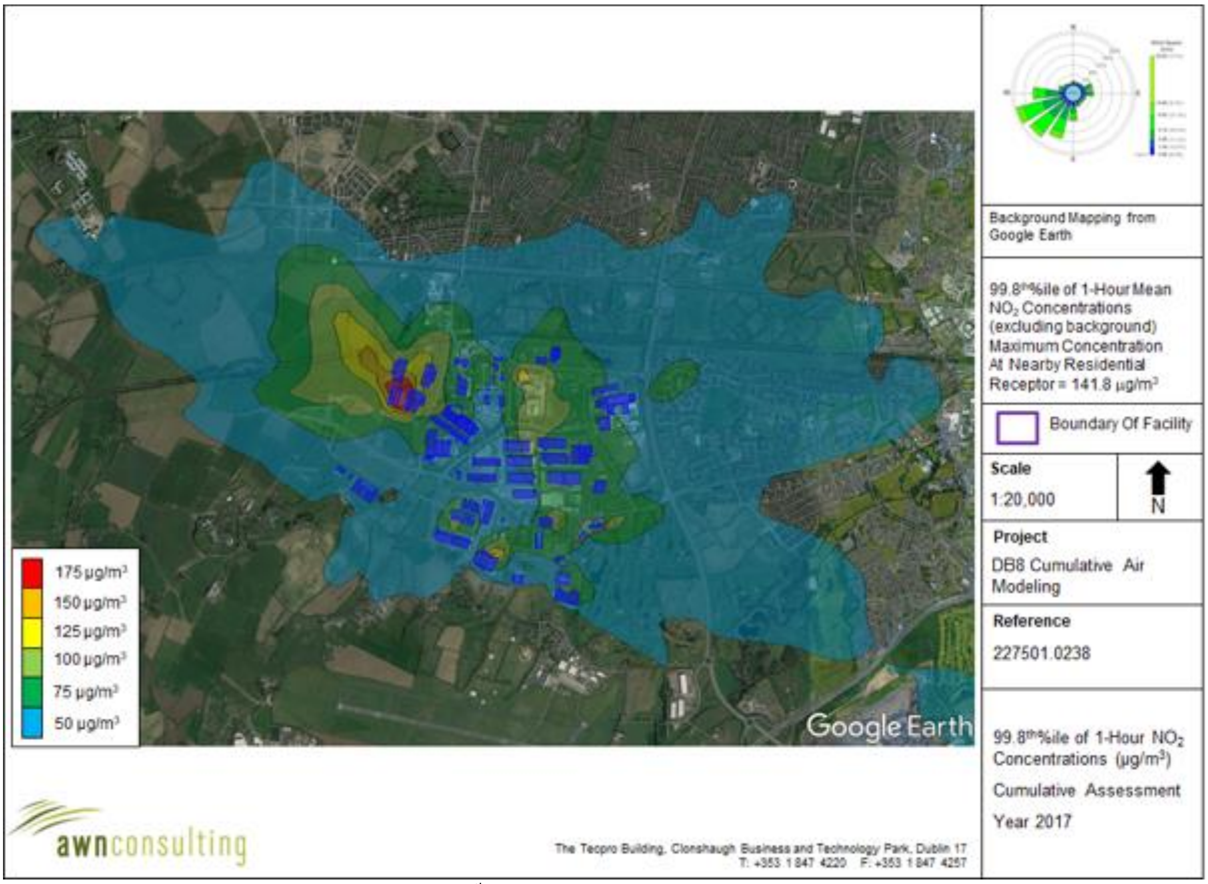


Figure 9.8 Cumulative Scenario – Predicted NO_2 99.8th Percentile 1-Hour Concentrations

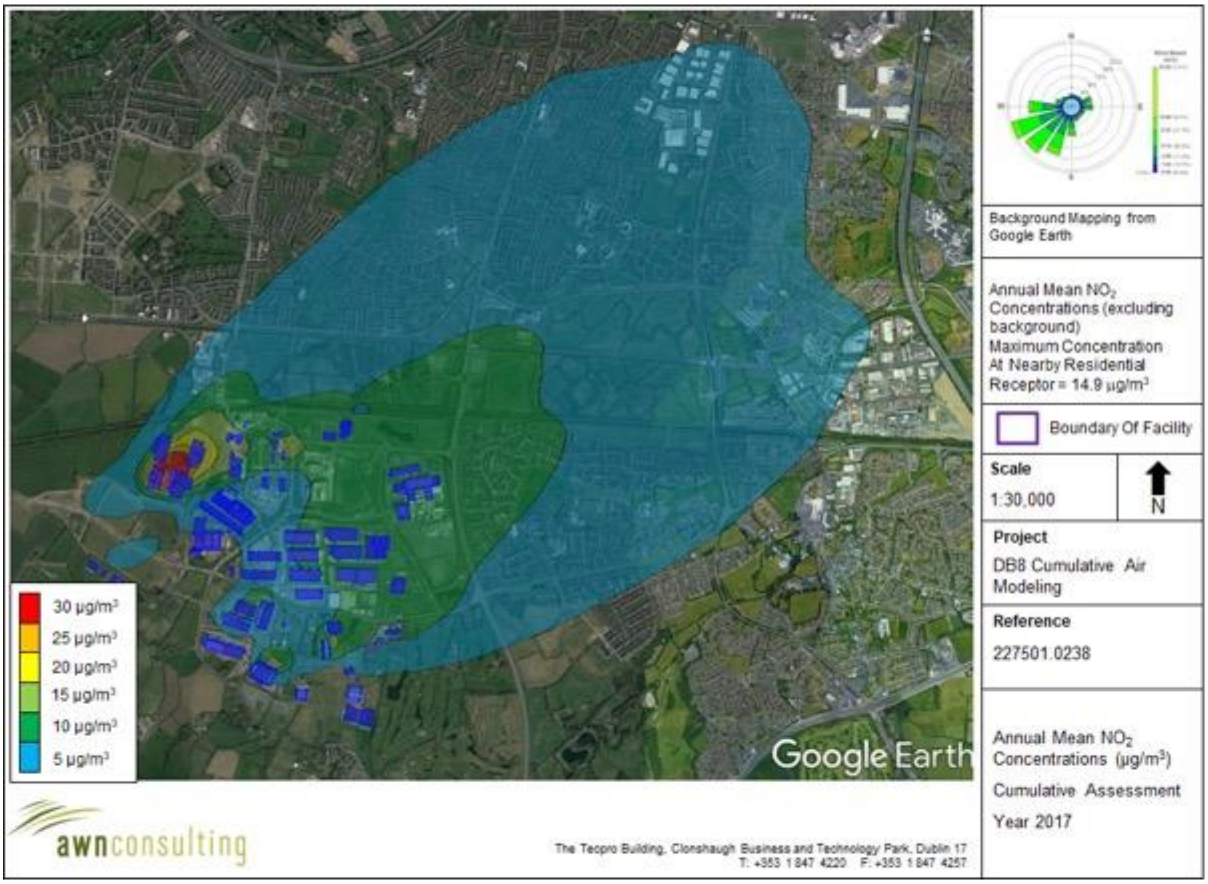


Figure 9.9 Cumulative Scenario – Predicted NO_2 Annual Mean Concentrations

9.8.3 Summary of Cumulative Modelling Assessment

The cumulative modelling assessment has found that ambient NO_2 concentrations as a result of the Overall Project – Data Centre & OSPG Scenario and nearby facilities are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. The impacts to air quality from the cumulative operation of the Overall Project – Data Centre & OSPG Scenario and other nearby facilities are therefore deemed ***long-term*** and ***slight*** in terms of significance and ***negative*** in terms of quality.

9.9 DECOMMISSIONING

In terms of air quality, if decommissioning of the OSPG is required the mitigation measures outlined for the Construction Phase of the Proposed Development will also be employed for the decommissioning phase.

9.10 REFERENCES

- BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites
- DEHLG (2004) National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010
- DEHLG (2007) Update and Revision of the National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010
- Eirgrid (2022) All-Island Transmission System Performance Report 2021
- EPA (2006) Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)
- EPA (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)
- EPA (2022a) Air Quality Monitoring Report 2021 (& previous annual reports 1997-2020)
- EPA (2022b) Guidelines on the Information to be contained in Environmental Impact Statements
- EPRI (2020) Phase II Assessment of NO_2/NO_X Ratios at Fossil Fuel Power plants
- German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft
- IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction
- The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
- UK EA (2016) Diesel Generator Short-term NO_2 Impact Assessment (Consultation Draft)
- USEPA (1999) "Comparison of Regulatory Design Concentrations: AERMOD vs. ISCST3 vs. CTDM PLUS"
- USEPA (2021) AERMOD Description of Model Formulation and Evaluation
- USEPA (2021) User's Guide to the AERMOD Meteorological Preprocessor (AERMET)
- USEPA (2017) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1
- USEPA (2011) Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard
- UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance
- USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures
- USEPA (1986) Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated)

10. Microclimate – Wind

10.1 Introduction

B-Fluid Limited has been commissioned by Equinix ltd to perform a Wind Micro-climate Modelling Study in relation to a proposed Gas Power Generator compound at lands located at Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 on the site bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue).

The on-site gas power generation compound (c.2,604sq.m in area) is proposed as part of the modifications to the permitted data centre granted under SDCC Reg. Ref. SD 21A/0186; the compound comprises 7 modular plant rooms (totalling c.180sq.m in area), 10 gas fired generators and associated flues c.14.7m high, gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and 2 vehicular access points including general and emergency access. The site location of the Overall Project (Proposed OSPG development and Permitted Data Centre) is shown in Figure 10.1.

A full description of the Overall Project is set out in (Project Description) of this EIAR. This Chapter should be read in conjunction with the site layout plans (drawing reference no.: DB080-RKD-ZZ-ZZ-M3-A-ZZZZ-9001-9003) and application documentation submitted with the application package.

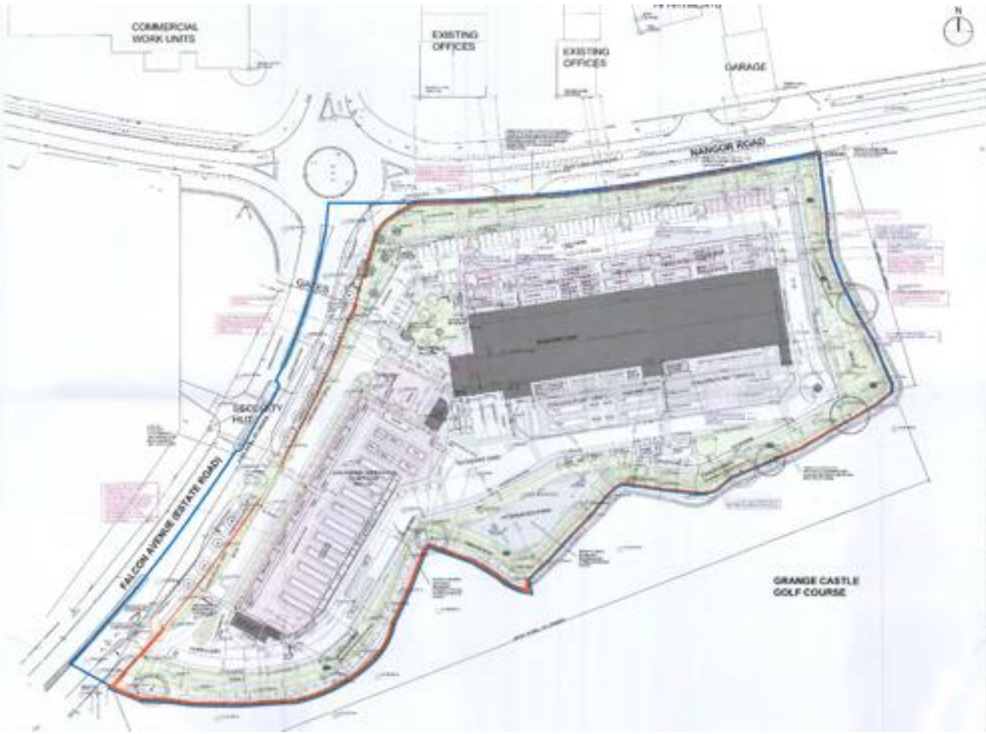


Figure 10.1- View of Site Boundary Showing Proposed Gas Power Generator and Permitted Data Centre under SD21A/0186 (Overall Project)

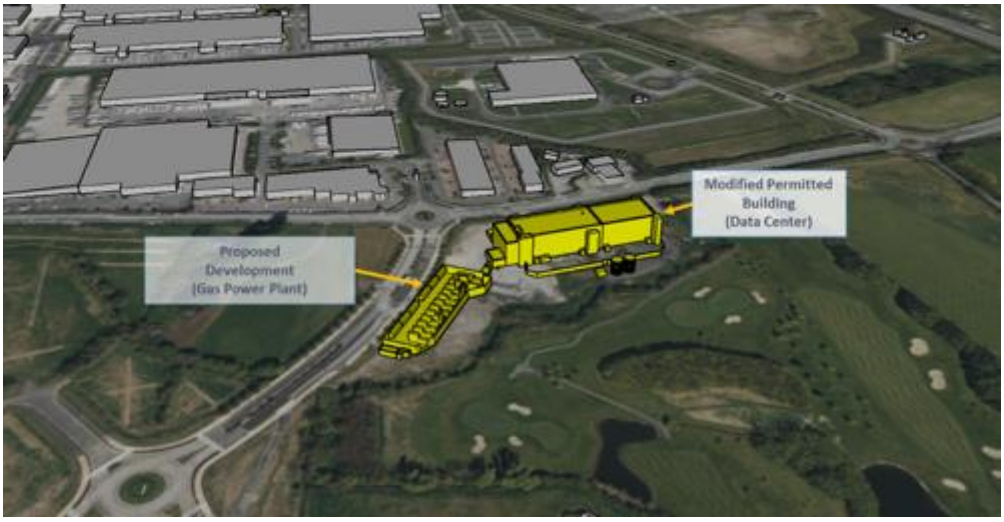


Figure 10.2- 3D Model View of Site Boundary Showing Proposed Gas Power Generator and Permitted Data Centre under SD21A/0186(Overall Project)

10.1.1 Author Information

This Chapter is completed by Dr. Cristina Paduano, Dr. Patrick Okolo and Dr. Arman Safdari.

Dr. Cristina Paduano is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environment and the construction industry with over 18 years of experience. She holds a PhD in Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Aerospace Engineering. with a demonstrated history of working in the design and civil engineering industry to assess fluid flows through numerical techniques. Cristina has carried out various wind modelling assessment for buildings complex in Ireland and UK such as Spencer Place, Elephant Park, Apollo House, Central Bank and Irish Whiskey Museum. Cristina reviewed and sing-off the analysis detailed in this chapter.

Dr. Patrick Okolo is a Chartered Engineer (CEng) and member of Engineers Ireland who is specialised in Computational Fluid Dynamics, Aeroacoustics analysis and Design Optimizations. He holds a PhD in Aeroacoustics from Trinity College Dublin, a M.Sc. and B.Sc. in Mechanical Engineering. For over 15 years, Patrick has been actively engaged in fluid dynamics modelling for built environments, aerospace, and automobile applications in industries and in various funded university collaborative research. He has featured in reputable journal publications. Patrick has numerically modelled and assessed wind impact within the urban environment at various developments in Ireland, UK and Middle east. Patrick carried out the Technical Assessment for the wind analysis of this chapter.

Dr. Arman Safdari is an expert in airflow modelling, heat and mass transfer and multi-phase flow simulations. He holds a PhD in Mechanical Engineering from Pusan National University, a M.Sc. and B.Sc. in Mechanical Engineering. He has over 10 years of expertise in engineering simulations in healthcare, power generation and oil & gas. Arman has authored several publications in technical journals and has disseminated his project findings at several leading international conferences. He has modelled various urban environments around developments such as Booterstown Marsh View, Eglinton Road and Claremont Project. Arman has run the CFD Modelling shown in this chapter.

10.1.2 Objective of the Wind Microclimate Analysis

A Wind Microclimate Study identifies the possible wind patterns that form when the wind moves through a built environment and evaluates how new development is going to modify those patterns. Wind Microclimate is defined as the wind flow experienced by people and the subsequent influence it has on their activities. Wind can accelerate or re-circulate through buildings in a way that compromise the comfort/safety of pedestrians and the usage of public realm/ external places per their designated intended purpose.

A wind microclimate study considers the possible wind patterns formed under both mean and peak wind conditions typically occurring on the site area, accounting for a scenario where the proposed development is inserted in the existing environment (potential impact) and, for a scenario where the proposed development is analysed together with the existing environment and any permitted development (not constructed yet) that can be influenced by the wind patterns generated by the proposed one (cumulative impact).

The potential receptors include those areas, in the surrounding of the development, which can be exposed to potential risks generated by the elevated wind speed or building massing wind effects. In particular:

- Amenity areas (pedestrian level), are areas likely to be utilised for leisure purposes and as such, should be comfortable surroundings.

- Pedestrian routes and seating areas – to determine if locations are comfortable for leisure activities.

- Entrance to the buildings – to determine if there is potential for pressure-related issues for entrances or lobbies.

- Landscaped areas – where there are sheltered areas.
- Impact on existing or adjoining developments – where the proposed buildings will cause discomfort conditions through proximity-related issues.

The acceptance criteria which define the acceptable wind velocities concerning the perception of comfort level experienced while carrying out a specific pedestrian activity is known as the "Lawson Criteria for Pedestrian Comfort and Distress". A wind microclimate study analyses the wind flow in an urban context (considering the wind conditions typically occurring on the site during a typical year) to develop the so-called "Lawson Comfort and Distress Map"; the map identifies where a specific pedestrian activity can be carried out comfortably during most of the time.

The assessment can be performed by physical testing in wind tunnels or by performing "virtual wind tunnel testing" through numerical simulation using Computational Fluid Dynamics (CFD), as done for this project and based on the 'Urban Development and Building Heights, Guidelines for Planning Authorities' referenced in the section below. The scope of the numerical study is to simulate the wind around the development to predict under which wind speeds pedestrians will be exposed and what level of comfort pedestrians will experience when carrying out a specific activity (i.e. walking, strolling, sitting).

The following sections detail the methodology, acceptance criteria, CFD wind simulations, and the impact of the proposed development on the local wind microclimate against best practice guidelines for pedestrian comfort and safety.

10.1.3 Guidance.

According to the 'Urban Development and Building Heights, Guidelines for Planning Authorities (Government of Ireland, December 2020)' document, specific wind impact assessment of the microclimatic effects should be performed for 'buildings taller than prevailing building heights in urban areas'. In the same guidance, the standard building height is considered 6-8 storeys. Above this height, buildings are considered 'taller' for Dublin standards.

The recommended approach to wind microclimate studies is outlined in the "Wind Microclimate Guidelines for Developments in the City of London '(August 2020) and the guidelines and recommendations contained in BRE Digest (DG) 520, "Wind Microclimate Around Buildings" (BRE, 2011). The Lawson Criteria of Comfort and Distress is used to benchmark the pedestrian wind microclimate.

The Wind Microclimate Guidelines for Developments in the city of London (2020) document also indicates how to use Computational fluid dynamics (CFD) to assess wind microclimate conditions and how to generate high-quality outputs to provide a good understanding of the fundamental flow features around an urban context.

Building Height	Recommended Approach to Wind Microclimate Studies
Similar or lower than the average height of surrounding buildings **Up to 25m**	Wind studies are not required, unless sensitive pedestrian activities are intended (e.g. around hospitals, transport hubs, etc.) or the project is located on an exposed location
Up to double the average height of surrounding buildings **25m to 50m**	Computational (CFD) Simulations **OR** Wind Tunnel Testing
Up to 4 times the average height of surrounding buildings **50m to 100m**	Computational (CFD) Simulations **AND** Wind Tunnel Testing
High Rise **Above 100m**	**Early Stage Massing Optimization:** Wind Tunnel Testing OR Computational (CFD) Simulations **Detailed Design:** Wind Tunnel Testing **AND** Computational (CFD) Simulations to demonstrate the performance of the final building design

Figure 10.3 - Recommended Approach to Wind Microclimate Studies based on Building Height, Source: Wind Microclimate Guidelines for Developments in the City London (2020)

10.1.4 Urban Wind Effects

Buildings and topography affect the speed and direction of wind flow. Wind speed increases with increasing height above the ground, assuming a parabolic profile shape as shown in Figure 10.4.

Flow near the ground level encounters obstacles represented by terrain roughness/buildings that reduce the wind speed and introduce random vertical and horizontal velocity components. This turbulence causes vertical mixing between the air moving horizontally at one level, and the air at those levels immediately above and below it. For this reason, the wind velocity profile is given by a fluctuating velocity along a mean velocity value, showing the wind velocity profile, as described above.

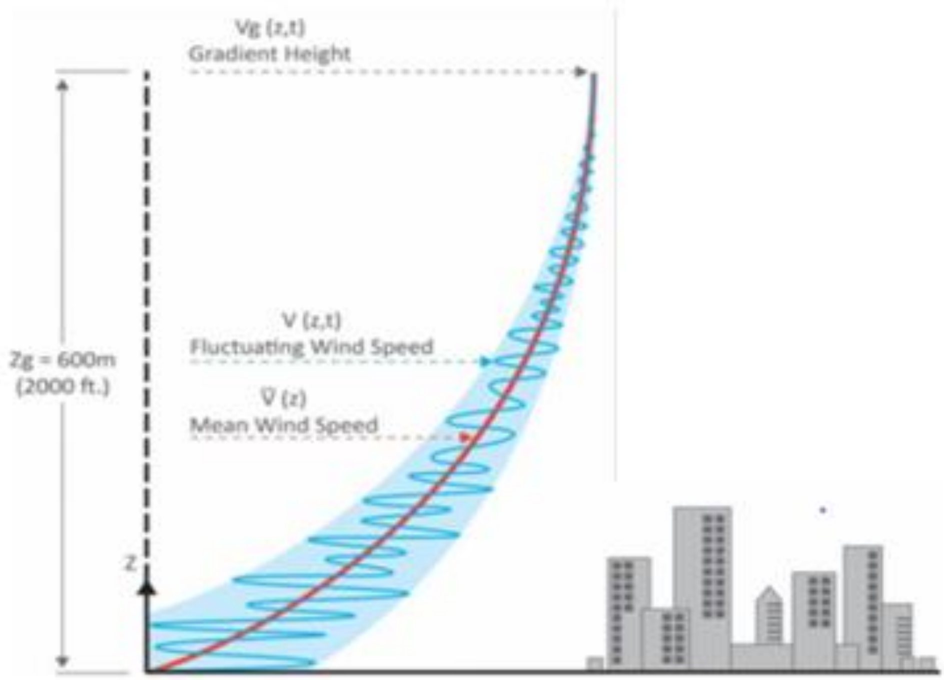


Figure 10.4 Atmospheric wind velocity profile Source: Building Aerodynamics, Tom Lawons -. Imperial College Press, 2001

In an urban context, wind speeds at the pedestrian level are generally low compared with upper-level wind speeds, however, the wind can create adverse patterns when flowing in between buildings which can cause local wind accelerations or re-circulations (Figure 11.4). This pattern affects pedestrian safety and comfort. In general, the wind effects to be avoided/mitigated in an urban context include the following:

Funnelling Effects: The wind can accelerate significantly when flowing through a narrow passage between building structures. The highest speeds are experienced at the point where the restriction of the area is the greatest.

Downwash Effects: The air stream when striking a tall building can flow around it, over it and a part can be deflected towards the ground. This downward component is called the downwash effect and its intensity depends on the pressure difference driving the wind. The higher the building, the higher this pressure difference can be.

Corner Effects: Wind can accelerate around the corners of the buildings. Pedestrians can experience higher wind speeds as well as more sudden changes in wind speeds. The reason for this is that there are narrow transition zones between the accelerated flows and the adjacent quiescent regions. This effect is linked to the downwash effect as the downward stream component subsequently flows around the corners towards the leeward side of the building.

Wake Effect: Excessive turbulence can occur on the leeward side of the building. This can cause sudden changes in wind velocity and can raise dust or lead to the accumulation of debris. This effect is also dependent on the height of the building.

The anticipation of the likely wind conditions resulting from new developments is an important consideration in the context of pedestrian comfort and the safe use of the public realm. While it is not always practical to design out all the risks associated with the wind environment, it is possible to provide local mitigation to minimise risk or discomfort where required.

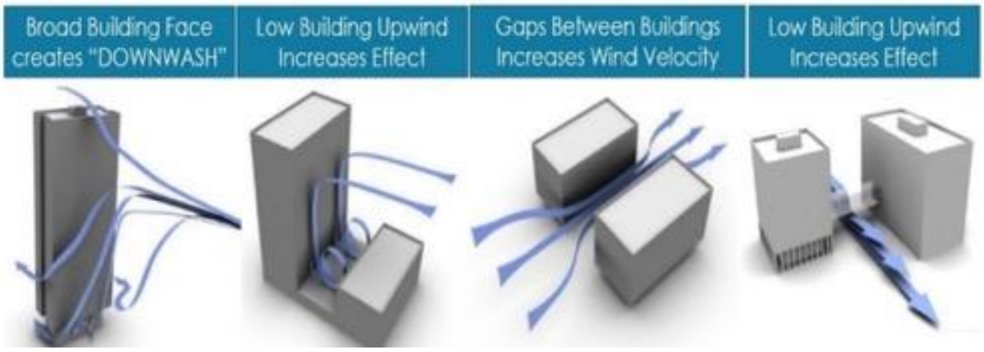


Figure 10.5 - Wind Patterns Created Around Buildings Showing Typical Wind Microclimate In An Urban Context

10.2 Assessment Methodology

The method for the study of wind microclimate combines the use of Computational Fluid Dynamics (CFD) to predict wind velocities and wind flow patterns, with the use of wind data from suitable meteorological stations and the recommended comfort and safety standards (Lawson Criteria).

The Overall project which is the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and the proposed amendments to this application as per application SDCC Ref. SD22A/0156 has been assessed.

The effect of the geometry, height, and massing of the proposed development and existing surroundings including topography, ground roughness and landscaping of the site, on local wind speed and direction is considered as well as the pedestrian activity to be expected (sitting, standing, strolling and fast walking).

The results of the assessment are presented in the form of contours of the Lawson criteria at the pedestrian level.

The assessment has comprised the following scenarios:

- **Baseline Existing Scenario**: this consists of the existing wind microclimate at the site and includes the permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and an empty greenfield site as well as any surrounding existing structures.

- **Proposed Development in the Existing Scenario:** this consists of the assessment of the wind microclimate of the proposed development for which consent is being sought under SDCC Ref. SD22A/0156 which includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works, considering any existing structures surrounding the area.

In particular, the following steps have been undertaken:

- Topography of the site with buildings (proposed and adjacent existing/permitted developments massing, depending on the scenario assessed "baseline or proposed") have been modeled using CFD OpenFOAM Software (CFD model and details are in Section 10.2.2)

- Suitable wind conditions have been determined based on historic wind data. Criteria and selected wind scenarios included means and peaks wind conditions that need to be assessed with the Lawson Criteria.

- Computational Fluid Dynamics (CFD) has been used to simulate the local wind environment for the required scenarios ('baseline, proposed").

- The impact of the proposed development massing on the local wind environment has been determined (showing the wind flows obtained at the pedestrian level).

- Potential receptors (pedestrian areas) have been assessed through a review of external amenity/public areas (generating the Lawson Comfort and Distress Map) as shown in Figure 10.6.

- Potential mitigation strategies for any building-related discomfort conditions (where necessary) have been explored and their effect introduced in the CFD model produced.

10.2.1 Definition of Study Area

Following the guideline cited in Section 10.1.3, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the centre of the site.

The extent of the built area (e.g. buildings, structures or topography) that is represented in the numerical domain depends on the influence of the features of such surrounding buildings on the region of interest. Other taller buildings outside of this zone that could have an influence on wind conditions within the project site should be included for wind directions where they are upwind of the project site. However, according to best practice guideline (Best practice guideline - COST action 732), a building's height may not have a significant influence if its distance from the region of interest is greater than 6-10 times the height of the buildings around the area of interest.

We considered surrounding buildings within a 400m radius which is larger than 10 times the height of the buildings in the site location) and no further or taller structure outside the 400m radius from the area are identified as having an impact.

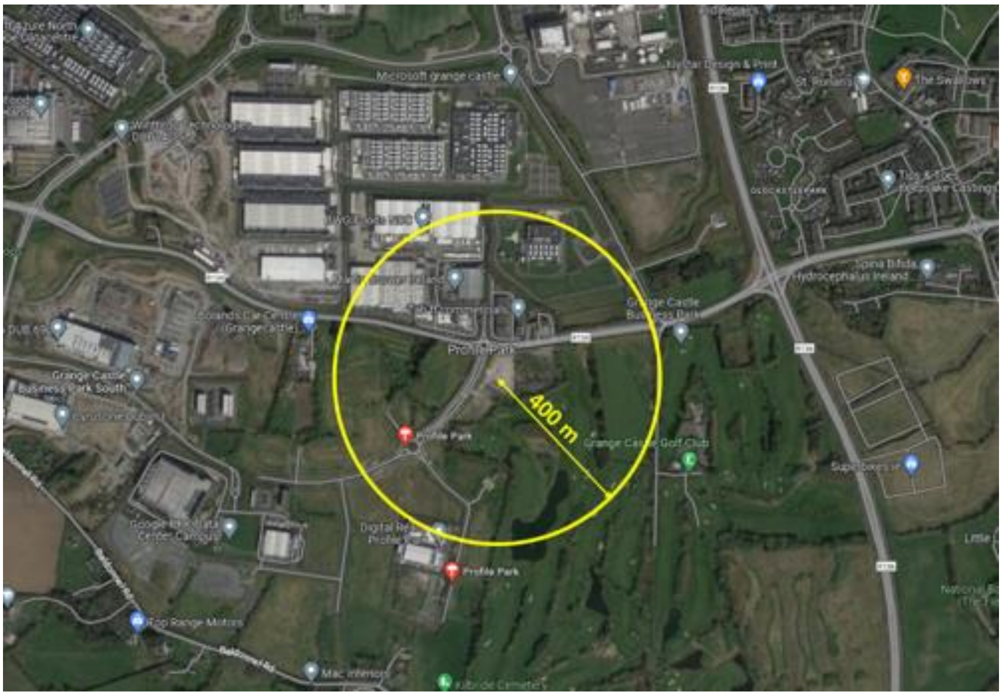


Figure 10.6 - Site Location and Extents of Study Area

Figure 10.7 - Site Location in Red

10.2.2 CFD Modelling Method

As explained previously, the wind study is conducted through Computational Fluid Dynamics (CFD). This is a numerical technique to simulate fluid flow, heat and mass transfer, chemical reaction and combustion, multiphase flow, and other phenomena related to fluid flows. CFD modelling includes three main stages: pre-processing, simulation, and post-processing as described in the figure that follows.

The Navier-Stokes equations, used within CFD analysis, are based entirely on the application of fundamental laws of physics and therefore produce extremely accurate results providing that the scenario modelled is a good representation of reality.

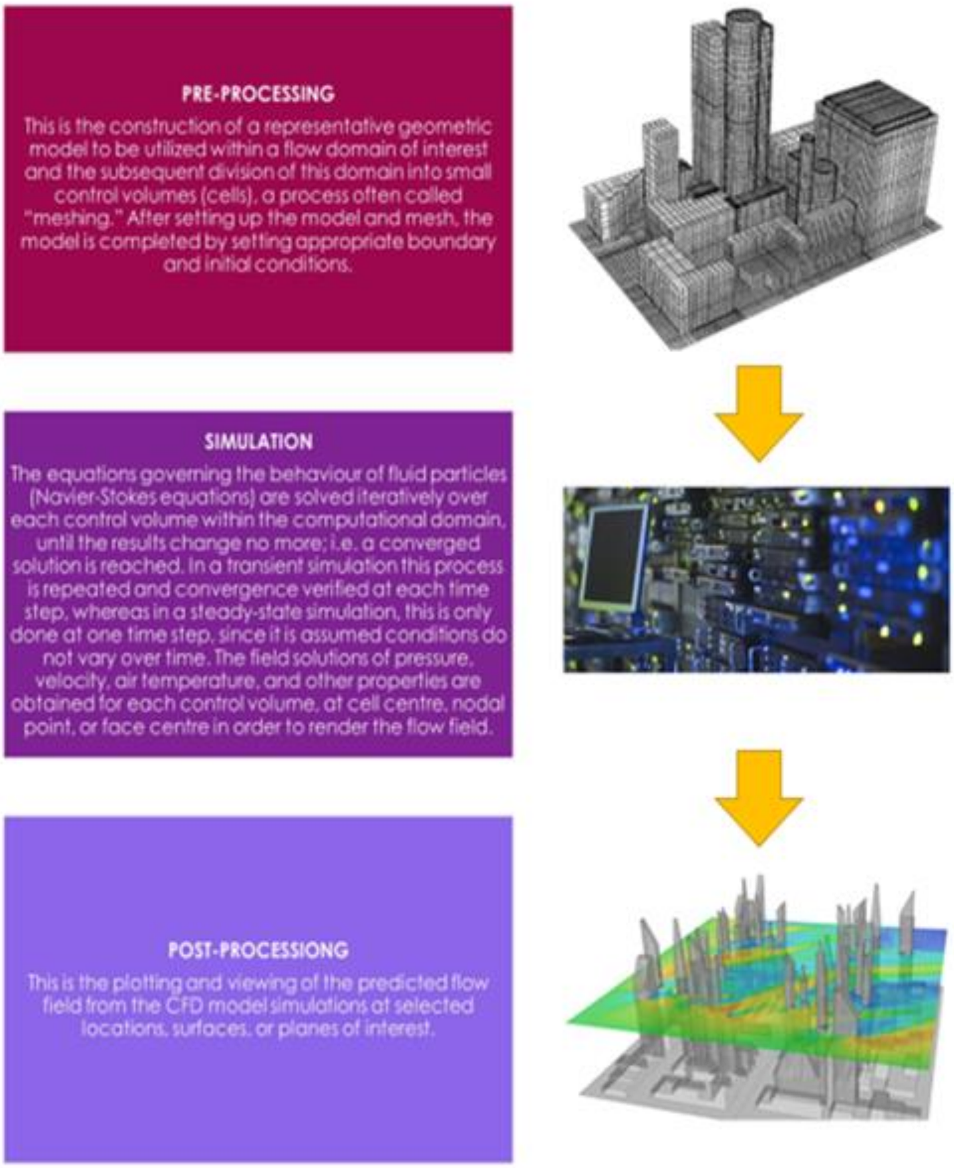


Figure 10.8 - CFD Modelling Process Explanation

10.2.2.1 OpenFOAM Software for CFD application

This report employs OpenFoam Code, based on the concept of Reynolds-Averaged Navier-Stokes (RANS) formulations and the post-processing visualisation tool ParaView. OpenFOAM is a CFD software released and developed primarily by OpenCFD Ltd, since 2004. It has a large user base across most areas of engineering and science, from both commercial and academic organisations. OpenFOAM has an extensive range of features to solve anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to acoustics and solid mechanics.

10.2.2.2 CFD Model Details

This subsection describes all features included in the geometrical and physical representation of the CFD model. Any object which may have significant impact on wind movement and circulation are represented within the model. To be accurate, the structural layout of the building being modelled should include only the obstacles, blockages, openings, and closures which can impact the wind around the building. It is important to remember that a CFD simulation approximates reality, so providing more details of the geometry within the model will not necessarily increase the understanding of the bulk flows in the real environment.

10.2.2.3 Modelled Geometry

A 3D view of the proposed development massing model is presented in the images that follow. The modelled layout and dimensions of the surrounding environment are outlined in the table below.

To represent reality and consider the actual wind impacting on the site, the modelled area for the wind modelling study comprises a wider urban area of over 1.5km^2 around the development, this to include the recommended dimensions as outlined in Section 10.1.3.

Figure 10.9 - 3D view of the CFD Model – Baseline

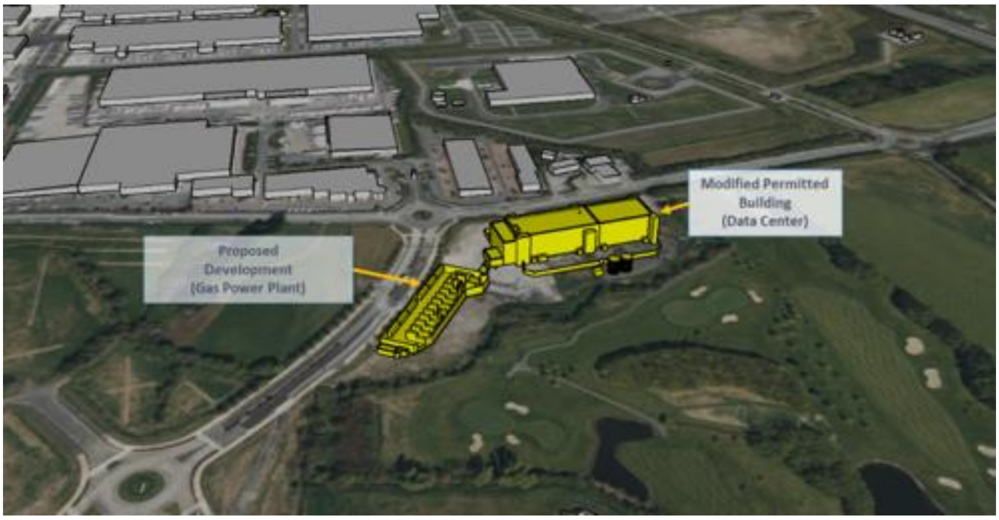


Figure 10.10 - 3D view of the CFD Model –Proposed

10.2.2.4 Boundary Conditions for The CFD Model

A rectangular computational domain was used for the analysis. Building surfaces within the model are specified as 'no slip' boundary conditions. Airflow inlet boundaries possess the 'Inlet' wind profile velocity patch boundary condition with its appropriate inflow turbulence intensity and dissipation rates.

For each wind directions, an initial wind velocity was set based on logarithmic wind profile obtained by following equation (Green Mark CFD Guideline, 2021 - Eurocode, 2005):

$$u_{(z)} = \frac{u^{\star}}{K} \cdot ln(\frac{z+z_0}{z_0})$$

Where:

- u(z) = wind speed measured at height z
- z = height
- z_0 = ground roughness
- u^* = friction velocity
- K = Karman constant

10.2.2.5 Computational Mesh

The mesh is a grid of computational cells used to represent the flow volume/domain. The level of accuracy of the CFD results are determined by the level of refinement of the computational mesh. Details of parameters used to calculate the computational mesh are presented in Table 10.1. Figure 10.12 shows the mesh utilised in the simulations.

The computational mesh used in this report is created using OpenFOAM utilities blockMesh and snappyHexMesh. It is a hybrid mesh containing a structured background grid and an unstructured hexahedron-dominated mesh in the near-wall region. The largest cell has a depth of 5 m, where the smallest has a depth of 0.15 m. The total cell count is approx. 33 million. An isometric view of the geometry captured by the computational mesh is shown in Figure 10.12

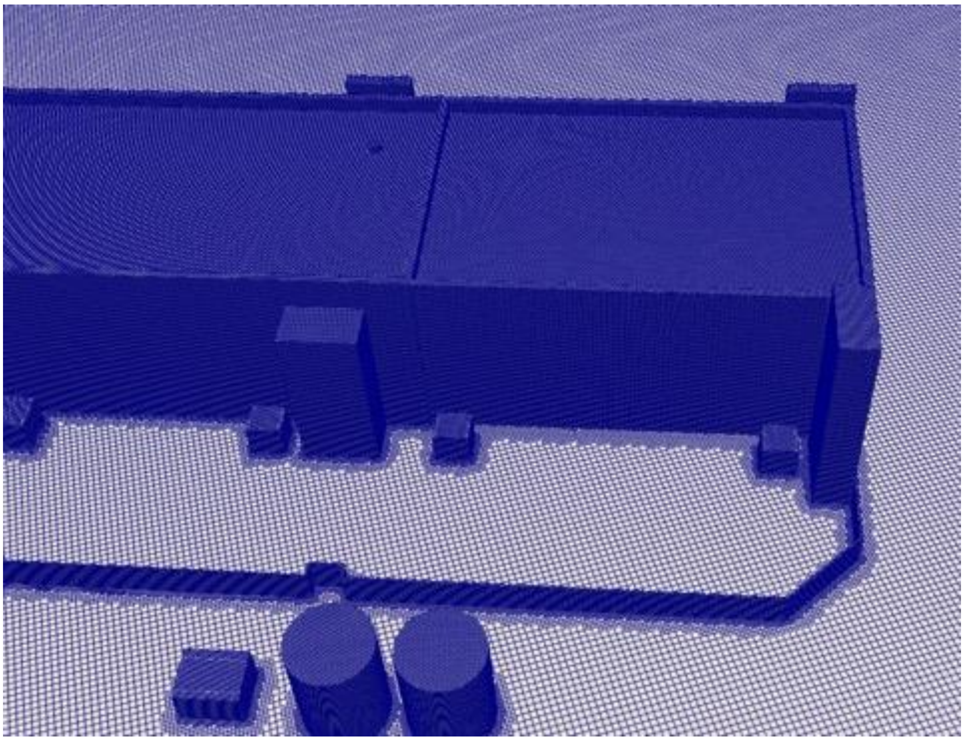


Figure 10.11- Computational Mesh Utilized for the CFD Model

NUMERICAL SIMULATION PARAMETERS	
Air Density ρ	1.2kg/m^3
Ambient Temperature (T)	288K($approx$.15C°)
Gravity Acceleration (g)	9.8m/s^2
Cell Size	.3 m at the building n in the surroundings m elsewhere
Total Number of Mesh Cells	Approx. 33 million

Table 10.1 Numerical simulation parameters for the CFD Model

10.2.3 Assessment Criteria

10.2.3.1 Pedestrian Comfort and Distress Criteria

"Lawson Comfort and Distress Criteria" has been developed for wind microclimate studies as a means of assessing the long-term suitability of urban areas for walking or sitting, accounting for both microclimatic wind effects (i.e., site location and prevailing winds) and microclimatic air movement associated with wind forces influenced by the localised built environment forms and landscaping effects.

The Lawson scale assesses pedestrian wind comfort in absolute terms and defines the reaction of an average person to the wind.

For the distress (safety) criterion, only gust winds are considered. These are usually rare events but deserve special attention in city planning and building design due to their potential impact on pedestrian safety. Gusts cause most cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 and these" gust equivalent mean" (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds. The following criteria are widely accepted by local authorities as well as the international building design and city planning community:

<u>COMFORT CRITERIA: Relates to the activity of the individual.</u>

The onset of discomfort:

- Depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM) which is exceeded 5% of the time.

- DISTRESS CRITERIA: Relates to the physical well-being of the individual.

The onset of distress:

  - 'Frail Person or Cyclist': equivalent to an hourly mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year (0.022% of the times). This is intended to identify wind conditions that 'less physically able' individuals or cyclists may find physically difficult. Conditions more than this limit may be acceptable for optional routes and routes that 'less physically able' individuals are unlikely to use.

  - 'General Public': A mean speed of 20 m/s and a gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed, aerodynamic forces approach body weight and it rapidly becomes impossible for anyone to remain standing. Where wind speeds exceed these values, pedestrian access should be discouraged.

	PEDESTRIAN COMFORT CATEGORY (LAWSON SCALE)	MEAN AND GEM WIND SPEED NOT TO BE EXCEEDED MORE THAN 5% OF THE TIME	DESCRIPTION
	Sitting	4m/s	Acceptable for frequent outdoor sitting use, i.e. restaurant /café
	Standing	6m/s	Acceptable for occasional outdoor sitting use, i.e. public outdoor spaces
	Walking/Strolling	8m/s	Acceptable for entrances/bus stops /covered walkaways
	Business Walking	10m/s	Acceptable for external pavements, walkways
	Uncomfortable	>10m/s	Start of not comfortable/distress level for pedestrian access

Table 10-2: Lawson Pedestrian Comfort Criteria Details

	PEDESTRIAN SAFETY CATEGORY (LAWSON SCALE)	MEAN AND GEM WIND SPEED NOT TO BE EXCEEDED MORE THAN 0.0022% OF THE TIME	DESCRIPTION
	Unsafe for public	>20m/s	Distress/safety concern for pedestrian
	Unsafe for cyclists or frail person	>15m/s	Distress/safety concern for cyclists/frail person

Table 10-3: Lawson Pedestrian Distress Criteria Details of Unsafe Conditions

These criteria for wind forces represent average wind tolerances. They are subjective and variable depending on thermal conditions, age, health, clothing, etc. which can all affect a person's perception of a local microclimate. Moreover, pedestrian activity alters between the winter and summer months. The criteria assume that people will be suitably dressed for the time of year and individual activity. It is reasonable to assume, for instance, that areas designated for outdoor seating will not be used on the windiest days of the year. Weather data measured are used to calculate how often a given wind speed will occur each year over a specified area.

Pedestrian comfort and distress criteria are assessed at 1.5m above ground level as required by the guideline cited in Section 10.1.3. If the predicted wind conditions exceed the threshold, then conditions are unacceptable for the type of pedestrian activity and mitigation measures should be implemented into the design.

10.2.3.2 Significance Criteria

The significance of on-site measurement locations is defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, using the table provided by the Lawson Comfort and Distress Criteria.

SIGNIFICANCE	TRIGGER	MITIGATION REQUIRED?
Major Adverse	*Conditions are "unsafe"* *(including cyclists or frail persons).*	*Yes*
Moderate Adverse	*Conditions are "unsuitable" (in terms of comfort) for the intended pedestrian use.* *(including cyclists or frail persons).*	*Yes*
Negligible	*Conditions are "suitable" for the intended pedestrian use (including cyclists or frail persons).*	*No*
Moderate Beneficial	*Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).* *(including cyclists or frail persons).*	*No*

Table 10-4 On-Site Receptors Significance Criteria extracted by Wind Microclimate Guidelines for Developments in the City of London (August 2020)

The significance of off-site measurement locations is defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, prior to and after the introduction of the proposed development.

Table 10-5 Off-Site

SIGNIFICANCE	TRIGGER	MITIGATION REQUIRED?
Major Adverse	Conditions that were "safe" in the baseline scenario became "unsafe" because of the proposed development. Or Conditions that were "suitable" in terms of comfort in the baseline scenario became "unsuitable" because of the proposed development. Or Conditions that were "unsafe" in the baseline scenario are made worse because of the proposed development.	YES
Moderate Adverse	Conditions that were "suitable" in terms of comfort in the baseline scenario are made windier (by at least one comfort category) because of the proposed development but remain "suitable" for the intended pedestrian activity.	NO
Negligible	Conditions remain the same as in the baseline scenario.	NO
Major Beneficial	Conditions that were "unsafe" in the baseline scenario became "safe" because of the proposed development.	NO
Moderate Beneficial Potential Receptors	Conditions that were "unsuitable" in terms of comfort in the baseline scenario became "suitable" because of the proposed development. Or Conditions that were "unsafe" in the baseline scenario are made better as a result of the proposed development (but not to make them "safe").	NO

Receptors Significance Criteria extracted by Wind Microclimate Guidelines for Developments in the City of London (August 2020)

10.2.3 Potential Receptors

Potential receptors for the wind assessment are all pedestrian circulation routes, building entrances, and leisure open areas within the site and in neighbouring adjacent areas as shown in Figures 10.13 and 10.14 . The pedestrian level is considered at 1.5m above ground in line with guidance recommendations as cited in Section 10.1.3.

For the proposed Gas Power Generator compound, the *on-site* receptor is the area identified in green below. This is the circulation area of the site where pedestrians/ workers could potentially carry out activities. However, no amenity area is designated in that location, therefore the activity considered is ' *standing/strolling*' or '*walking*'.

On the South/East, there is a large Golf Course area (Grange Castle) which is considered an *off-site* sensitive receptor for any wind impact which could be generated by the proposed development. This is considered an amenity area, where activities such as ' *standing*' or '*walking*' are considered applicable.

On the North and West, there are other data centre/office buildings which are considered *off-site* sensitive receptors; however, no amenity area are designated in the surroundings in these directions the area is a business/industrial zone therefore the activity considered is ' *standing/strolling*' or '*walking*'.

Figure 10.12 - On-Site Receptor area

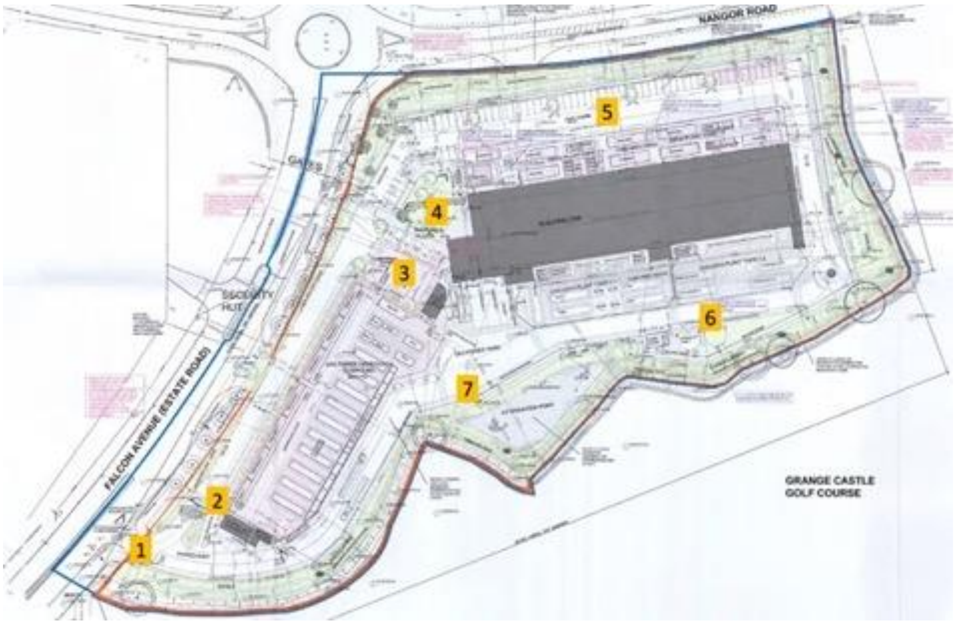


Figure 10.13 – Site Location in Red; Onsite Receptors: Main Entrance (1), Car and Motorbikes(2), Gas Generation Compound Access/Motorbike park(3), Building Entrance(4), Car Park(5), Pedestrian Walkway east(6), Pedestrian Walkway West(7)

Figure 10.14 – View of off-site sensitive receptor – Golf Course Area

10.3 Baseline Conditions (Existing Environment)

The baseline environment consists of the area to be developed and its surroundings as shown in the following figure. The wind microclimate of the baseline environment is defined by the wind patterns that develop on the existing site under the local wind conditions shown in Section 10.3.1 that follows.

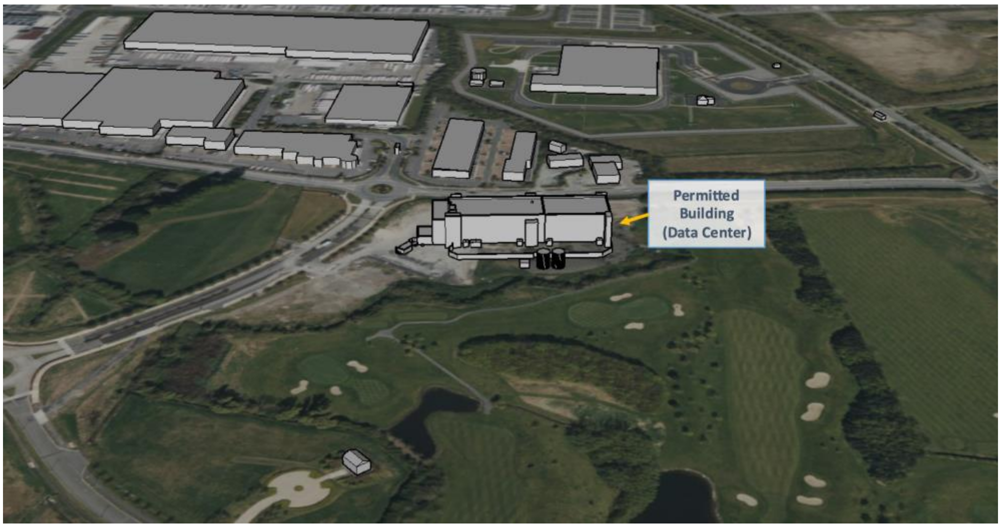


Figure 10.15 – View Of 3D Model of Existing Environment- Baseline

10.3.1 Local Wind

A statistical analysis of 30 years of historical wind data has been carried out to characterise the existing wind climate in terms of wind speeds, frequency, and directions.

The existing wind conditions are obtained using the annual average of meteorology data collected at Dublin Airport Weather Station.

Regarding the transferability of the available wind data from the Dublin Airport Weather Wind station to the site location, the following considerations have been made:

- Terrain: The meteorological station is located on the flat open terrain of the airport, whereas the development site is in an industrial area with built-in structures on the North and with a Golf Course area on the east/south which is basically flat and plain terrain.

- Mean Wind Speeds: Due to the different terrain environments, the ground-near wind speeds (at pedestrian level) will be lower at the proposed site compared to the meteorological station at the airport.

- Wind Directions: The landscape around the site can principally be characterised as flat terrain with a large Golf Course area on the Southeast which maintains the flat aspect of the site. For the general wind climate, no significant influence is expected.

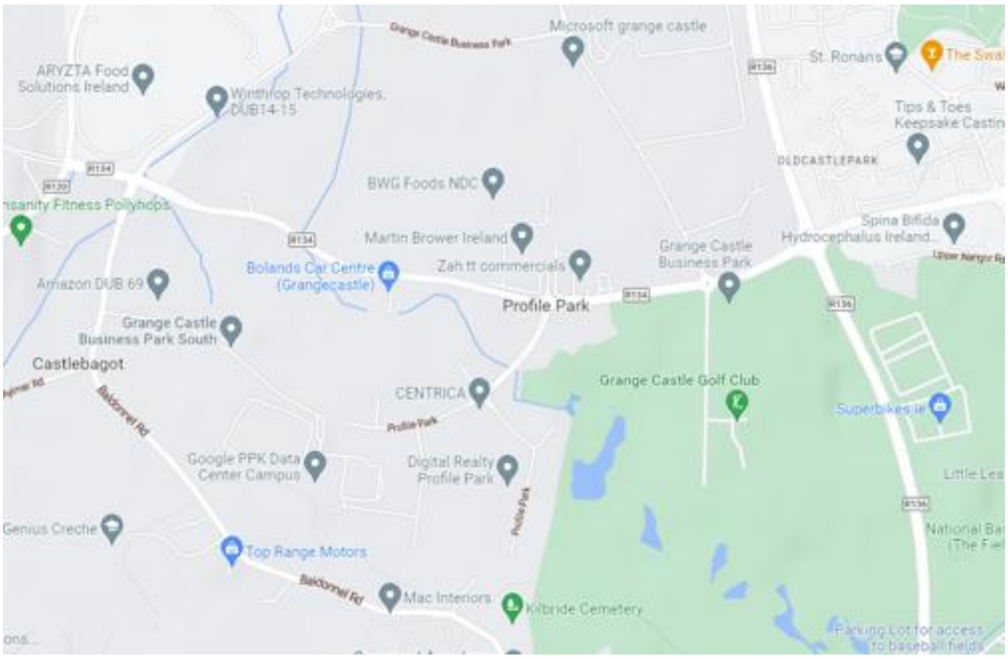


Figure 10.16 - View of Topography of The Site

The assessment of the wind comfort conditions at the new development will be based on a discrete set of wind data throughout a year (annual wind statistic) provided by Meteoblue for Dublin airport meteological wind station. The data set is analysed based on the meteorological data associated with the maximum daily wind speeds recorded over 30 years between 1990 and 2022.

10.3.2 Local Wind for the Assessment of Pedestrian Comfort and Distress

The predominant wind directions on the baseline environment identify from which direction the wind is blowing on the site for most of the time during a typical year.

Following Lawson Criteria, if the proposed site is exposed to wind from a specific direction more than 5% of the time, then the microclimate analysis should consider the impact of this wind (accounting for its direction and most frequent speed) on the local microclimate.

A statistical analysis was carried out based on historical wind data source:

- Meteoblue (over 40 years of historical data – since 1979) – Dublin Airport

However, the data set used from this historical wind data focused majorly on 1990 to 2022.

To understand and correctly validate the weather conditions at the site, a comparison was carried out between the historical data provided by both sources (Meteoblue and Openweather) at the weather station (Dublin Airport).

Data analysis and data visualization were obtained with an in-house program that is coded based on Python language. The speed and frequency of wind per direction were considered, and seasonal changes were analysed to indicate the prevailing wind directions (as shown in the following Figures).

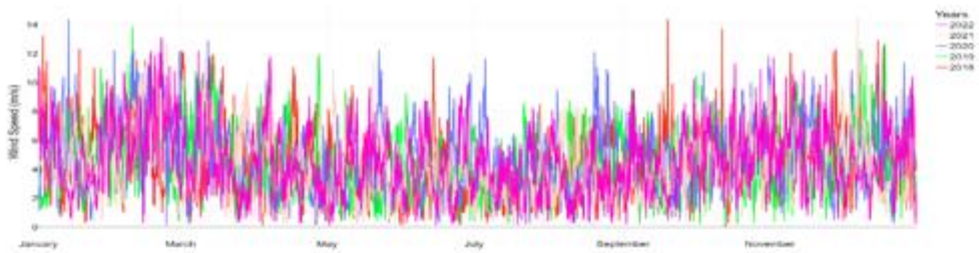


Figure 10.17 - Wind Speed Historical Data Plot On A Typical Year

Furthermore, statistical analysis of the number of hours and magnitudes of wind for 36 angles (10° increments) is performed to produce the Lawson plots. Each of the 36 wind directions was interpolated to calculate the probability that a velocity threshold will be exceeded.

Figure 10.19 presents the wind speed diagram for Dublin, the diagram shows how often (how many days per month) the wind blows with a specific speed.

Figure 10.20 shows the wind rose for Dublin and details how often (how many hours per year in this case) the wind blows from a specific direction, these data highlight that wind from west is the prevailing wind direction. This implies that the largest contribution to the discomfort exceedance probability.

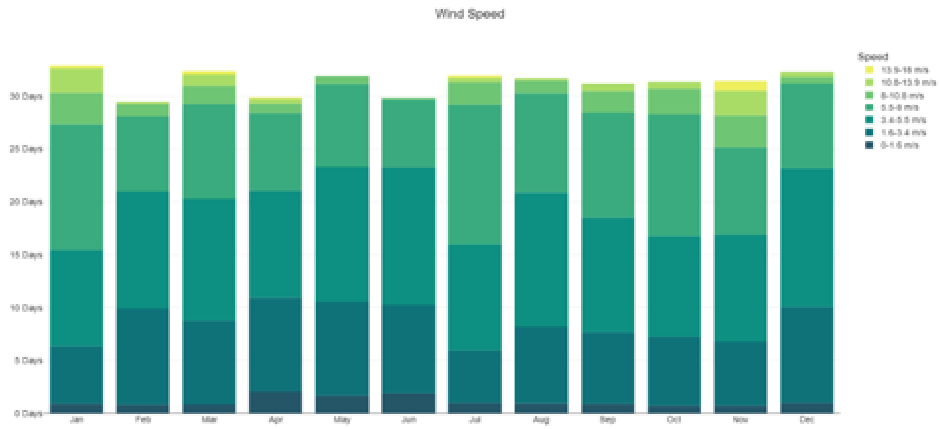


Figure 10.18 Dublin Wind Speed Diagram -Source www.Meteoblue.com - Graphics elaborated by B-Fluid

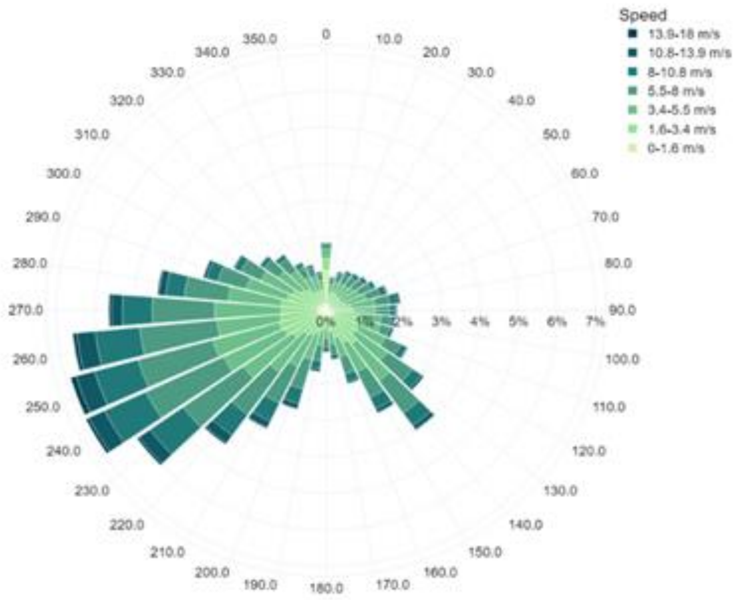


Figure 10.19 Local Wind Rose With Wind Frequency Of Occurrence Details - Source [Www.Meteoblue.Com](http://www.Meteoblue.Com) - Graphics Elaborated By B-Fluid

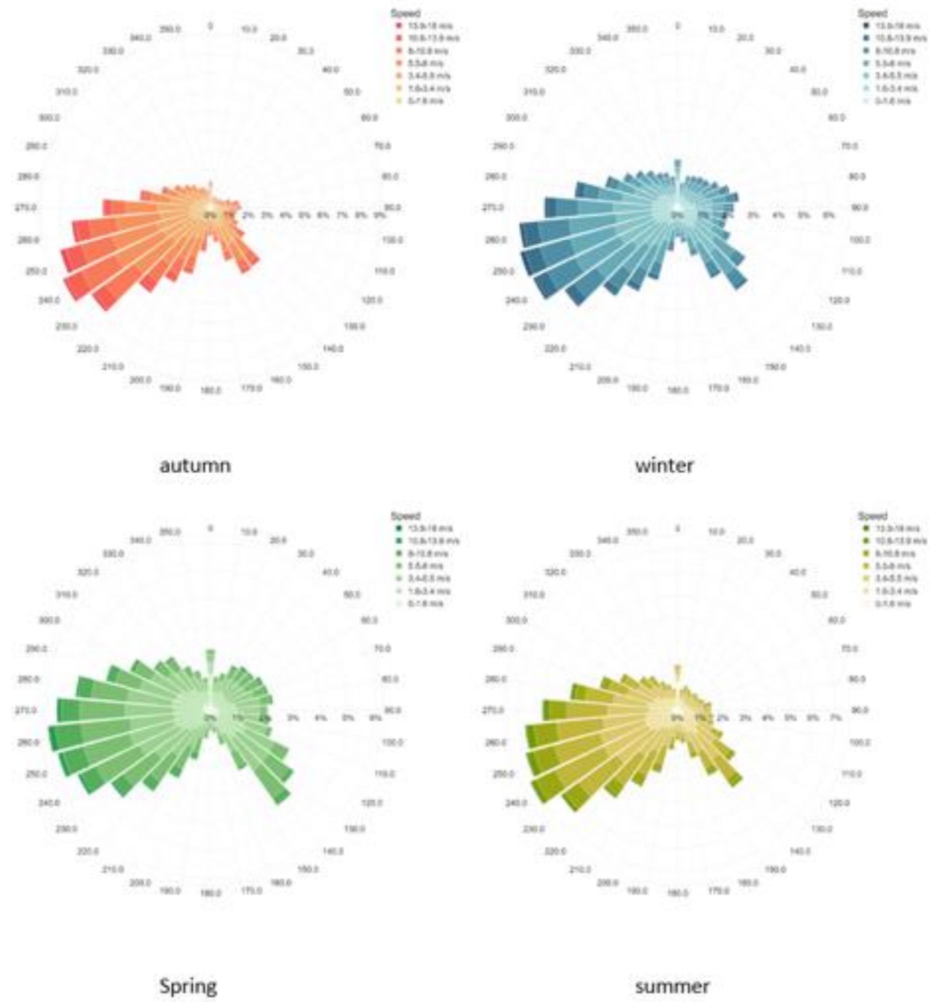


Figure 10.20 Wind Speeds And Wind Directions At Different Seasons In Ireland - Source [Www.Meteoblue.Com](http://www.meteoblue.com) - Graphics Elaborated By B-Fluid

The table that follows reports all the wind directions and their corresponding velocity, displayed in order of frequency of occurrence with those most frequent on the top.

As it can be noted, the wind at the site is mostly blowing (higher frequency of occurrence) from the South-West (225deg) direction with a wind velocity of approximately 5m/s. A similar wind speed is blowing also from the South-South-West direction (213deg).

DUBLIN WIND SCENARIOS AND DIRECTIONS		
Velocity (m/s)	**Direction (deg)**	**Frequency (%)**
5.601	225	11.233
4.626	135	6.849
5.847	236.25	6.792
6.049	258.75	6.747
6.034	247.5	6.689
5.888	270	5.662
4.994	315	4.338
5.503	281.25	3.904
4.974	292.5	3.436
5.357	213.75	3.288
4.736	123.75	3.105
4.406	146.25	2.751
5.101	303.75	2.648
5.246	112.5	2.500
4.121	157.5	2.386
4.581	101.25	2.340
4.169	45	2.180
3.558	90	2.135

Table 10.6: Dublin Wind Frequency- Directions

10.4 Baseline Scenario

The wind microclimate of the baseline scenario is defined by the wind patterns that develop on the site and it's the surroundings (existing buildings and topography) under the local wind conditions relevant for the assessment of the Pedestrian Comfort and Distress.

In this scenario, the assessment has considered the impact of wind on the existing area.

Results of wind microclimate at pedestrian level (1.5m height - flow speeds) are collected

throughout the modelled site. These flow velocities identify if locally, wind speeds at pedestrian-level are accelerated or decelerated in relation to the undisturbed reference wind speed due to the presence of the existing baseline environment.

The impact of these speeds is then combined with their specific frequency of occurrence and presented in the maps that show the area of comfort and distress in accordance with Lawson Criteria, these maps are produced at pedestrian level on the ground and identify the suitability of each areas to its prescribed level of usage and activity.

10.4.1 Wind Microclimate at Pedestrian Level

Results of wind speeds and their circulations at pedestrian level of 1.5m above the development ground are presented in the following images in order to assess wind flows.

Wind flow speeds are shown to be within tenable conditions although some high velocity and recirculation effects are found in the existing site.

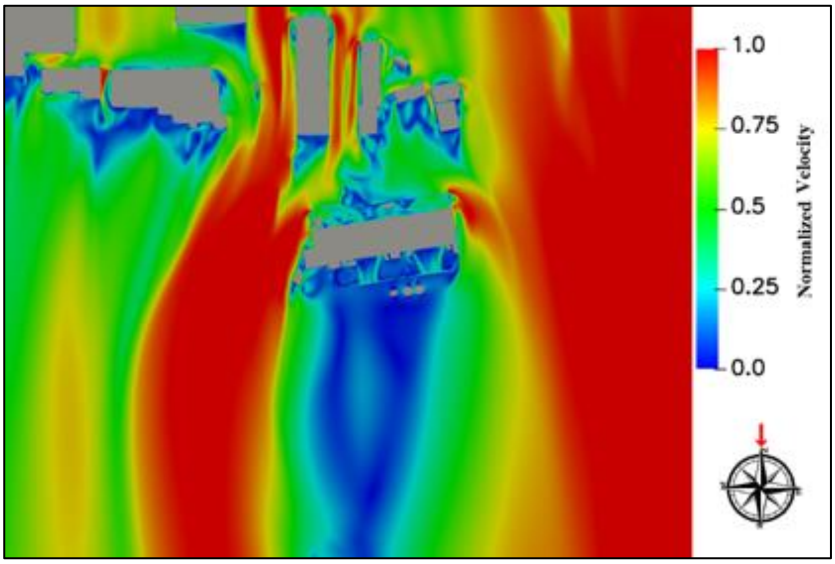


Figure 10.21 Wind Speed at 1.5 m above ground – Wind Direction 0°

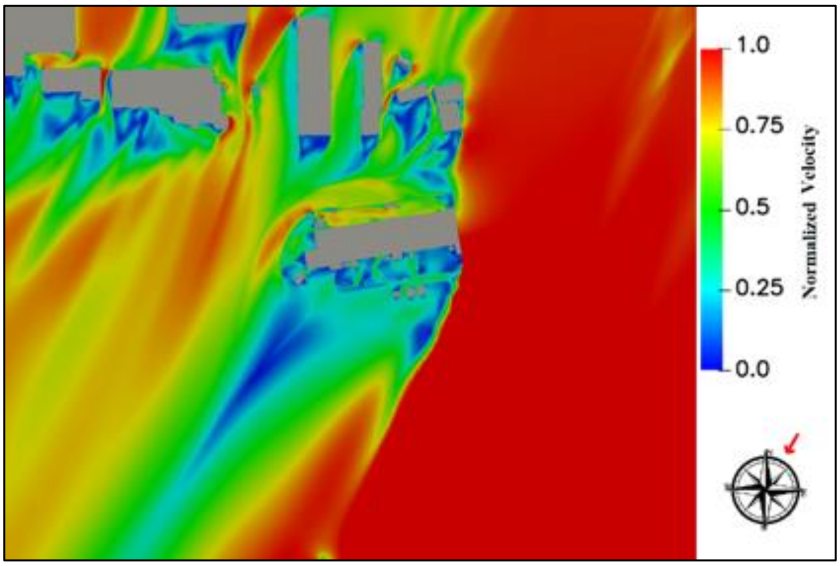


Figure 10.22 Wind Speed at 1.5 m above ground – Wind Direction 30°

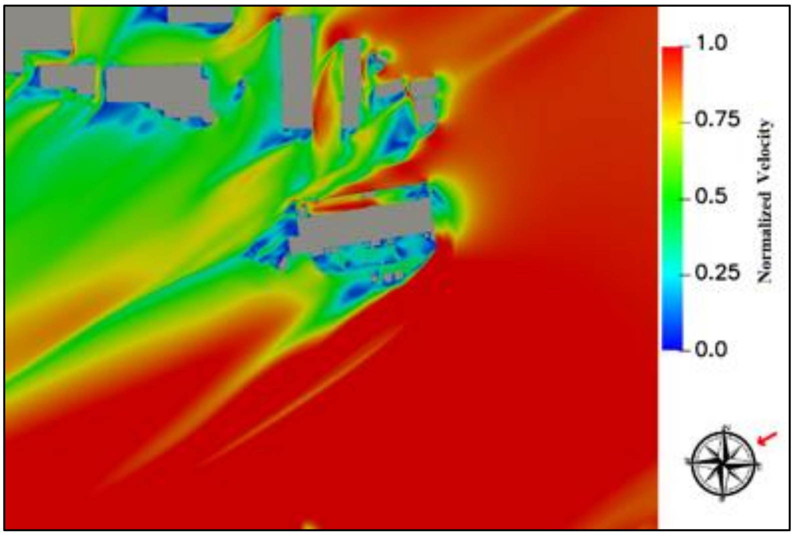


Figure 10.23 Wind Speed at 1.5 m above ground – Wind Direction 60°

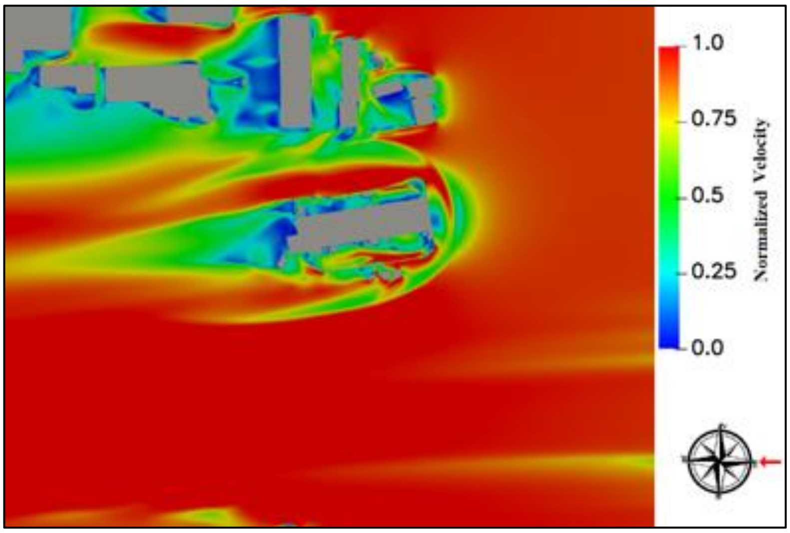


Figure 10.24 Wind Speed at 1.5 m above ground – Wind Direction 90°

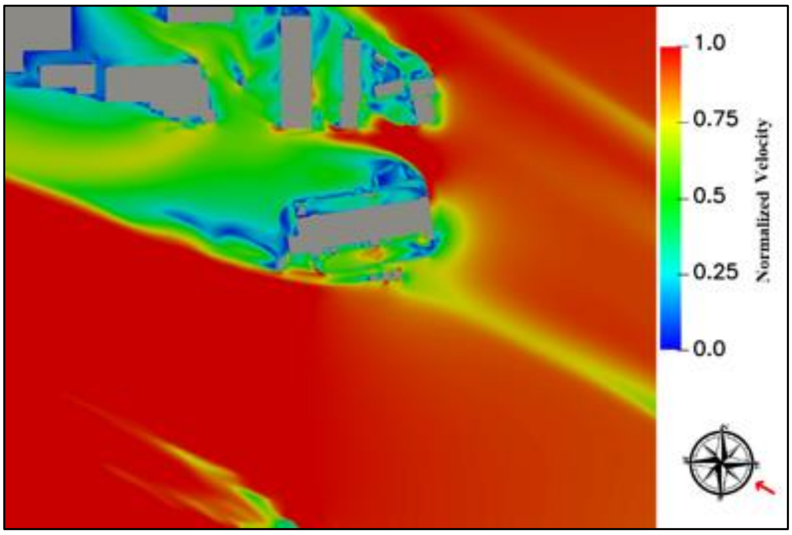


Figure 10.25 Wind Speed at 1.5 m above ground – Wind Direction 120°

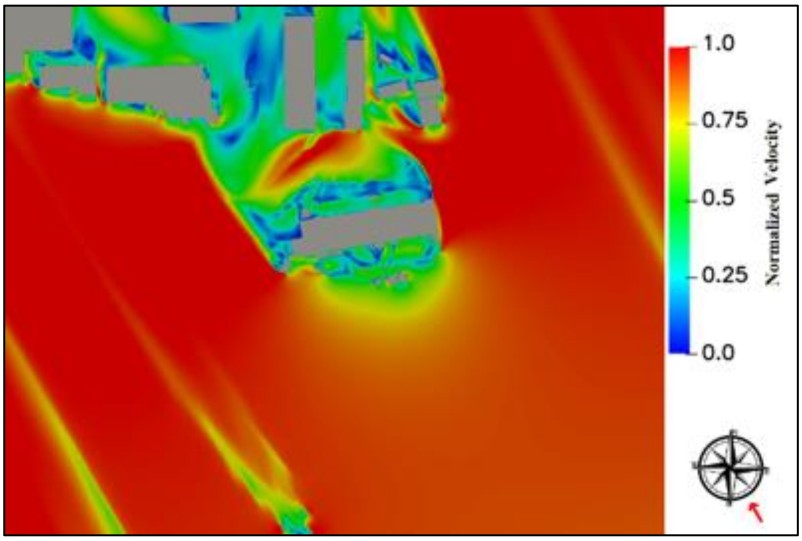


Figure 10.26 Wind Speed at 1.5 m above ground – Wind Direction 150°

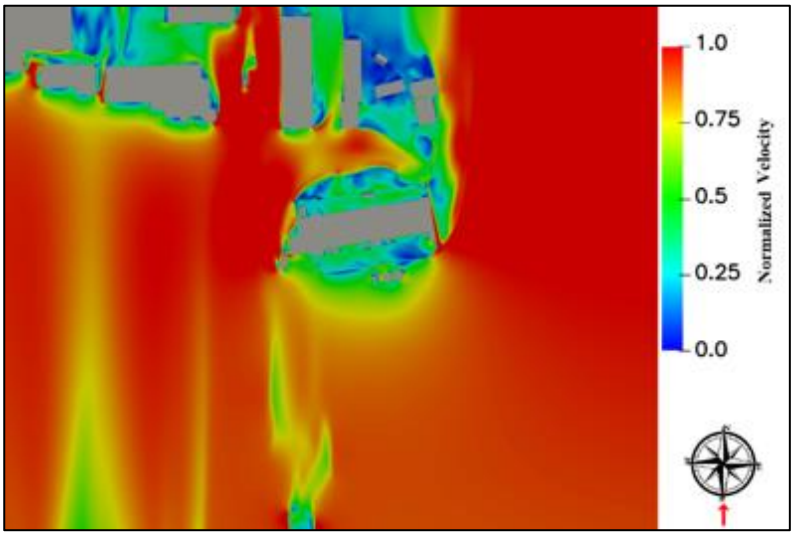


Figure 10.27 Wind Speed at 1.5 m above ground – Wind Direction 180°

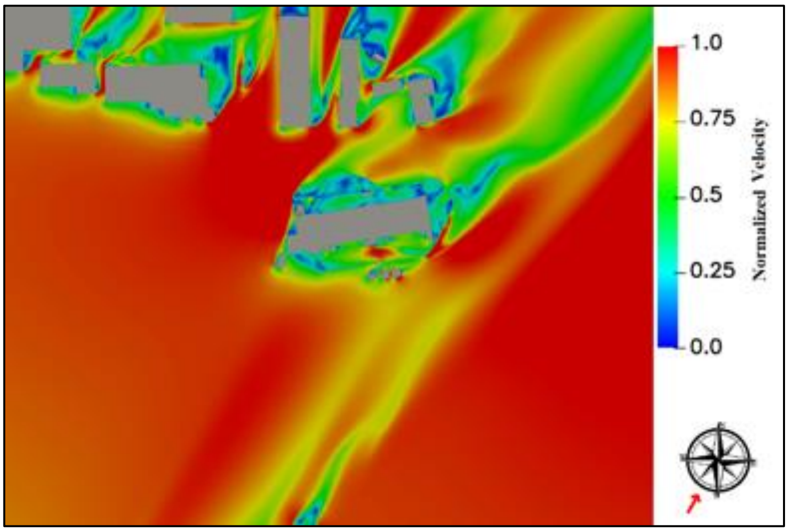


Figure 10.28 Wind Speed at 1.5 m above ground – Wind Direction 210°

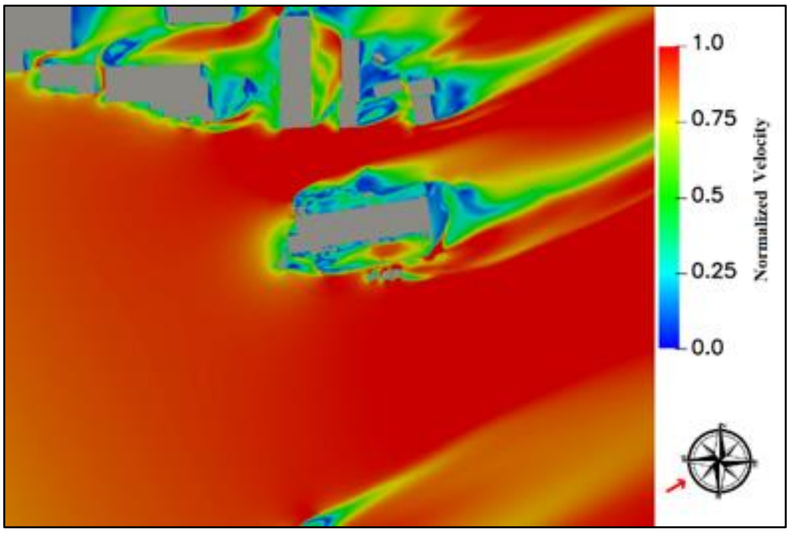


Figure 10.29 Wind Speed at 1.5 m above ground – Wind Direction 240°

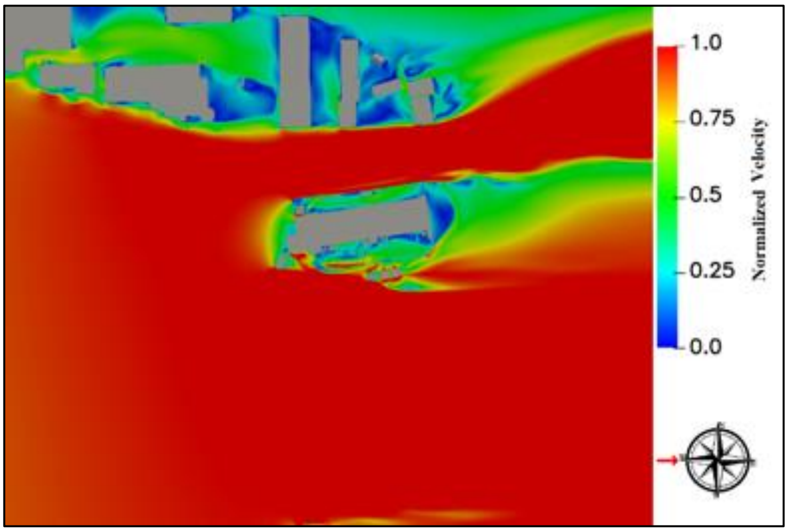


Figure 10.30 Wind Speed at 1.5 m above ground – Wind Direction 270°

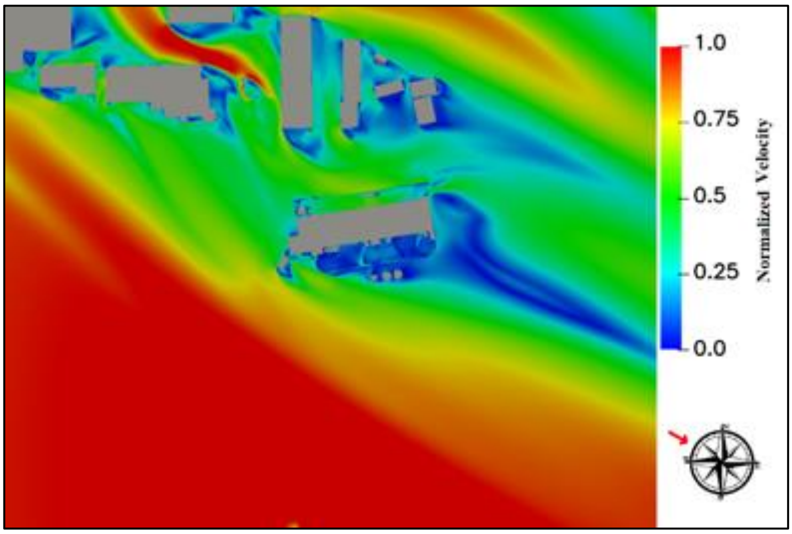


Figure 10.31 Wind Speed at 1.5 m above ground – Wind Direction 300°

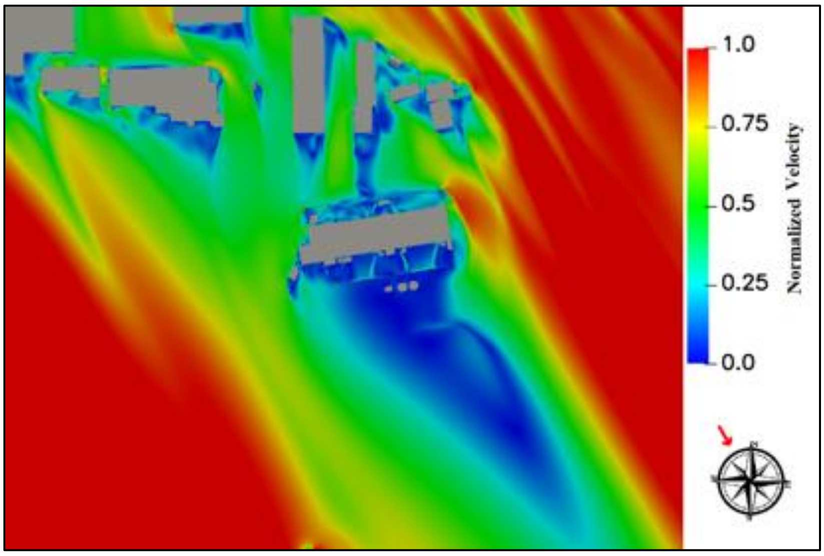


Figure 10.32 Wind Speed at 1.5 m above ground – Wind Direction 330°

10.4.2 Impact on Pedestrian Comfort and Distress

The wind flow results obtained simulating the different direction and wind speeds, are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows. The comfort/distress conditions are presented using a colour coded diagram formulated in accordance with the Lawson Criteria.

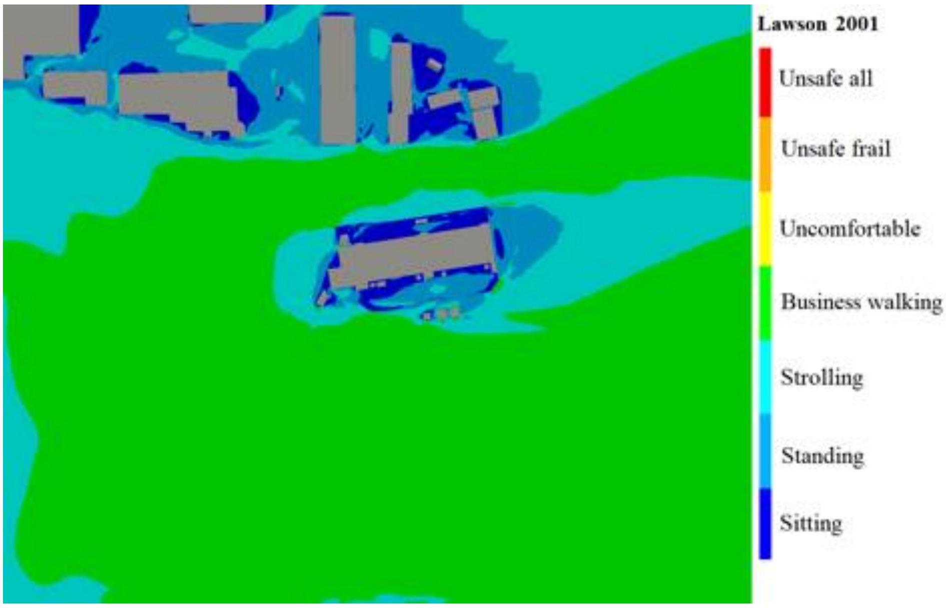


Figure 10.33- ***Lawson Map of Wind Comfort Level/Activity – Top view***

From the simulation results the following observations are pointed out:

- The assessment of the baseline scenario has shown that no area is unsafe, and no conditions of distress are created in the existing environment under the local wind climate.

- The site is usable for walking and sitting, the roads in the surrounding are usable for their intended scope.

10.5 Impact Assessment of Proposed Development

The wind microclimate of the proposed development is defined by the wind patterns that develop in the surroundings of the proposed development under the local wind conditions relevant for the Lawson Criteria and considering the existing buildings and topography.

10.5.1 Do Nothing

In case the development will not be constructed, the wind conditions on the site will be in line with those observed and shown as results of the wind analysis of the "Baseline Wind Microclimate" section which features the permitted development and surrounding existing structures.

10.5.2 Construction Phase

The criteria for wind comfort and distress at the site during the construction phase of the proposed development is not applicable as the construction will not involve the pedestrians activities that will be carried out on the site after the construction is completed. From the statistical historical wind data carried out, it can be noted that the most onerous wind conditions during the construction phase will be South-West direction with a wind of approximately 5m/s.

Since windier conditions are acceptable within a construction area (not accessible to the public), and the proposed development would not be the reason for critical wind conditions on-Site (and are slightly calmer when the development is in site), the impacts evaluated on-Site are considered insignificant. Thus, the predicted impacts during the construction phase are identified as "not significant" or "negligible" and similar to the existing (baseline) wind conditions.

As the finalisation of the development proceeds, the wind setting at the site would progressively conform to those of the completed development.

10.5.3 Operational Phase

The results of the wind simulations carried out are detailed in the following sections. Results of wind microclimate at ground level (1.5m height - flow speeds) are collected throughout the modelled site and the impact of these on the potential receptors presented in the map shows the area of comfort and distress following Lawson Criteria.

10.5.3.1 Wind Microclimate at Pedestrian Level

Results of wind speeds and their circulations at a pedestrian level of 1.5m above the development ground are presented in the images that follow in order of frequency of occurrence, from the most frequent wind direction to the least frequent one.

These flow velocities identify if locally, wind speeds at the pedestrian level are accelerated or decelerated when compared with the 'undisturbed' reference wind speed (i.e. the baseline wind speed) by the presence of the proposed development. As it can be seen, wind speeds are shown to be within tenable conditions and in general similar to the wind speed of the undisturbed flow for the direction considered.

The site receives the prevailing South-West and South-East winds at approximately 5m/s. However, considering that the baseline wind speed is ranging from 3.9ms/ to 6m/s, throughout the area the wind is not accelerating to significant values (green colour indicated velocity of max 6m/s) and the wind is also decelerated with respect the undisturbed wind speed, in some area, because of the presence of the proposed development (blue colour indicate speeds of max 3m/s which are less than baseline winds.

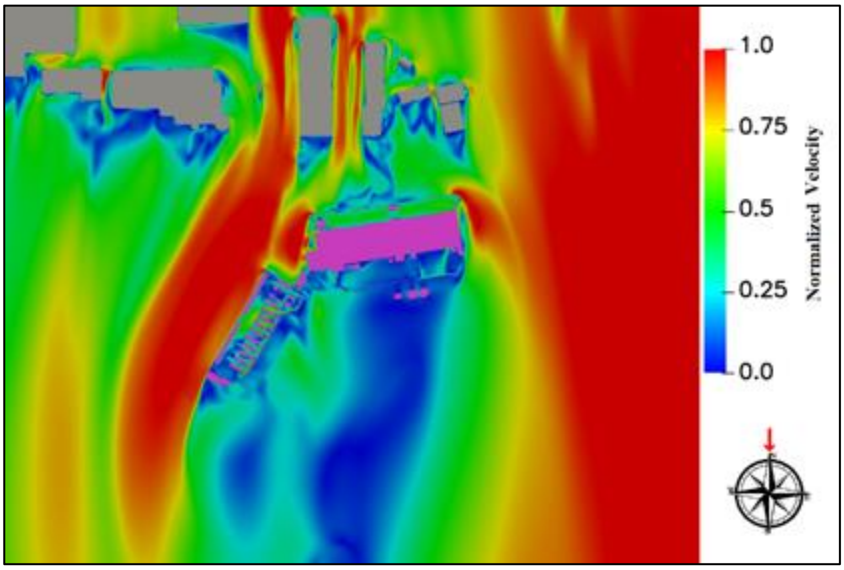


Figure 10.34 Wind Speed at 1.5 m above ground – Wind Direction 0°

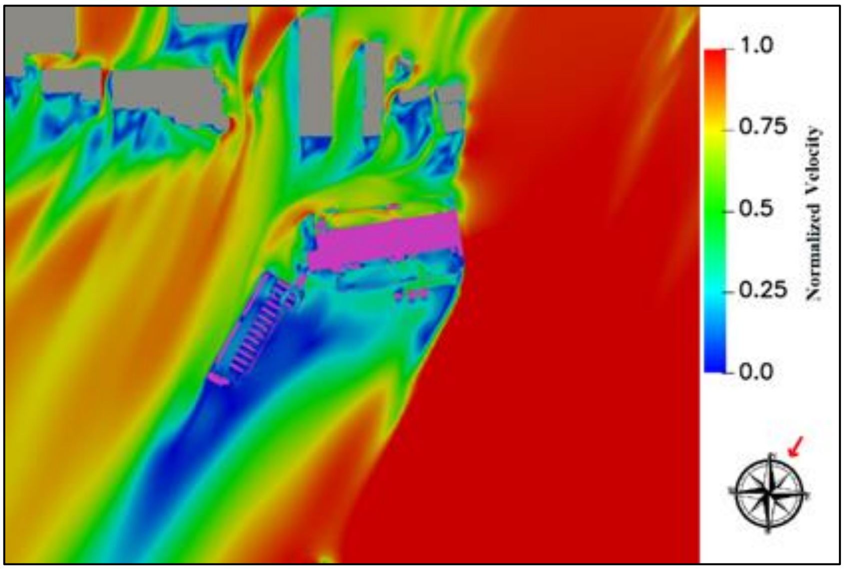


Figure 10.35 Wind Speed at 1.5 m above ground – Wind Direction 30°

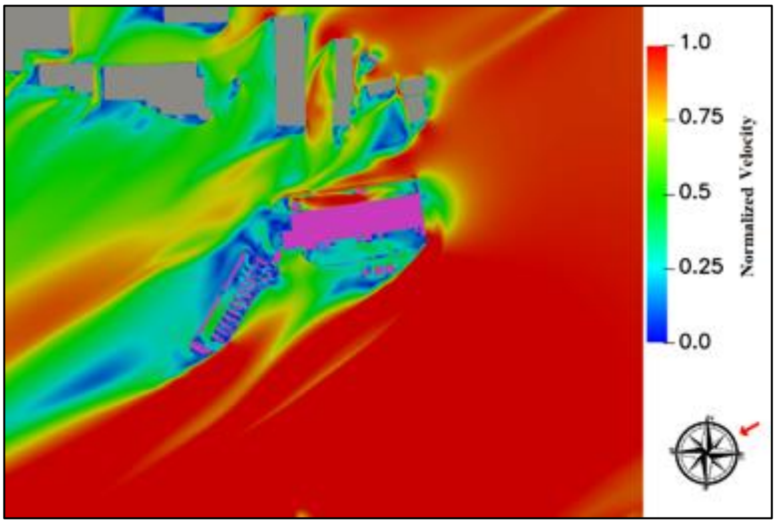


Figure 10.36 Wind Speed at 1.5 m above ground – Wind Direction 60°

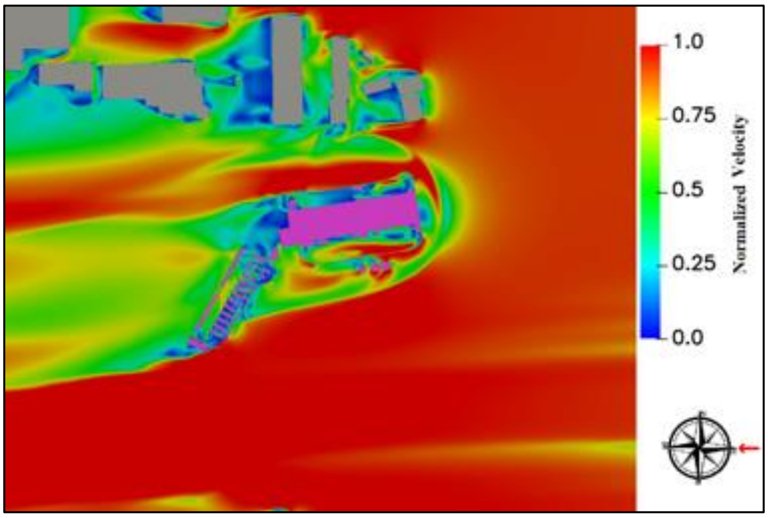


Figure 10.37 Wind Speed at 1.5 m above ground – Wind Direction 90°

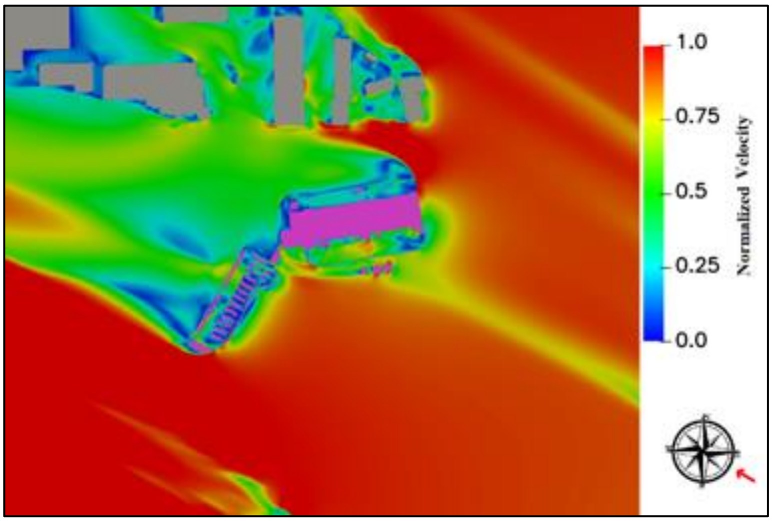


Figure 10.38 Wind Speed at 1.5 m above ground – Wind Direction 120°

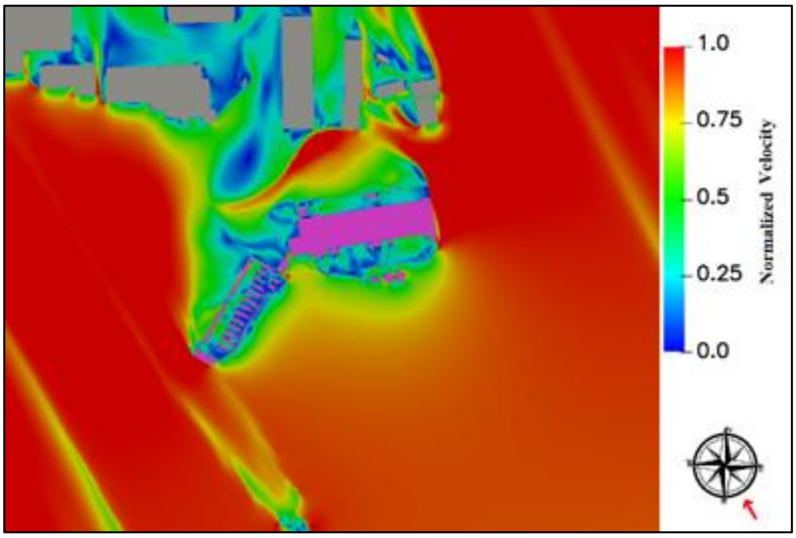


Figure 10.39 Wind Speed at 1.5 m above ground – Wind Direction 150°

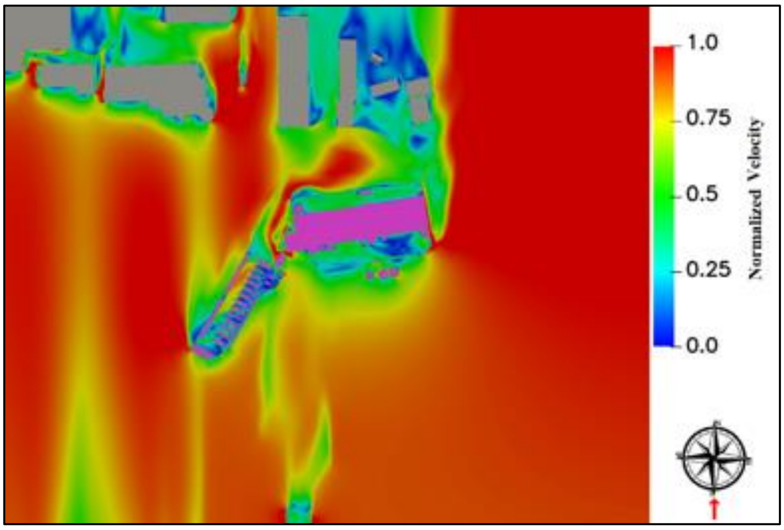


Figure 10.40 Wind Speed at 1.5 m above ground – Wind Direction 180°

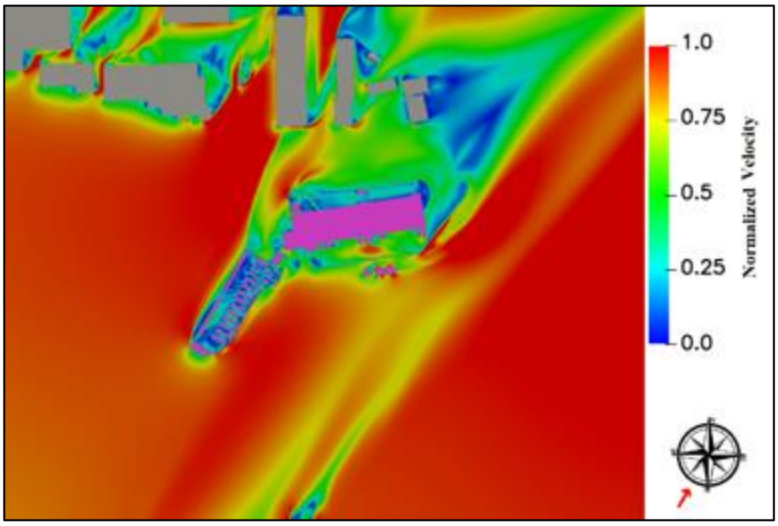


Figure 10.41 Wind Speed at 1.5 m above ground – Wind Direction 210°

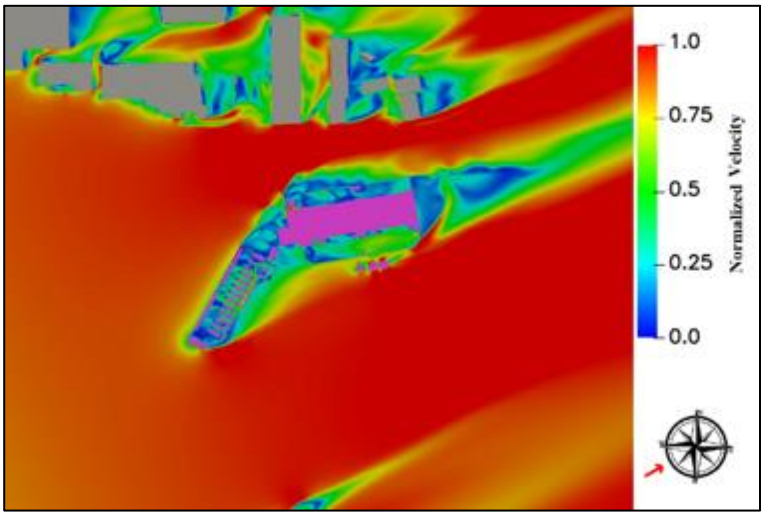


Figure 10.42 Wind Speed at 1.5 m above ground – Wind Direction 240°

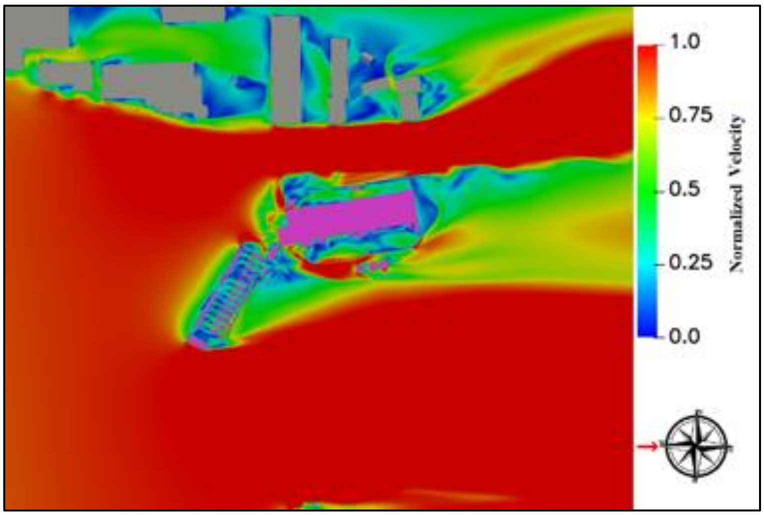


Figure 10.43 Wind Speed at 1.5 m above ground – Wind Direction 270°

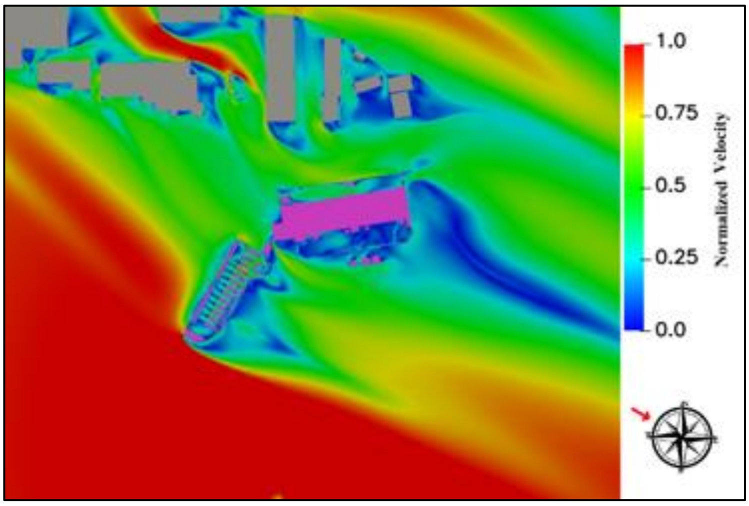


Figure 10.44 Wind Speed at 1.5 m above ground – Wind Direction 300°

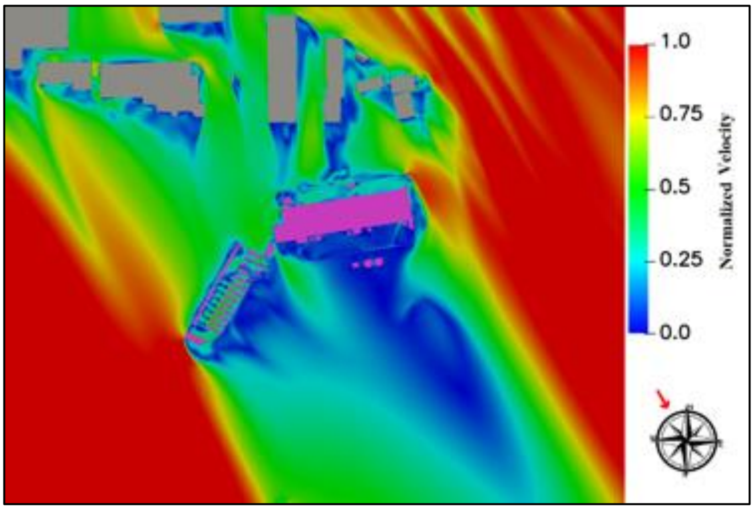


Figure 10.45 Wind Speed at 1.5 m above ground – Wind Direction 330°

10.5.4 Impact on Pedestrian Comfort and Distress

The wind flow results obtained simulating the different directions and wind speeds are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows and the impact of the proposed development is classified on the potential receptors in line with the significance criteria cited in **Section 10.2.3** and detailed in the summary tables provided at the end of this section. The comfort/distress conditions are presented using a colour-coded diagram below formulated following the Lawson Criteria.

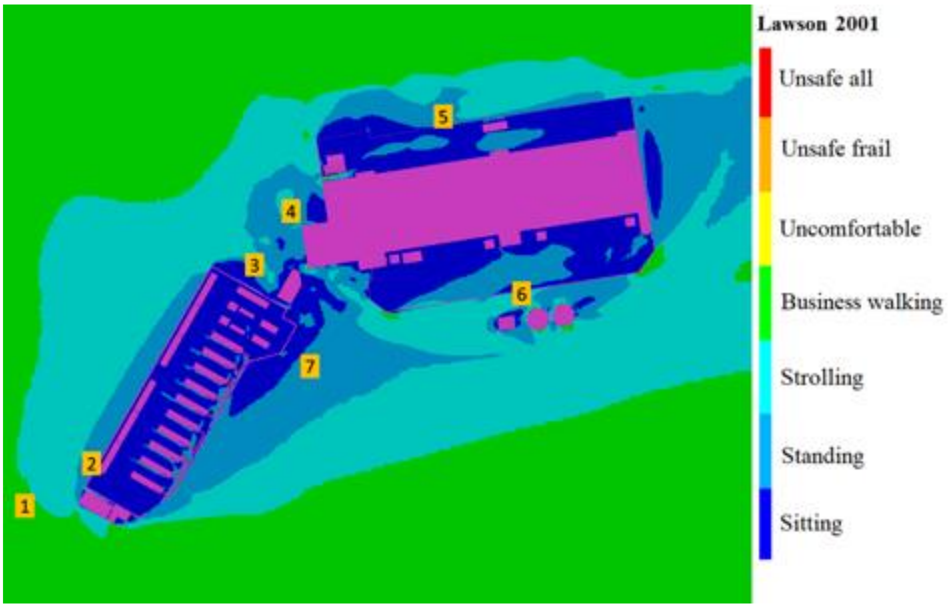


Figure 10.46- ***Lawson Map of Wind Comfort Level/Activity with labelled potential receptor Areas***

In summary, the following conclusions can be made by observing the results of the wind microclimate analysis and comparing the results obtained, under the same wind conditions for the baseline scenario versus the proposed development scenario:

- The assessment of the proposed scenario has shown that no area is unsafe, and no conditions of distress are created by the proposed development.
- The area is already interested by similar wind conditions to the ones obtained after the construction of the proposed development and the proposed development do not pose any increased risk related to wind comfort and distress.
- The wind microclimate of the proposed development is suitable for the type of activities expected on the type of structure (walking).
- The proposed development does not enhance any critical wind conditions on the off-site areas compared to the actual existing wind conditions on the same place.

As a result of the proposed development construction, the wind in the surrounding urban context remains basically like the existing microclimate as shown in the Lawson map produced for the baseline scenario (as shown for comparison in Figure 49 and 50 that follow). A summary of the impact of the proposed development following the significance criteria of **Section 10.2.3** is detailed in **Table 10.7.**

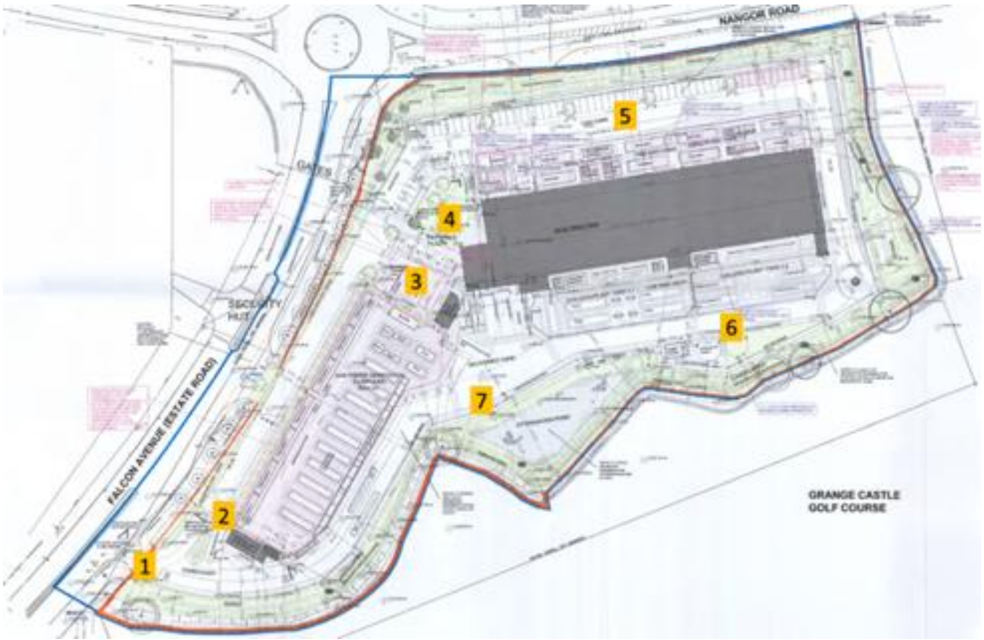


Figure 10.47- *Site Location in Red; Receptors: Main Entrance (1), Car and Motorbikes(2), Gas Generation Compound Access/Motorbike park(3), Building Entrance(4), Car Park(5), Pedestrian Walkway east(6), Pedestrian Walkway West(7).*

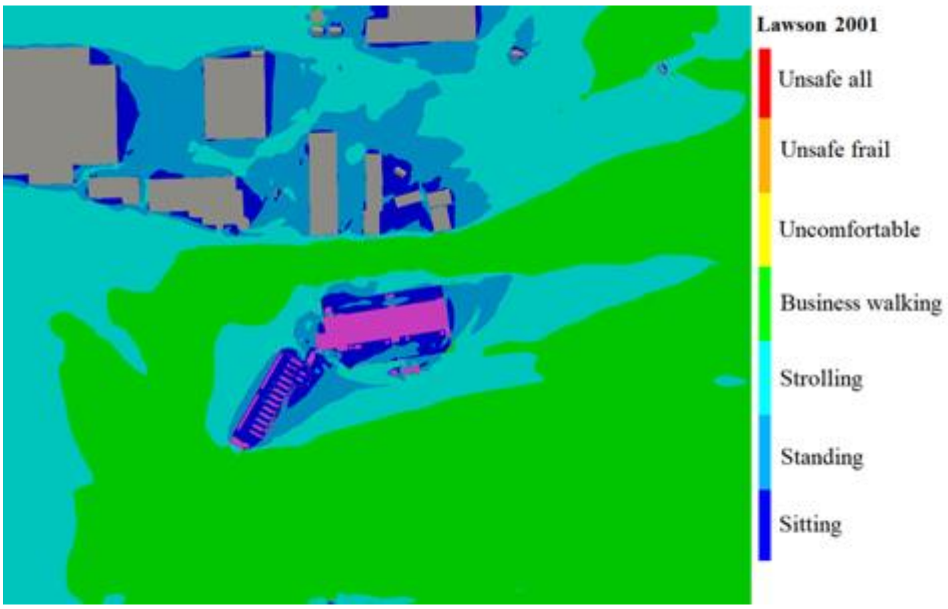


Figure 10.48- *Lawson Map of Wind Comfort Level/Activity – Plan view -Proposed*

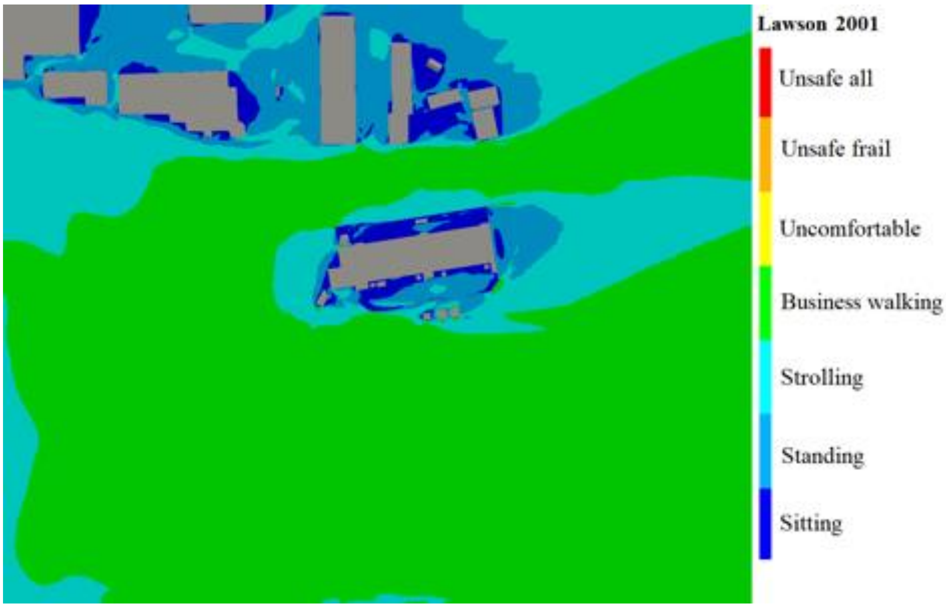


Figure 10.49- ***Lawson Map of Wind Comfort Level/Activity – Plan view -Baseline***

Table 10.7: Impact Significance of Proposed Development In Relation To Baseline Conditions

Potential Receptors *(on-site)*	Baseline Conditions	Proposed Development Conditions	Impact Significance
Main Entrance (1)	Conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*
Car and Motorbikes ntrance (2)	Conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*
Gas Power Generation ompound ccess/Motorbike Park (3)	Conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*
Building Entrance (4)	Conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*

Car Park (5)	Conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*
Pedestrian walkway ast (6)	Conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*
Pedestrian walkway Vest (7)	Conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*
Potential Receptors *(Off-Site)*	**Baseline Conditions**	**Proposed Development Conditions**	**Impact**
***Off-Site* Area-North**	On the location designated for this use conditions are "suitable" for the intended pedestrian use.	Conditions are "suitable" for the intended pedestrian use.	*Negligible*
***Off-Site* Area-South**	On the location designated for this use conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the baseline scenario.	*Negligible*
***Off-Site* Area-East**	On the location designated for this use conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the baseline scenario.	*Negligible*
***Off-Site* Area-West**	On the location designated for this use conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the baseline scenario.	*Negligible*

10.6 Cumulative Impact

This section assesses the impact of the proposed development on the existing environment and considers projects that have been:

- (a) granted planning permission but that are not built yet and,
- (b) projects that have been submitted for consent but not yet consented.

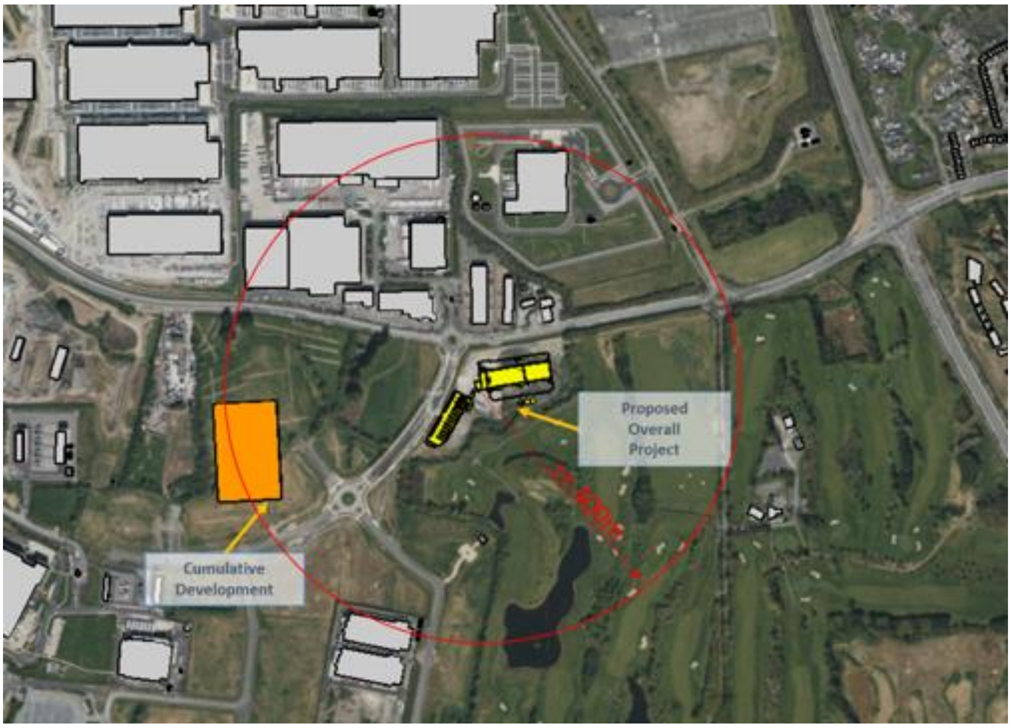


Figure 10.50- ***Cumulative schemes within the vicinity of the Proposed Overall Project Area***

In accordance with the guideline cited in section 12.2, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the centre of the site. Other taller buildings outside of this zone that could have an influence on wind conditions within the project site should be included for wind directions where they are upwind of the project site.

The potential and permitted schemes within the vicinity of the proposed Overall Project are listed below. The criteria to select the relevance of these schemes for the wind microclimate is based on their distance from the centre of the proposed site.

In particular, the following applications are considered:

- SD21A/0186, Applicant Equinix, granted: The development is located on the Subject Site and forms part of the Overall Project.
- SD23A/0035, Applicant: Vantage, under evaluation: The development is at 20m west from the site of the Overall project.
- SD22A/0420 Applicant: Vantage, under evaluation: The development is at 20m west from the site of the Overall project.
- SD21A/0241 Applicant: Vantage, granted: The development is at 20m west from the site of the Overall project.

10.6.1 Impact on Pedestrian Comfort and Distress

The wind flow results obtained simulating the different directions and wind speeds are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows and the impact of the proposed development is classified on the potential receptors in line with the significance criteria cited in **Section 10.2.3** and detailed in the summary tables provided at the end of this section. The comfort/distress conditions are presented using a colour-coded diagram below formulated following the Lawson Criteria.

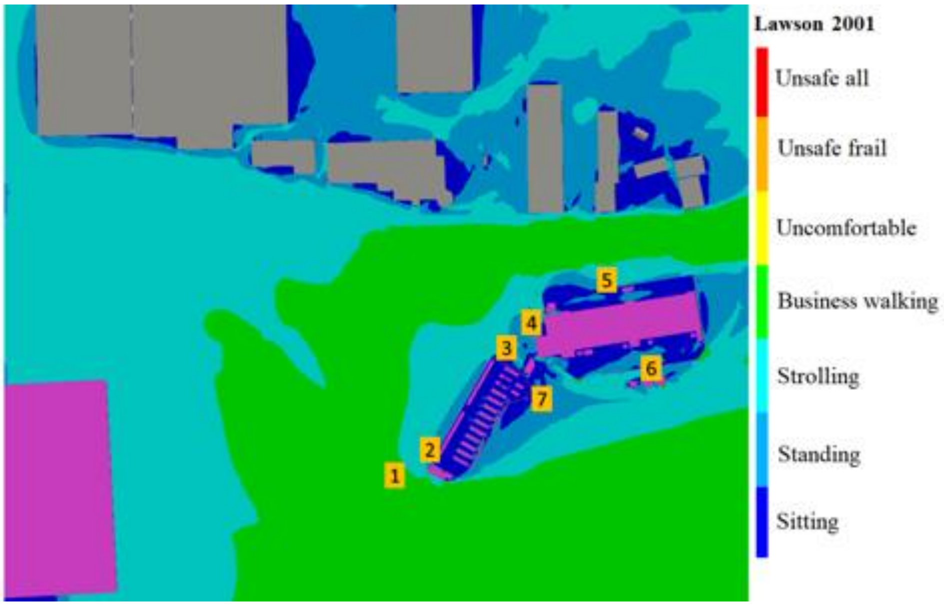


Figure 10.51- ***Lawson Map of Wind Comfort Level/Activity with labelled potential receptor Areas***

In summary, the following conclusions can be made by observing the results of the wind microclimate analysis and comparing the results obtained, under the same wind conditions for the proposed development scenario versus the cumulative scenario:

- The assessment of the cumulative scenario has shown that no area is unsafe, and no conditions of distress are created by the proposed development.
- The area is already impacted by similar wind conditions to the ones obtained after the construction of the proposed development and the proposed development does not pose any increased risk related to wind comfort and distress.
- The wind microclimate of the proposed development is suitable for the type of activities expected on the type of structure (walking).
- The proposed development does not enhance any critical wind conditions on the off-site areas compared to the actual existing wind conditions on the same place.

As a result of the proposed development construction, in conjunction with the permitted development considered in the Cumulative Scenario, the wind in the surrounding urban context remains basically the same when compared with the baseline situation and proposed scenario in the existing context. The wind comfort distress map showing the proposed and cumulative scenarios are illustrated as shown for comparison in **Figure 10.53 and 10.54**.

A summary of the impact and significance of the proposed development in a Cumulative Scenario on the on-site receptors (pedestrian areas, roads, entrances) and on the off-site receptors (roads/ pedestrian areas off-site on the north, south, west and east directions) following the significance criteria of **Section 10.2.3** is detailed in **Table 10.8.**

The proposed development therefore has a beneficial effect on the surrounding wind microclimate and can create comfortable pedestrian areas and public spaces.

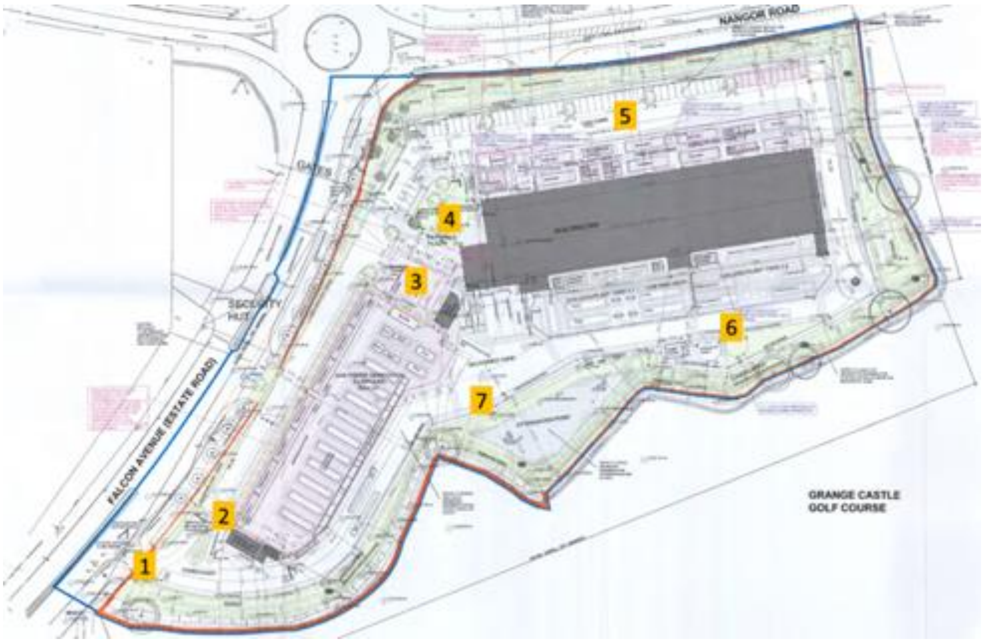


Figure 10.52- ***Site Location in Red; Receptors: Main Entrance (1), Car and Motorbikes(2), Gas Generation Compound Access/Motorbike park(3), Building Entrance(4), Car Park(5), Pedestrian Walkway east(6), Pedestrian Walkway West(7).***

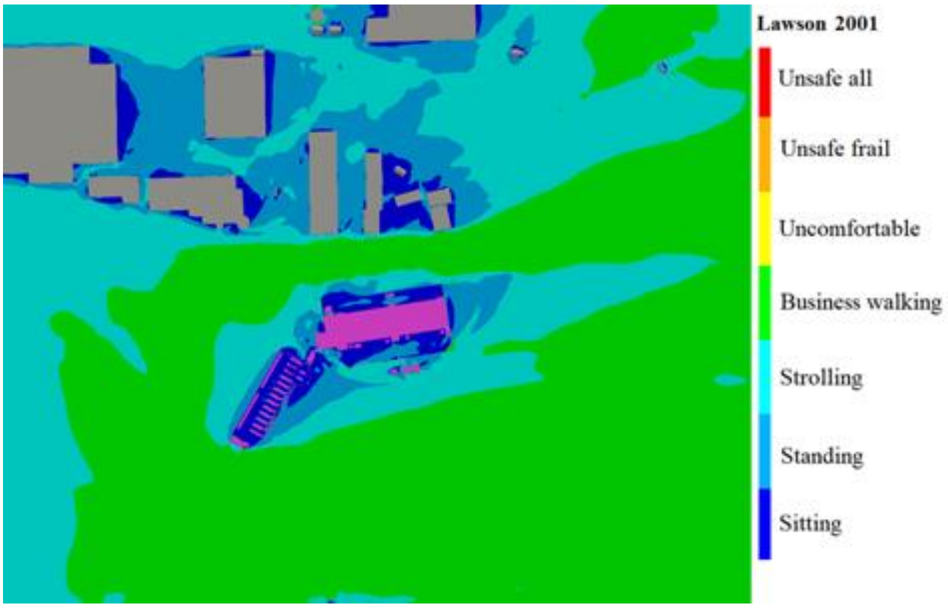


Figure 10.53- ***Lawson Map of Wind Comfort Level/Activity – Plan view -Proposed***

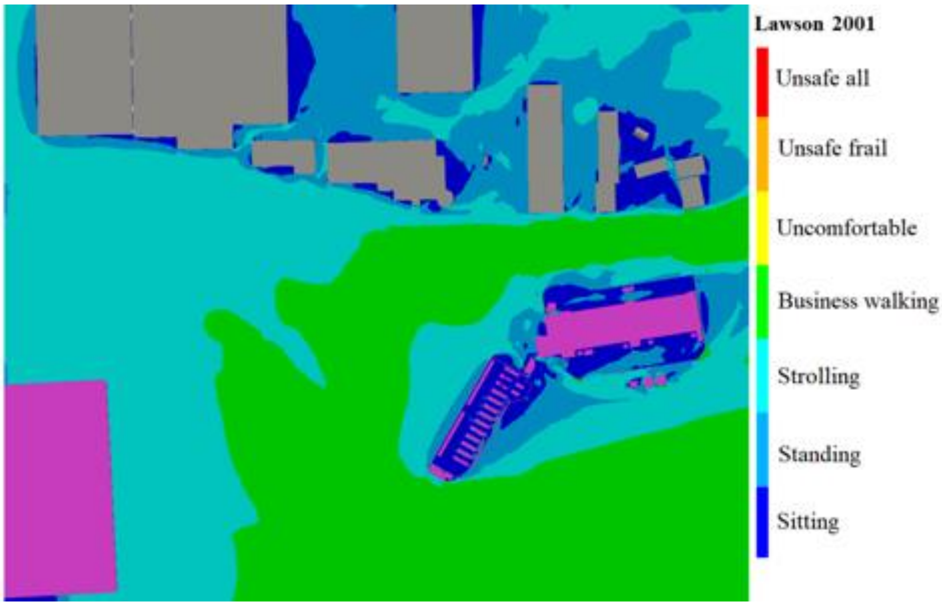


Figure 10.54- ***Lawson Map of Wind Comfort Level/Activity – Plan view -Cumulative***

Table 10.8: Impact Significance of Proposed Development In Relation To Cumulative Conditions

Potential Receptors *(on-site)*	Proposed Development Conditions	Cumulative Conditions	Impact Significance
Main Entrance (1)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Car and Motorbikes Entrance (2)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Gas Power Generation	Conditions are "suitable" for the	Conditions remain the same as in the	*Negligible*

ompound ccess/Motorbike ark (3)	intended pedestrian use.	Proposed development scenario	
Building Entrance 4)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Car Park (5)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Pedestrian valkway East (6)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Pedestrian valkway West (7)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Potential Receptors *(Off-Site)*	**Proposed Development Conditions**	**Cumulative Conditions**	**Impact**
***Off-Site* Area-North**	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
***Off-Site* Area-South**	Conditions remain the same as in the baseline scenario.	Conditions remain the same as in the Proposed development scenario	*Negligible*
***Off-Site* Area-East**	Conditions remain the same as in the baseline scenario.	Conditions remain the same as in the Proposed development scenario	*Negligible*
***Off-Site* Area-West**	Conditions remain the same as in the baseline scenario.	Conditions remain the same as in the Proposed development scenario	*Negligible*

10.7 Residual Impact

Wind cannot be eliminated or mitigated as it depends on weather conditions which could vary. The data of the historical wind conditions collected and reported in the previous sections show that the wind speeds likely to occur on the site are below critical values and that a pleasant and comfortable microclimate can be maintained for most of the time and under the most frequent wind scenarios.

Gusts and storms can still occur, however, and they can create unpleasant and sometimes unsafe conditions. The pedestrian activities concerning the Lawson Comfort and Distress Criteria are not in general carried out during those weather conditions.

Having considered the above, no further changes to the development design and further increase of the landscaping are suggested, as safety and pedestrian comfort are maintained under Lawson Comfort and Distress Criteria.

10.8 Monitoring

10.8.1 Construction Phase

There is no requirement to monitor wind impact during the construction phase for pedestrian comfort and distress as the designated amenity areas will not be in use during this phase of the project and pedestrians are not accessing construction sites.

10.8.2 Operational Phase

The development has been designed to conform to acceptable Lawson Criteria for Comfort and Distress following the Wind Beaufort Scale and considering the historical wind conditions of the site, there is no further element to monitor for this scope as far as the design and landscaping is maintained in place as proposed.

References

- Lawson, T.V., 2001, 'Building Aerodynamics', Imperial College Press, London
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- Blocken, B., 2015. Computational Fluid Dynamics for Urban Physics: Importance, scales, possibilities, limitations and ten tips and tricks towards accurate and reliable simulations. Building and Environment.
- Blocken, B., Janssen, W.D. and van Hooff, T., 2012. CFD simulation for pedestrian wind comfort and wind safety in urban areas: General decision framework and case study for the Eindhoven University campus. Environmental Modelling and Software, 30, pp.15–34.
- Franke, J., Hellsten, A., Schlunzen, H., Carissimo, B, Ed. 2007; Best Practice Guidelines for the CFD Simulation of Flows in the Urban Environment, University of Hamburg
- CFD - Green Mark 2021 Computational Fluid Dynamics Guidelines.

11. Landscape and Visual Impact Assessment

11.1 Introduction

This assessment addresses appraisal of the existing landscape character of the site and its wider setting, analysis of the interaction of the proposed development and the overall project with the elements of the existing landscape in terms of visual effects, description of any design mitigation measures and prediction of any residual impacts of the proposed development.

The chapter will assess the 2 no. developments:

1. **The Proposed Development** for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant (referred to as OSPG) and associated site works - refer to section 2.3.1 of this EIAR for a full description of the proposed development.

2. **The Overall Project** which includes the permitted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to this application as per application SDCC Ref. SD22A/0156 - described in full detail in section 2.3.2 of this EIAR.

As per Article 3 of the EIA Directive, this Chapter aims to "describe and assess in an appropriate manner, […]the direct and indirect significant effects of a project on the following factors: […] landscape".

Annex IV, point 4 of the EIA Directive requires a "description of the factors specified in Article 3(1) likely to be significantly affected by the project: […] landscape".

This chapter describes and assesses the following topics:

- Project Context
- Project Character
- Landscape Context
- Landscape Appearance and Character incl. Sensitivity
- Significance
- Views & Prospects

11.2 Methodology

The assessment was based on the methodologies set out in the following guidelines:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports 2022 (referred to as EPA Guidelines)
- Guidelines for Landscape and Visual Impact Assessment 3rd Edition 2013 (referred to as GLVIA)
- Technical Information Note 05/2017 (Revised 2018) on Landscape Character Assessment (hereafter referred to as the 'TCA') (Landscape Institute 2018)
- Landscape Institute Technical Guidance Note 06/2019 on Visual Representation of Development Proposals (hereafter referred to as the VRDP (Landscape Institute 2019)

Based on the above guidelines the methodology can be described in these few steps:

1. Identify baseline conditions of the site and its environs.
2. Identify the sensitivity of receptors with the potential to be affected by changes in the baseline conditions.
3. Predict the magnitude of likely changes to the baseline receiving environment.
4. Assess the significance of the effect taking into account the sensitivity of receptors and the magnitude of the effect.
5. Identify and assess appropriate mitigation measures, including alternatives.
6. Assess the significance of residual effects, taking into account any mitigation measures.

11.2.1 Summary of Terminology

All the below terminology explanations follow the GLVIA.

There is a distinction between the terms *impact* – understood as an action being taken, and the *effect* understood as a result of that action.

Magnitude is a term that combines judgements about the size and scale of the effect.

Sensitivity is a measure which describes the susceptibility of the receptor to a specific type of change.

Significance of effects is understood as the importance or gravity of the outcome of the effect (the consequences of a change).

Baseline is understood as the conditions against which any future changes can be measured and assessed.

Landscape Character Areas are single unique areas which are the discrete geographical areas of a particular landscape type.

Landscape Character Types are distinct types of landscapes that are homogenous.

Visual Amenity is understood as the overall pleasantness of the views.

Visual effect means an effect on specific views and the general visual amenity experienced by people.

11.2.1 Data

The assessment process has been carried out with the support of the following documents, which will be further described and referenced in this chapter:

- Tree survey prepared by landscape architects Murray Associates Ltd.
- Landscape scheme design prepared by Murray Associates Ltd.,
- Historic maps (Source: GeoHive website)
- Current aerial photography (Source: GeoHive website)
- SDCC Development Plan 2022-2028
- Landscape Character Assessment of South Dublin County prepared in 2022.
- Photographs and verified photomontages prepared by Digital Dimensions Ltd.

The process has been supported by a site walkover which took place on 18th October 2021.

11.2.2 Appraisal Method

To provide an assessment of effects which is comparable to other types of environmental assessment it is necessary to use the criteria specified in the 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' 2022.

The impact can be rated under the criteria set out in Table 3.4 within the EIAR Guidelines document: significance, quality and duration.

The **significance** of the effects can be described as follows:

Table 11.1:

SIGNIFICANCE	DESCRIPTION
Imperceptible	***An effect capable of measurement but without significant consequences.***
Not Significant	***An effect which causes noticeable changes in the character of the environment but without significant consequences.***
Slight 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 merging baseline trends.***
Significant Effect	***An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.***
Very Significant Effect	***An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.***
Profound Effect	***An effect which obliterates sensitive characteristics.***

Significance of the effects (Source: 'Guidelines on the Information to be Contained in environmental Impact Assessment Reports')

The **quality** of the effects can be rated as follows:

QUALITY	DESCRIPTION
Positive	***A change which improves the quality of the environment (for example, by increasing species diversity, or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities)***
Neutral	***No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error***
Negative / Adverse	***A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance).***

Table 11.2: Quality of the effects (Source: 'Guidelines on the Information to be Contained in environmental Impact Assessment Reports')

In terms of **duration and frequency** of effects, the following descriptions are applicable:

DURATION	DESCRIPTION
Momentary Effects	*lasting from seconds to minutes - Not applicable to visual aspect*
Brief Effects	*lasting less than a day.*
Temporary Effects	*lasting less than a year*
Short-term Effects	*lasting one to seven years*
Medium-term Effects	*lasting seven to fifteen years.*
Long-term Effects	*lasting fifteen to sixty years*
Permanent	*lasting over sixty years*
Reversible	*Effects that can be undone, for example through remediation or restoration.*

Table 11.3: Duration of the effects (Source: 'Guidelines on the Information to be Contained in environmental Impact Assessment Reports')

Figure 11.1 below demonstrates the relationship between the sensitivity of the existing environment, effect magnitude and significance (as per Figure 3.4 of the EIAR Guidelines).

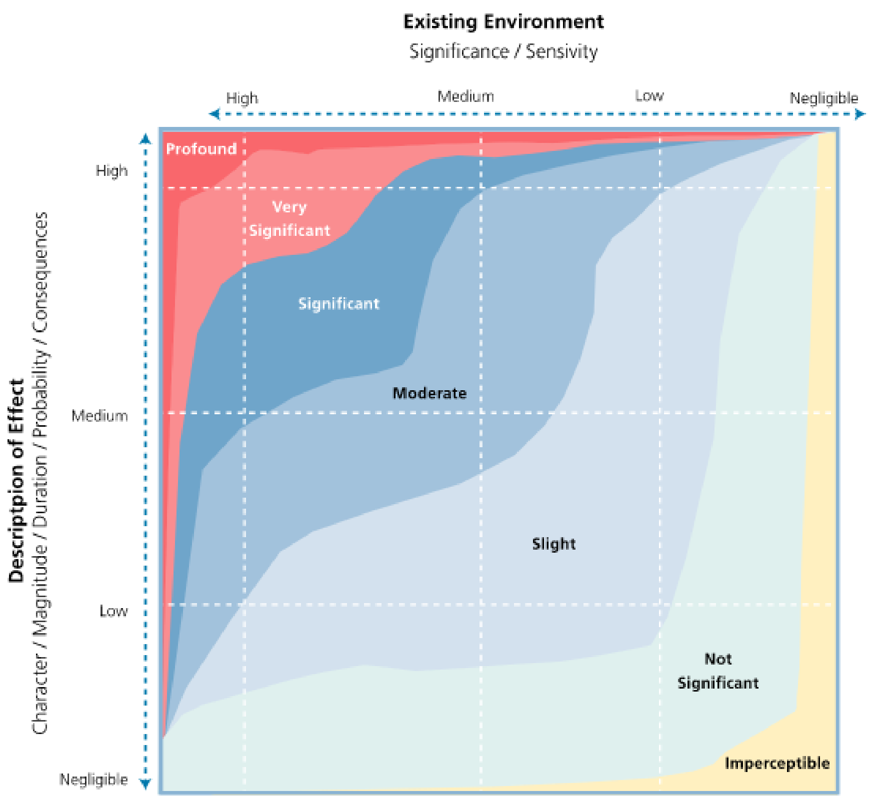


Figure 11.1 – Chart showing typical classifications of the significance effects (Source: Figure 3.4, EIAR Guidelines 2022.

11.2.3 Photomontage Methodology

The methodology for the preparation of photomontages has regard to the Landscape Institute Technical Guidance Note 06/2019 on Visual Representation of Development Proposals (Landscape Institute 2019) and is further informed by the experience in photomontage production of Digital Dimensions Ltd.

The following steps have been followed in the photomontage production:

1. Photographs were taken from the 13 no. selected locations (refer to section 11.7.4 for further information on how the locations have been selected.) with a full-frame SLR camera. The photographs are taken horizontally with a survey level attached to the camera. The photographic positions are marked for later surveying, the height of the campera and the focal length of the image recorded.

2. In each photograph, a minimum of 3 no. visible fixed points were marked for surveying. These were control points for model alignment within the photographs. All surveying was carried out by a qualified topographical surveyor from Jones Engineering Geo Surveying Department on 22nd June 2021, 20th November 2021 and 01st September 2022, using Total Station / GPS devices.

3. The photographic positions (view points) and the control points were geographically surveyed and this survey is tied to the site topographical survey of the site and its surrounds.

4. The buildings and other structures being part of the proposed development and the overall project were accurately modelled in 3D software from the architectural planning drawings (Floor plans, sections and elevations as submitted for planning). Material finishes were applied to the 3D model and scene elements like trees and plants were placed to represent the proposed landscaping.

5. Virtual 3D cameras are positioned according to the survey co-ordinates (surveyed control points) and the focal length is set to match the photograph. Pitch and rotation are adjusted using the survey control points to align the virtual camera to the photograph. Lighting is set to match the time of the day the photograph is taken.

6. The proposed development is output from the 3D software using the camera and the image is then blended with the original photograph to give an accurate image of what the proposed development would look like in its proposed setting.

7. If the development is not visible, the roof line of the development is outlined in red.

Photomontages, which have been prepared are presented in 3 versions: ‘as existing’, ‘as permitted’ under planning Reg. Ref. SD21A/0186 and ‘as proposed’ under the current planning application, in landscape format in Appendix 11.1 and Appendix 11.2 of the EIAR.

11.3 Relevant Legislation and Policy

The applicable legislation for th assessment is:

- South Dublin County Development Plan 2022-2028

The following objectives from the Development Plan apply to the landscape of the site and its surrounds:

Specific objectives relating to EE-zoned land ('To provide for Enterprise and Employment related uses') as per Chapter 12.9.2 of the Development Plan:

Key principles for development within enterprise and employment zones:

Open Space and Landscape Principles:

- *Important natural features of the site such as trees, hedgerows and watercourses are retained, integrated within the landscape plan and reinforced with the planting of native species.*
- *Natural buffer zones and defensive planting are used to define private space and the use of fencing to the front of buildings minimised. Where fences interface with the public domain they should be of high quality and incorporate elements of landscaping (for screening).*
- *Development within business parks maintains and promotes a parkland-like setting with high-quality landscaping.*

Built form and Corporate Identity:

- *Building heights respond to the surrounding context with transitions provided where necessary with reinforce urban structure with taller building located along key movement corridors, gateway and notes.*
- *Individual buildings to be of contemporary architectural design and finish (including use of color)*
- *Various treatments, finishes and colors should be employed to reduce the bulk, massing and scale of larger buildings.*
- *The layout and design of buildings should maximize frontages onto the public realm and enclose private external spaces (such as service yards and car parks) and storage areas behind them.*

Natural, Cultural and Built Heritage chapter – Policy NCBH11: Tree preservation orders and Other Tree/ Hedgerow Protections (Chapter 3.3.6 of the Development Plan)

There are no protected trees or tree groups within the proposed site listed in the Development Plan 2022-2028 although the following Objectives are applicable:

NCBH11 Objective 3: *To protect and retain existing trees, hedgerows and woodlands which are of amenity and/or biodiversity and/or carbon sequestration value and/or contribute to landscape character and ensure that proper provision is made for their protection and management taking into account Living with Trees: South Dublin County Council Tree Management Policy (2015-2020).*

NCBH11 Objective 4: *To protect the hedgerows of the country, acknowledging their role as wildlife habitats, biodiversity corridors, links within the County's green infrastructure network, their visual amenity and landscape character value and their significance as demarcations of historic field patterns and townland boundaries.*

Policy NCBH14: Landscapes (Chapter 3.4.3 of the Development Plan)

NCBH14 Objective 2: *to Ensure that development is assessed against Landscape Character, Landscape Values and Landscape Sensitivity as identified in the Landscape Character Assessment for SDC (2021) in accordance with Government Guidance on Landscape Character Assessment and the National Landscape Strategy (2015-2025).*

NCBH14 Objective 3: *To ensure that the development respects and reinforces the distinctiveness and uniqueness of the landscape Character Types and retains important characteristics such as habitats, landform, vernacular heritage and settlement patterns.*

Policy NCBH14: Views and Prospects (Chapter 3.4.4 of the Development Plan)

There are no views or prospects that relate to the proposed site listed in the Development Plan 2022-28, Table 3.5.

Green infrastructure objectives – Biodversity (Chapter 4.2.1 of the Development Plan):

GI2 Objective 5*: To protect and enhance the County's* the Development Plan *network, in particular hedgerows that form townland, parish and barony boundaries recognising their historic and cultural importance in addition to their ecological importance and increase, and increase hedgerow coverage using locally native species including a commitment for no net loss of hedgerows on any development site and to take a proactive approach to protection and enforcement.*

Green infrastructure objectives – Riparian Corridors (Chapter 4.2.2 of the Development Plan):

GI3 Objective 3*: To promote and protect native riparian vegetation along all watercourses and ensure a minimum 10m vegetated riparian buffer from the top of the riverbank is maintained/reinstated along all watercourses within any development site.*

11.4 Characteristics of the Development

11.4.1 Proposed Development

The details of the full proposed development that is subject to this planning application are included in section 2.3.1 of this EIAR. The proposed development involves the following works that have the potential to visually impact the landscape:

- Amendments to the previously permitted data centre known as "DB8", including:
    - Extension of the loading dock at ground floor level by c.60sqm and minor height increase to c.5.3m (increase by 450mm).
    - Removal of the front-of-house offices at the third-floor level and parapet height increase of the front-of-house to c.16.8m (increase by approx. 350mm).
    - Removal of 3 no. air plenums to the front (north) elevation and provision of screening to generator flues in place of omitted plenums.
    - Removal of 2m high gantry screening at roof level.

- Provision of additional 4 no. external generators (total of 9 no) within the plant compound north of the data centre building.

- Removal of 1 no. sprinkler tanks (c.12m high) at the back of the building.

- Provision of on-site gas power generation compound (c. 2,604 sqm in area) in the area previously reserved for a future data centre. The compound comprises 7 no. modular plant rooms (totalling c.180sqm in the area), 10 no. gas-fired generators and associated flues c.14.7m high, gas skid, associated modular plant, boundary treatment surrounding the compound c.6.5m high and 2 no. vehicular access

- Provision of 2 no. swales (drainage features to collect the rainwater and allow it to soak away into the ground)

Please note that the proposed OSPG is being assessed in line with 3 options relating to the period of operation, as described in greater detail in section 2.11. Landscape and visual impact of decommissioning has been assessed in section 11.7.16.

Figure 12.2 – Landscape masterplan showing all previously approved features and newly proposed elements combined (Please refer to Appendix 11.7 for the full scale drawing)

11.4.2 Overall Project

The full details of the overall project are included in section 2.3.2 of this EIAR.

The overall project involves the following works that have the potential to visually impact the landscape:

- Construction of a 3-storey data centre known as "DB8" with amendments as per the current planning application (refer to 12.2.1)
- Provision of 9 no. external generators and ancillary plant contained within a plant yard to the north of DB8;
- Provision of a water tank plant room, air-cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a water sprinkler pump room (c.23sqm), 1 no. sprinkler tanks (c.12m high), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm). Total floor area of ancillary structures and plant (c.303sqm);
- Provision of on-site gas power generation compound in the area previously reserved for a future data centre, as per current planning application (refer to 12.2.1)

- Associated development works, services provisions, 64 no. car parking spaces, internal access roads and footpaths,

- Drainage works including attenuation ponds (to collect the rainwater and allow it to soak away into the ground)

- Landscape and boundary treatment works incl. earth berm to the north, hedgerow protection areas and security fencing.

11.4.4 Associated infrastructure projects

The scope of the Proposed Development includes the following associated infrastructure project:

- Connection to gas network – The proposed connection point is located west of the subject site, within the Falcon Avenue (internal Profile business Park estate road). Refer to section 14.4.6 of this EIAR for full connection details.

The Overall Project includes the following associated infrastructure project:

- Connection to water main within the pavement along Falcon Avenue (Profile Business Park estate road), north-west of the site. Refer to section 14.4.5 of this EIAR for full connection details.
- Foul drainage connection to the existing foul sewer network laid along the western edge of Falcon Avenue via the existing spur connection laid across Falcon Avenue. The ctual connection point is within the site boundary. Refer to section 14.4.4 of this EIAR for full connection details.
- Storm Water - All surface water to be attenuated within the site and designed in accordance with the Greater Dublin Strategic Drainage Strategy. Refer to section 14.4.3 of this EIAR for full details.
- Fibre network connection – Refer to section 14.4.7 of this EIAR for full connection details.

11.5 Receiving Environment

The site, which is currently (April 2023) a greenfield site, is located at the entrance to the Profile Business Park on the western outskirts of Dublin.

Profile Business Park is an established business park developed in the late 2000' – early 2010' (planning Reg. Ref. SD06A/0568).

There are still several sites within the business park which are yet undeveloped (like the site subject to this planning application).

Existing developments within the park include Digital Realty Data Centre further south (Planning Reg. Ref. SD11A/0023) and the marketing suite office for the park (Reg. Ref. SD08A/0239).

There are a few permitted developments which have not yet been constructed. These include Greener Ideas gas-fired power plant (Reg Ref. SD21A/0167) further south of the subject site, and a data centre building on the subject site itself (SD21A/0186) (referred to as a 'Permitted Development' in this EIAR).

There are further developments within Profile Park which are currently in the planning process, for example, data centres west of the subject site (Vantage data centres Reg. Ref. SD 21A/0241 and SD22A/0420).

Please refer to a comprehensive list of the relevant developments listed in Appendix 19.

There are several land uses surrounding the site, which define the landscape character (as of February 2023).

Lands to the north and west are characterised by large-scale built industrial developments.

The wider area is currently a popular location for data centres, due to the development plan zoning and services availability. The use of the site for a data centre facility was permitted by the Development Plan 2016-2021.

Data centres in the area include Microsoft facilities in the Grange Castle Business Park (located north of the Profile Park, on the other side of Nangor Road) and Google, Cyrus One and UBC (currently in construction) data centres in the IDA Grange Castle South Business Park Grange Castle South Business Park, which is adjacent to the Profile Business Park to the west.

There are various commercial, office and industrial buildings (including another data centre by Equinix) located across the road from the site within Kilcarberry Business Park. The petrol station (Circle K) is located directly north of the subject site. Whilst the uses in the vicinity of the site are predominantly commercial and industrial, there is also a small residential dormer bungalow block located approx. 70m north of the site (beside the petrol station) and a small residential housing estate 600m to the east of the site.

Further to the west, beyond IDA Grange Castle South Business Park, the landscape is of rural typology with medium to large fields and individual houses. Field sizes are irregularly shaped and are separated by hedgerows and tree lines, which often block otherwise open landscapes.

All the above-mentioned developments for part of the current developing trends in this area.

To the east and south of the site lies the Grange Castle Golf Course, with artificial mounds and ponds and managed landscaping. It is evident from the aerial images that original treelined field boundaries have been retained within the golf course lands. These effectively block the open vistas across the golf course.

There is a rural area directly south of Profile Park. It includes a detached house and agricultural buildings which are screened by vegetation. The fields surrounding them provide an open landscape with views in all directions.

Baldonnel Casement Aerodrome dominates the landscape further south or Baldonnel Road.

Figure 12.3- Aerial view of site surrounds (Source: Google Maps)

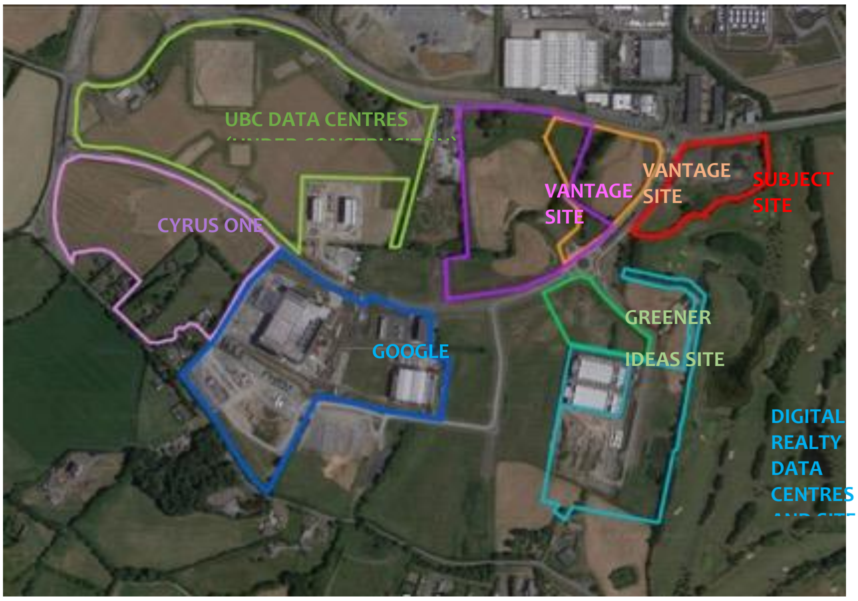


Figure 12.4. Aerial view of site surrounds with locations of other developments and planning applications (Source: Google Maps)

11.5.1 Baseline Scenario 1 - for the proposed development

The impact of the proposed development comprising the On-Site Power Generator Plant and minor alterations to the permitted data centre (for full description please refer to section 2.3.1 of this EIAR) will be assessed versus the development that has been permitted on the site as per planning Reg. Ref. SD21A/0186.

The baseline scenario for the currently proposed development, therefore, comprises (also refer to Figure 12.5 for the permitted site plan layout):

- 3/4-storey data centre known as “DB8” with a total gross floor area c.9,535 sqm.
- 5 no. external generators with fuel tanks and ancillary plant contained within a plant yard to the north of DB8;

- Water tank plant room, air-cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;

- A water sprinkler pump room (c.23sqm), 2 no. sprinkler tanks (c.12m high), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm). The total floor area of ancillary structures and plant (c.303sqm);

- Associated development works, services provisions, 64 no. car parking spaces, internal access roads and footpaths.

- Drainage works including attenuation pond.

- Landscape and boundary treatment works incl. earth berm to the north, hedgerow protection areas and security fencing.

Figure 12.5 – Proposed site plan as permitted under Reg. Ref. SD21A/ 0186

The certified photomontages of this development have been included in Appendix 11.1 and 11.2 and referred to as 'as permitted'. Figure 12.6 depicts the proposed development as seen from the Nangor Road roundabout.

Figure 12.6– Development as permitted under Reg. Ref. SD21A/ 0186, as seen from the roundabout northwest from the site.

11.5.2 Landscape character in Baseline Scenario 1

The data centre building permitted under Reg. Ref. SD21A/0186, considering its scale, massing and function relates to the surrounding buildings. The natural character of the permitted landscape scheme at the south and east boundaries corresponds with the existing hedgerow, whereas the 'managed' character of the permitted landscaping along the north and west boundary complement the existing landscape elements of the Profile Park. By term 'managed' character is understood a quality green urban area: tree-lined roads, managed perimeter hedges, roundabout planting, etc.

Figure 12.7 – Development as permitted under Reg. Ref. SD21A/ 0186, as seen from the roundabout northwest from the site.

11.5.3 Visual environment character in Baseline Scenario 1

The description of the visual receiving environment is covered within sections 11.7.5 to 11.7.17 where individual selected viewpoints have been analysed - refer to 'The character of the view with the permitted development (Baseline scenario for the Proposed Development)' descriptions.

11.5.4 Site Description and Baseline Scenario 2 - for the 'Overall Project'

Currently (as of February 2023) vacant, greenfield site forms the baseline scenario for the Overall Project, as described in section 2.3.2 of this EIAR.

The site measures 2.649 hectares / 6.545 acres and is of irregular, quasi-triangular shape.

The ground levels within the site area appear flat however with a gradual fall from north to south. The existing site levels differ by approx. 2m between the levels along the north boundary (75.5 O.D.) and levels along the existing dry ditch along the south boundary (73.24-73.5 O.D.).

The site has been used in the past for agricultural use (before the Profile Business Park has been built in 2006 – refer to Figure 12.8 for an aerial photograph from that time.)

Figure 12.8. Aerial picture of the site taken before Profile Business Park was built (between 2001 and 2006) – hedgerow clearly visible.

It has been used as a temporary builders' compound since the business park's inception and no permanent structure has ever existed.

There was also stockpiling of fill from adjacent sites stored on the site, which has recently been cleared. It has been recently used by ESB as a site compound during their work in the area. Currently, the site is not being used. Refer to Figure 12.9 for aerial photograph of the site from 2021.

Figure 12.9. Aerial view of the site and its immediate surrounds in 2021 (Source: Google Maps)

The site is bounded by an old townland boundary between Ballybane and Kilcarberry on the west and south (refer to Figure 12.10), which is nowadays represented by an old hedgerow and a - mostly dry - ditch. The hedgerow is seen as a sensitive element from heritage as well as from an ecology point of view (Please also refer to Chapter 6. Biodiversity, sections 6.3.4 and 6.5.1.1 as well as Chapter 14 Cultural Heritage – Archaeological, sections 14.3 and 14.9).

Figure 12.10. Historic 6-inch map with a clear representation of townland boundaries

As demonstrated by the Tree Survey Plan (drawing number DB80-MA-LS-XX-DR-V-PLNT-1040, revision P01, and Tree Protection Strategy Report prepared by Murray Associates Landscape Architects for the previous planning application (attached as Appendix 11.3 and 11.5 respectively), there is little vegetation on the site. It mainly includes trees, tree groups and hedges along the southeast and east boundary and a contemporary screening hedgerow to the north boundary. Refer to Figure 11.11 for an extract from the Tree Survey Plan. The trees within the site area are in fair to good condition.

The majority of the trees along the southeast and east boundary are Ash (Fraxinus excelsior). A number of these specimens are showing signs of Ash Dieback (Chlara). This is a serious disease which causes rapid decline and failure of Ash. Hedge species include Hawthorn, Blackthorn, Elder, Bramble and Dogrose. The hedgerow along the dry ditch has not been managed and it is in a dilapidated state.

There is a row of Lime trees along the estate road, just outside of the site's west boundary, which forms part of the Profile Business Park landscaping scheme.

For further information please refer to Appendix 11.5 - Arboricultural Inventory and Impact assessment incorporating Tree Protection Strategy prepared by Murray Associates, prepared based on the survey carried out on the 21st of April 2021 and including findings of this survey and assessment of mature trees and hedgerows on the subject site.

Visually the site is well contained by the perimeter trees to the east, south and west and Nangor Road to the north, which is demonstrated in the site pictures (see Figures 12.12-12.15).

Figure 11.11. Extract from tree survey drawing by Murray Associates - refer to Appendix 11.3 for full scale drawing.

Baldonnel Stream adjoins the site at its southwest corner. The existing ditch connects with it and occasionally fills with water draining from the adjacent golf course (Refer to section 7.2.1 in Chapter 7. Water).

Figure 11.12. View of the site looking southeast.

Figure 11.13. View of existing ditch and hedge.

Figure 11.14. View along Falcon Avenue towards the Business Park entrance. Subject site to the right-hand side of the road.

11.5.5 Landscape character in Baseline Scenario 2

As noted within the Development Plan 2022-28 Chapter 3.4.3 and following the Landscape Character Assessment of South Dublin County prepared in 2022, the proposed site is designated as ‘LCA2 - Newcastle Lowlands’ landscape character area.

Its main characteristics are:

- Low-lying and gently undulating agricultural lands
- Agricultural land use
- The increasing influence of urban activities closer to the motorways, national roads and regional roads
- Agricultural resources vulnerable to urbanizing pressures
- Rural landscape as a distinct and important identity

The landscape pattern has been described as relatively simple, ie. agricultural areas, a largely consistent mix of pasture and tillage comprising medium to large fields enclosed by hedgerows; some variety is added through the demesnes, stone walls and historical features with some fragmentation present associated with urban fringe and transport corridors. A high value has been noted in the variety of habitats: pasture, tillage with hedgerows and treelines.

It is noted that conserving this character requires controls on urban expansion, ribbon development and other sources of erosion and fragmentation.

The LCA also identifies several <u>landscape character types</u>, for example agricultural, foothills, mountains, urban and others. There may be several landscape character types within each character area. The subject site is classified as <u>Urban Fringe / Periurban</u>. Refer to Figure 12.15.

LCA summarizes this type as '*Transitional lands that were largely rural, transforming into suburban or urban-derived land use. Radiate from established settlements and close to transport links Land use is built land comprising transport, retail/business parks, quarries and urban-derived housing*'. *(Source LCA, page 95)*

Principles for development are *(Source LCA, page 95)*:

- *'Screening through appropriate native broadleaf planting to provide a stronger visual boundary and definition as well as enhance ecological connectivity'.*
- *'Coherent approach to boundary treatments and design'.*
- *'Prepare plans to integrate transitional lands into the landscape through appropriate planting and boundary treatments'.*

Visual sensitivity has been characterised as <u>medium</u>, due to flat open character and intervisibility with hills south of this area (further described in section 12.6).

At a more localised level, the landscape can be described as an 'edge of city' type with increasing urban influences that impact the rural landscape character, resulting in a mixture of commercially developed land, agricultural land and one-off houses.

It can be considered that the land use zoning '*to provide for Enterprise and Employment related uses*' as per South Dublin Development Plan 2016-21 and 2022-28 and the significant presence of large commercial/industrial developments means that the landscape has <u>a high capacity to accommodate further developments without significantly altering its character</u>.

The character of the proposed site and its environs has largely been determined by the following:

- Flat topography
- Large industrial buildings in the vicinity
- History of the agricultural use
- Townland boundary with the dry ditch and hedgerow along the east and south perimeter
- Tree-lined internal estate road

The subject site has a character of an agricultural field including the hedgerow field boundary to the east and south, however, the site has already been visually incorporated into the industrial park as it is adjacent to the park entrance and estate road.

The landscape of the proposed site has little aesthetic qualities of note as the original agricultural landscape has been degraded in recent times. The only element of some quality would be the hedgerows along the east and south boundaries.

The principles for development for the landscape character area 'Newcastle Lowlands', which are relevant to the subject site are:

- Existing developments around Newcastle would benefit from greater consistency in boundary treatments and greater use of natural planting.
- Boundary treatments including screening through appropriate tree planting (of native provenance) would sympathetically absorb development.
- This LCA functions as the rural landscape that frames western Dublin and retaining both separate distances and its agricultural character is very important.

The above principles have been incorporated into the proposed landscape scheme (permitted development).

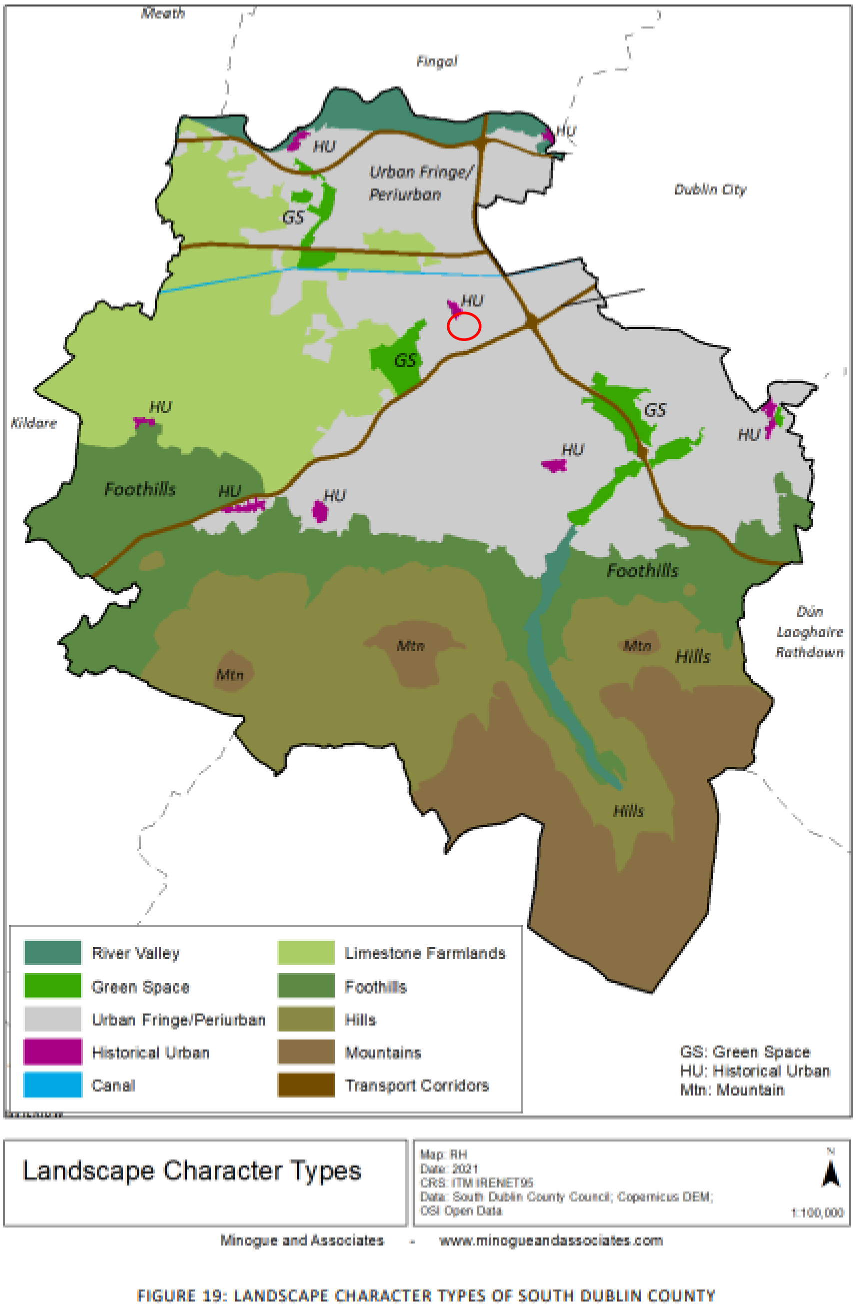


Figure 11.15. Landscape character types (Source: SDCC Development Plan 2021-27). Subject site marked with red circle.

11.5.6 Visual environment character in Baseline Scenario 2

The description of the visual receiving environment is covered within sections 11.7.5 to 11.7.17 where individual selected viewpoints have been analysed - refer to 'Character of the existing view (Baseline scenario for the Overall Project)' descriptions.

11.6 Sensitivity of the Existing Landscape and Visual Environment

As outlined within the Development Plan 2022-28, page 110:

'The capacity of each Landscape Character Type to absorb new development will largely depend on the sensitivity of the landscape. Landscape capacity means the ability of a landscape to accommodate different amounts of change for the development of a specific type without adversely affecting the intrinsic character of the landscape. Assessment of sensitivity takes account of the overall landscape character, quality and condition of the landscape and considers its potential ability to adapt to change without losing its intrinsic character. (…). For each landscape character type a set of principles has been devised. These principles will aid in the management of development including designing development proposals and assessment of planning applications.

As per the Landscape Character Assessment, being an Appendix 9 to the South Dublin County Development Plan 2022-2028, the subject site is located within the landscape character area 'Newcastle Lowlands'. The sensitivity of this character area is rated as '<u>Medium</u>' – refer to Figure 11.17.

The landscape character type 'Urban Fringe / Periurban' has no sensitivity allocated to it - refer to Figure 11.18.

As outlined earlier in this chapter, landscape sensitivity directly relates to a level of capacity to absorb changes.

In this case, 'Medium' sensitivity results in a fair potential to absorb changes. The surrounding large-scale industrial developments and current land use zoning of the subject site being 'Employment and Enterprise' further supports that potential. Refer to Figure 12.16.

The subject site has a character of an agricultural field including the hedgerow field boundary to the east and south, however, the site has already been visually incorporated into the industrial park as it is adjacent to the park entrance and estate road.

The landscape of the proposed site has little aesthetic qualities of note as the original agricultural landscape has been degraded in recent times. The only element of some quality would be the hedgerows along the east and south boundaries. It should be protected in line with the Development Plan policies mentioned earlier in section 12.3.

The prominent location at the entrance to Profile Business Park increases the significance and sensitivity of the site in terms of visual amenity from Nangor Road.

There are no designated scenic views or prospects towards the site identified by the Development Plan 2022-2028 (refer to Figure 11.16.)

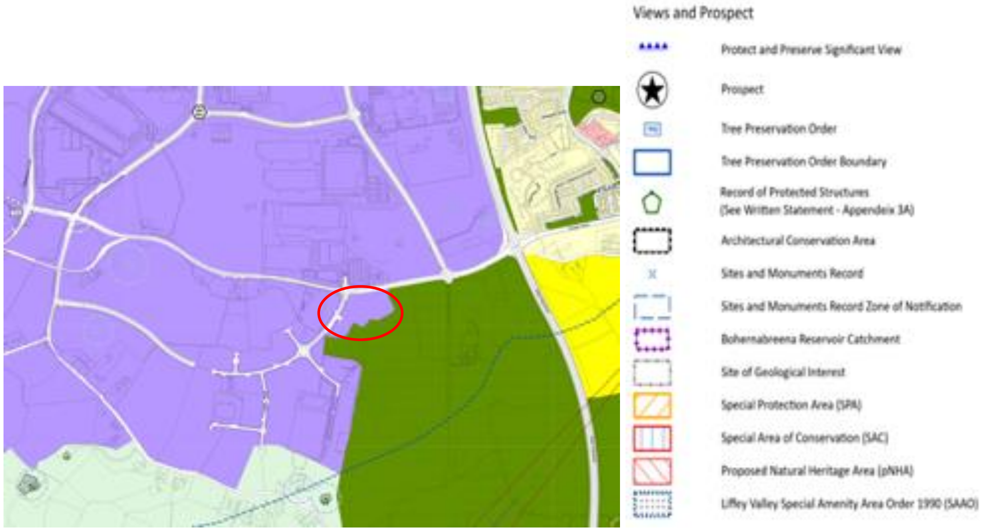


Figure 11.16. Extract from the Development Plan zoning map with legend – subject site identified with red circle.

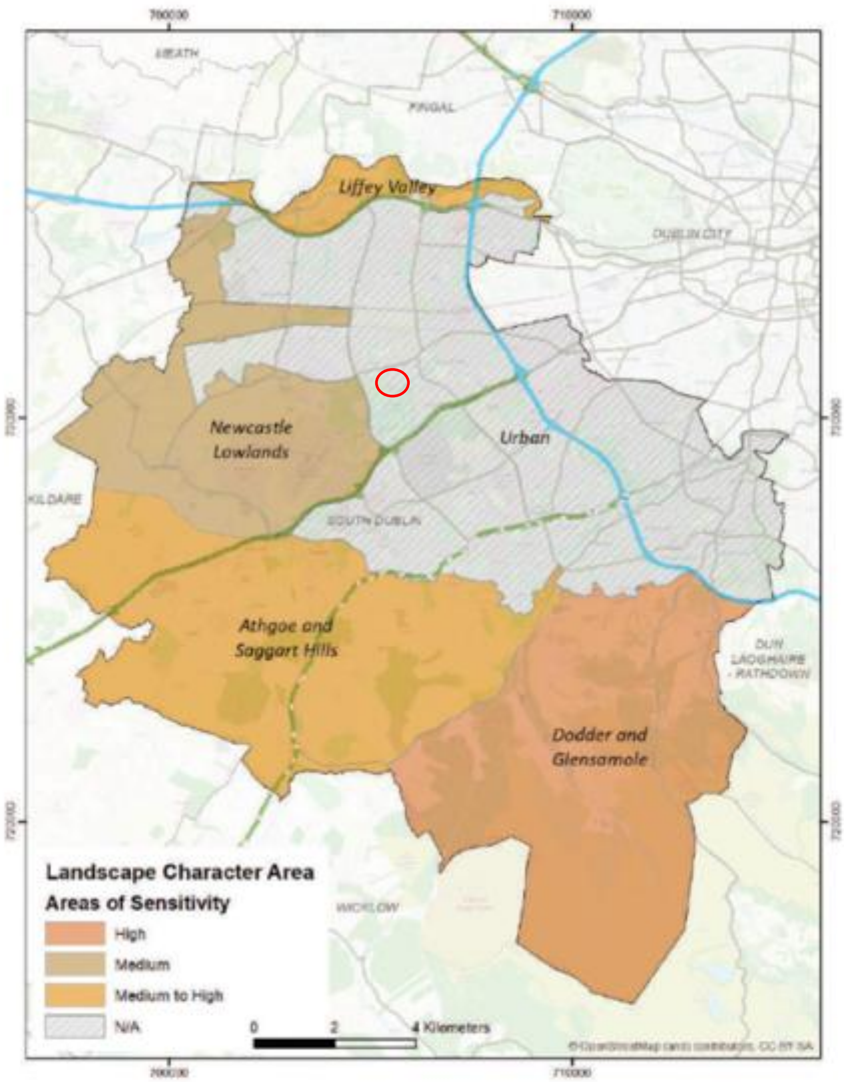


Figure 3.1: Landscape Character Areas and Sensitivity for South Dublin County

Figure 11.17. Sensitivity of the Landscape character areas of South Dublin County. Source: Landscape Character Assessment of South Dublin Count.

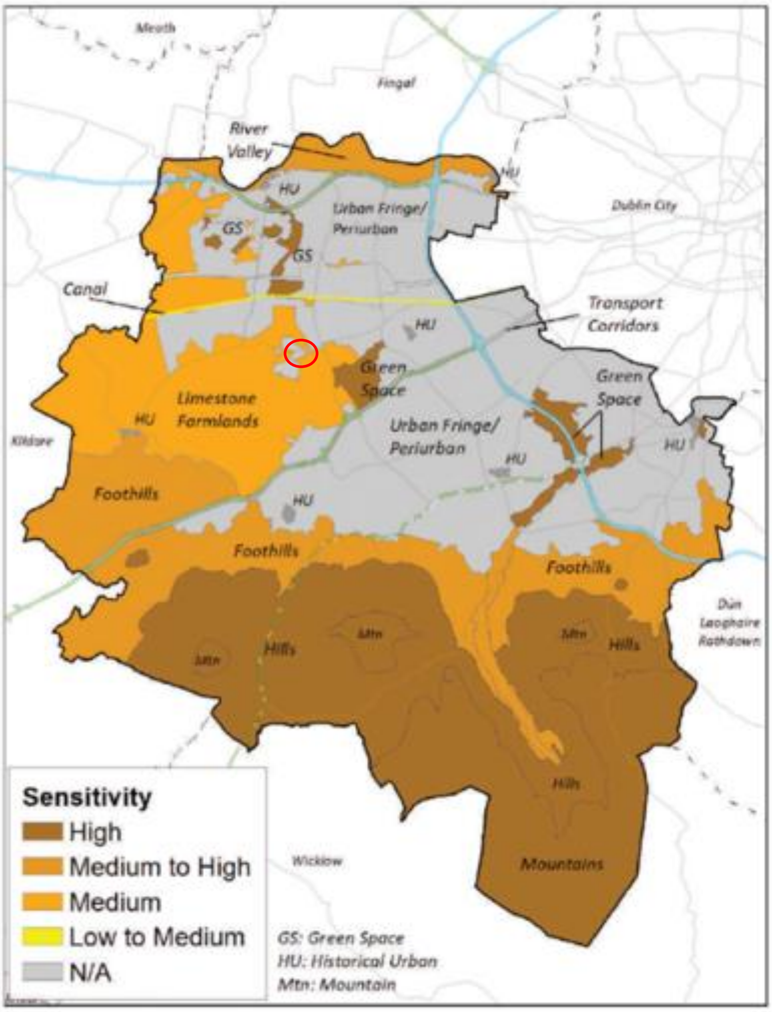


Figure 3.2: Landscape Character Types and Sensitivity for South Dublin County

Figure 11.18. Sensitivity of the Landscape character types of South Dublin County. Source: Landscape Character Assessment of South Dublin County

The potential visibility of the proposed development is defined by the relatively flat topography, existing surrounding development and vegetation. Taking vegetation into account, which is quite rich in certain areas around the site, including the perimeter hedge, the site is not readily visible unless the viewer is located in the immediate surroundings.

13 no. key locations have been selected around the site, from which the development may be visible. Refer to section 11.7.4 for the selection methodology. The verified photomontages have been prepared and the nature of visual effects has been assessed in sections 11.8.5-11.8.17, please also refer to Appendix 11.1 and 11.2 for the photomontages.

11.7 Potential Impacts of the Development

The development will give rise to some degree of landscape and visual impact.

11.7.1 Construction Phase Landscape Impact

The construction period has been estimated to take approximately 16-18 months for the overall project. It is intended to construct the on-site power generation compound being subject to the current planning application (the Proposed Development) within the same time frame, simultaneously with the Data centre building and other works (referred to as Overall Project).

Both projects (Proposed Development and Overall Project) would result in the same type of construction work taking place:

- Erection of site hoarding
- Removal of soil and creation of mounds of subsoil
- Removal of vegetation (without affecting perimeter hedgerows and trees).
- Erection of construction compound incl. temporary buildings and contractors' parking
- General earthworks
- Construction of the new buildings
- Installation of external plant
- Construction of roads and service yards
- Drainage works including provision of pond and swales
- Landscape works including construction of berm.

The above will result in alteration the character of the environment in a manner that is consistent with existing trends, which can be observed on other sites in this area currently under construction.

All the above actions will alter the character of the environment in a manner that is consistent with existing and emerging baseline trends.

It is considered that the construction phase of the proposed development and overall project may have a **negative** effect on the landscape character, however, they will be **moderate** in significance (alteration the character of the environment in a manner that is consistent with existing and emerging baseline trends) and **short-term** in its duration. They will all recede upon completion of construction.

11.7.2 Construction Phase Visual Impact

Most of the operations listed in section 12.7.1 above will cause a visual disruption to the site's appearance, in particular, these would be:

- The visual impact of temporary site structures, machinery, cranes, materials storage, associated earthworks, car parking, lighting and hoarding.
- Increased construction traffic on Nangor Road and Falcon Avenue

The above will result in alteration the character of the environment in a manner that is consistent with existing baseline trends associated with other developments in this area currently under construction.

The visual impact overall would be **negative**; however, it will be **moderate** in significance and **short-term** in duration. It will cease upon completion of construction.

11.7.3 Operational Phase Landscape Impact

The impact of the proposed development, as described in section 2.3.1 of this EIAR, will not be that noticeable, given the context of the permitted Data Centre building with ancillary plant areas and site works (baseline scenario 1). Proposed modifications to the Data Centre building will have a positive impact on the integration of the building into the surrounding landscape, mainly via the reduction of overall height, and the omission of the hot air plenums. The scale of the OSPG compound is not significant in the context of the permitted building and other buildings in the area. The appearance of tall solid enclosing walls has been mitigated by the application of green walls and screening rows of trees (refer to Mitigations section 12.8 for further information) that would assist in further integration of the proposed development into the existing landscape.

The impact of the proposed development therefore can be rated as **neutral**, **moderate in magnitude**, and **long-term / permanent** in duration.

The Overall Project as described in section 2.3.2 of this EIAR, will cause a transition from a previously greenfield site to a commercial and employment use of the site. However, the character of the development is following the current and emerging trends in the area. The scale of the building and ancillary buildings and equipment matches that of the other buildings in the wider area. The overall project spatial arrangement has been designed and laid out in a way that integrates well into the context of the area (industry, commercial and employment use).

The proposed landscaping and site works are also important elements of the overall design approach and strategy. It aims to provide a high-quality and well-integrated landscape at this location. The proposed landscape works will enhance the biodiversity on site through the use of native plants and the protection of existing hedge vegetation. It will also improve the appearance of the site from the public areas.

For further details as well as for the architectural design approach please refer to Architectural Design Statement and Landscape Design Statement and drawings which have been submitted with the planning application.

While the overall project would have a noticeable impact on the current landscape character (as described in section 11.5 and 11.6), it will not adversely impact the sensitivity of the character. The project will improve the quality of the site (which is currently unused) via intensification of use of the site which is in line with the current trends and baseline scenario (please refer to section 11.5 Receiving Environment for explanation of the current trends). The changes therefore can be rated as **positive in quality, moderate in magnitude**, and **long term / permanent** in duration.

11.7.4 Operational Phase Visual Impact

Due to the flat topography and existing vegetation surrounding the subject site, the views towards the site are generally well screened, except the views from and near the Nangor Road roundabout opposite the Profile Park entrance. The site is in a prominent location at the entrance of the business park so the development of this land will be a noticeable change.

The on-site power generation compound, which is part of the proposed development, as described in section 2.3.1 of this EIAR, which is located southwest of the permitted data centre, will be well screened by the data centre building and by the existing vegetation.

That effects can be rated as **neutral in quality and moderate** in magnitude.

The modifications to the permitted building, which are also part of this planning application will have a noticeable impact, which would be rated positive, as the changes reduce the visual impact of the permitted building via:

- Omission of hot air plenums to the north façade.
- Omission of the gantry screening on the roof.

The impact of the above changes can be rated as **positive** and **moderate** (please also refer to the particular views assessments in the following sections 11.7.5-11.7.17).

The overall project as described in section 2.3.2 of this EIAR, has the potential to result in noticeable visual impacts:

- The visual impact of new buildings, screening structures and technical equipment.
- The visual impact of landscaping works – increased planting and berms.

However, as mentioned earlier, due to the existing topography conditions and vegetation the development will generally be well screened with an impact rating from **significant to imperceptible** depending on the view and **quality rating negative/neutral/positive.** (Please refer to the particular views assessments in the following sections 11.7.5-11.7.17). All effects would be rated as **long term/permanent.**

The most significant effect will occur to the close views, for example, the views from the roundabout opposite Profile Business Park entrance.

13 no. views have been selected for a detailed assessment of the visual impact. 7 no. locations have been picked along Nangor Road, which is the main access road to the site. 2 no. locations from road R156 east of Grange Castle Golf Club have been selected as this is one of the major traffic routes in the area. 2 no. viewpoint have been selected from within the Profile Park area, although the public will have limited access to this location. One additional location from Baldonnel Road has also been selected, which offers a wide and open view over Profile Park from the south.

Figure 11.9. Landscape character types of South Dublin County. Source: Landscape Character Assessment of South Dublin County

Impacts on selected external views have been assessed individually in the following sections. Please also refer to Appendix 11.1 and 11.2 (Photomontages) for each view impression.

For each viewpoint the following variants have been assessed:

- Existing view (being the baseline scenario for the Overall Project)
- View as permitted under SDCC Ref. SD21A/0186 (being the baseline scenario for the Proposed Development)
- View as currently proposed – showing the Overall Project, combining the permitted scheme and the Proposed Development.

The above approach assists in visualizing how the visual impact of the previously approved data centre is being altered by the current proposal (the Proposed Development).

11.7.5 Visual Impact View 1

The viewpoint is on the pavement at Nangor Road roundabout at the entrance to Grange Castle Business Park, looking west. On the left-hand side there is an entrance to the public golf course, with extends on the left-hand side of Nangor Road.

The character of the view with the permitted development (Baseline scenario for the Proposed Development

The main elements dominating this view are the existing mature trees along Nangor Road and within the golf course. The subject site is not visible – it is concealed by the existing trees and shrubs. The permitted development is visible above the ridgeline of the trees, in particular the 3 no. hot air plenum towers at the north façade of the permitted development, which are taller than the parapet of the building.

The visual impact of the Proposed Development

Proposed changes to the permitted building - replacement of the hot air plenums with feature screens (refer to section 2.3.2 of this EIAR for full description) - have a noticeable impact on this view. The top edge of the building is less visible above the trees. The effect can be rated as **moderate in magnitude, positive in quality and long term / permanent in duration.**

The proposed on-site power generation plant is not visible in this view.

The character of the existing view (Baseline scenario for the Overall Project)

The main elements dominating this view are the existing mature trees along Nangor Road and within the golf course. The subject site is not visible – it is concealed by the existing trees and shrubs.

The visual impact of the Overall Project

The top edge of the building (the parapet, top of the rear staircase and front façade feature screens) is visible above the tree line. Given that it is the only building visible from this viewpoint, this change can be considered significant. However, a wider context needs to be taken into account. This change is in line with the established trend within this area, as there are business / industrial parks around. Therefore, although the effect on the view can be rated as **negative** in quality, it is **insignificant in magnitude.**

11.7.6 Visual impact View 2

The view is from the pavement at Nangor Road about 20m east of the subject site, looking west.

The character of the view with permitted development (Baseline scenario for Proposed Development

The permitted development is very well visible to the left-hand side of Nangor Road – the data centre building with hot air plenums attached to the façade and a row of maple trees planted on top of the earth berm behind the existing railing fence. The trees provide screening to the bulky mass of the building. The boundary between the site and Nangor Road is quite formal – with a fence and a hedge which offers further screening and lawn.

The visual impact of the Proposed Development

Proposed changes to the permitted building result in a noticeable improvement in the quality of this view. The hot air plenums, which were a dominating feature, are now removed and replaced with panels screening the flues at the façade.

The effect can be rated as **significant in magnitude and positive in quality.**

The proposed on-site power generation plant is not visible in this view.

<u>The character of the existing view (Baseline scenario for the Overall Project)</u>

From this location, the view is quite open, and the site is well visible. The existing tree group planted along the north boundary of the golf course, visible on the left-hand side provides screening to the site.

The character of this view is that of a flat agricultural field landscape, which this area used to be before the Profile Business Park has been established after 2006. The value of this view however is low as there is no interesting ridgeline. The front edge of the site along Nangor Road features an existing railing fence with a hedge behind it. Overall, the front of the site is very structured and characteristic of business parks - this is further highlighted by the existing lawn and bollards.

<u>The visual impact of the Overall Project</u>

The ridgeline of the view is noticeably changed by the scope of the Overall Project. The alteration of this view can be considered **negative in quality** due to the prominent location of the building and its large scale and massing.

However, the panels screening the generator flues at the north façade, as well as vertical fins on the solid cladding assist in visually breaking up the massing and adding an attractive detail to the façade. This mitigates the level of the negative impact.

The negative impact is also further mitigated by a row of maple trees planted on top of the earth berm behind the existing railing fence. The trees offer a significant screening of the façade and form an interesting ridge line of this view.

What also needs to be taken into account, in the context of this view, although not visible in the image. There is a petrol station and other large-scale industrial developments on the opposite side of the road. The proposed development would therefore be considered consistent with existing trends in the area.

As a result, although the overall impact on this view would be rated **negative in quality**, it would be considered **moderate in magnitude**.

11.7.7 Visual impact View 3

The view is from the pavement at the Nangor Road roundabout opposite Profile Business Park entrance, looking south.

<u>The character of the view with permitted development (Baseline scenario for Proposed Development</u>

The site is very well visible in the centre, beyond the roundabout landscaped island, resulting in the permitted development dominating in the centre of this view. The Office part of the building is facing towards the roundabout, with large expanses of glazing. Hot air plenum towers, which reach above the parapet level of the building, are very strong features.

The permitted landscape scheme integrates very well with the existing vegetation to the very left, very right and in the background.

The character of the view is consistent with other views within the business and industrial parks in the vicinity – it follows the established trends.

The visual impact of the Proposed Development

Proposed changes to the permitted building result in a noticeable improvement in the quality of this view. The hot air plenums are now removed and replaced with panels screening the flues at the façade. They look visibly lighter and as a result do not compete with the office façade, which is retained as the main feature in this view. The aesthetic aspect of the building is considerably improved. The other changes proposed to the permitted building are not visible in this view.

The effect can be therefore rated as **significant in magnitude and positive in quality.**

The proposed on-site power generation plant is located to the right of the data centre building and is screened behind the existing vegetation (outline of the OSPG compound indicated with a red line in the proposed view). The impact, therefore, is **neutral in quality and imperceptible in magnitude.**

The character of the existing view (Baseline scenario for the Overall Project)

From this position expansive view is offered over a flat agricultural field landscape. The is a particular value in the long-distance view with the Dublin Mountains visible at the horizon.

The site is very well visible in the centre of this view, beyond the roundabout landscaped island. Trees belonging to the hedgerow along the ditch east and south of the site form the ridge line of this view.

The visual impact of the Overall Project

The alteration of this view could be considered negative in quality and very significant in magnitude due to the prominent location of the building and its scale. The ridgeline of the view is considerably changed and the view towards the mountains is blocked.

However, the office part of the proposed building is designed as a feature (light grey panels with a large area of glazing) and it is intentionally facing west so that it is exposed to the roundabout. It is acting as a landmark in this view, drawing attention to it. Panels screening the generator flues along the façade, assist in breaking up the massing of the dark grey façade of the data halls. All this mitigates the negative impact of the scale of the building.

The negative effect is also further mitigated by a row of maple trees planted along the north site boundary. The trees offer a significant screening of the façade.

The trees planted along the site's west boundary offer further screening and add interest to the landscape ridgeline.

Although not visible in the image, there are other large-scale industrial developments on the opposite side of the roundabout (behind the viewer's back) which provide a vital context. The proposed development would be considered consistent with the existing built areas.

The on-site power generation compound is not visible in this view as it is screened by the existing row of trees planted along the estate road (outline of the OSPG compound indicated with a red line in the proposed view).

As a result, although the overall impact on this view can be rated **negative in quality**, it would be considered **moderate** in magnitude, as it is in line with the trends

in the area.

11.7.8 Visual impact View 4

The view is from the pavement at Nangor Road about 350m west of the subject site, looking east.

The character of the view with permitted development (Baseline scenario for Proposed Development

The view is dominated by the existing trees and shrubbery on the opposite side of the road. There is no long-distance view as the tall poplar trees are forming the ridgeline and closing the perspective.

The permitted development is partially visible at the end of the perspective of the road but partially screened by the existing vegetation. The hot air plenum towers at the north façade are a dominant feature of the building.

The visual impact of the Proposed Development

Proposed changes to the permitted building result in a minor improvement in the quality of this view. The hot air plenums are now removed and replaced with panels screening the flues at the façade. The aesthetic aspect of the building is improved. The other changes proposed to the permitted building are not visible in this view.

The effect can be rated as **positive in quality and significant in magnitude.**

The proposed on-site power generation plant is fully screened behind the group of existing tall poplar trees.

The character of the existing view (Baseline scenario for the Overall Project)

The view is dominated by the existing trees and shrubbery on the opposite side of the road. There is no long-distance view as the tall poplar trees are forming the ridgeline and closing the perspective.

The subject site is partially visible at the end of the perspective of the road but is mostly screened by the existing greenery.

The visual impact of the Overall Project

Due to the distance to the site and the screening effect of the existing trees on the right-hand side, the development appears quite small in this view. The ridgeline of the view changes only slightly. The proposed building is closing the perspective of the road, but the impact is very slight in the context and the scale of the tall poplar trees of poplar trees on the right-hand side. The character of the view is affected only slightly.

The OSPG compound is not visible in this view as it is completely screened by the existing trees. The negative impact has been mitigated with trees planted to the north of the data centre building.

The overall impact on this view can be rated as **negative in quality,** but it would be considered **slight in magnitude.**

11.7.9 Visual impact View 5

The view is from the pavement at Nangor Road about 600m west of the subject site, looking east.

The character of the view with permitted development (Baseline scenario for Proposed Development

The view is not expansive due to the existing fence and hoarding on the left-hand side and existing vegetation on the opposite side of the road. The view is limited to the space of the street. The subject site and the permitted development are not visible as both are fully screened by the existing tree group in the centre of the view.

The visual impact of the Proposed Development

As the site is screened in this view, none of the changes proposed as part of the current planning application is visible in this view. The impact is **neutral in quality and imperceptible in magnitude.**

The character of the existing view (Baseline scenario for the Overall Project)

The view is not expansive due to the existing fence and hoarding on the left-hand side and existing vegetation on the opposite side of the road. The view is limited to the space of the street. The subject site is not visible as it is fully screened by the existing tree group in the centre of the view.

The visual impact of the Overall Project

The alteration of this view would be considered **neutral in quality and imperceptible in magnitude** as the development is fully screened by the existing vegetation (refer to red outline) and the character of the view is not affected.

11.7.10 Visual impact View 5A

The view is from Baldonnel Road south of Profile Business Park, about 800m away from the subject site, looking north.

The character of the view with the permitted development (Baseline scenario for Proposed Development

From this position expansive view is offered over a flat agricultural field landscape, with a green meadow/field in the foreground. The landscape ridgeline is formed by a consistent line of vegetation in the background broken up by large-scale industrial buildings belonging to business and industrial parks lying in the distance.

The rural landscape character and the ridgeline are affected by a 2-storey high large-scale industrial building (Digital Realty data centre) on the left-hand side. In the centre of the view, there is a tall office / industrial building visible above the vegetation (likely to be the Pfizer facility in Grange Castle). The permitted development is located on the right-hand side of it: the flat grey façade with external staircases enclosed with mesh.

The visual impact of the Proposed Development

Proposed changes to the permitted building are mostly invisible in this view, due to the distance to the site and the orientation of the building. The only change visible is the omission of the roof gantry screen. The effect can be rated – mostly due to the distance – as **neutral in quality and insignificant in magnitude.**

The proposed on-site power generation plant is fully screened behind the vegetation to the left-hand side of the data centre.

The character of the existing view (Baseline scenario for the Overall Project)

From this position expansive view is offered over a flat agricultural field landscape, with a green meadow/field in the foreground. The landscape character has already been affected by a 2-storey high large-scale industrial building (Digital Realty site), which, however, changes the ridge line only slightly. The landscape ridge line is formed by a consistent line of vegetation in the background. A tall office / industrial building is breaking up the consistent ridge line, visible in the centre of the view (likely to be Pfizer facility in Grange Castle).

The subject site is located in the centre of this view, however, is partially screened by the existing vegetation.

The visual impact of the Overall Project

The proposed building is visible to the right-hand side of the centre of the view. It does alter the landscape ridge line; however, due to the distance to the site and the scale of the building in an overall view, this is not a very noticeable change. This change is also in keeping with the existing character of this view (with other existing buildings present) and in line with existing trends in the area.

The alteration of this view would be considered **negative in quality,** but **moderate in magnitude.**

11.7.11 Visual impact View 6

The view is from the pavement near the roundabout on the internal estate road (Falcon Avenue) about 160m southwest of the site, looking northeast.

The character of the view with permitted development (Baseline scenario for Proposed Development

The landscape ridgeline is formed by the existing vegetation. The view is dominated by the existing vegetation along the stream. In the foreground, there is a roundabout with a landscaped island and artwork as a focal point. The permitted building is partially visible behind the roundabout.

The visual impact of the Proposed Development

Proposed changes to the permitted building result in a slight change to this view.

The omission of the hot air plenum towers is affecting this view in a minor way because of the orientation of the building. The omission of the roof gantry greening is slightly visible and improves the aesthetics of the building in a limited way. The above-mentioned changes simplify the contour of the building visible in this view. The effect can be therefore rated as **positive in quality but slight in magnitude.**

The other changes proposed to the permitted building are not visible in this view.

The proposed on-site power generation plant is located in front of the permitted data centre building. The dark grey enclosure and 2 no structures grouping the generator flues are visible. The left-hand side of the enclosure is partially screened behind the existing trees along the business park estate road.

The impact can be rated as **negative in quality but slight in magnitude**, as the flues are not significantly amending the ridgeline of this view (sensitivity is not affected).

The character of the existing view (Baseline scenario for the Overall Project)

The view is dominated by the existing vegetation along the stream. The landscape ridgeline is formed by the existing vegetation. In the foreground, there is a roundabout with a landscaped island and artwork as a focal point. The subject site is partially visible behind the roundabout.

The agricultural field character of the landscape is still present, with existing vegetation forming the ridgeline, however, that character has already been affected by the estate roads network and lighting posts.

The visual impact of the Overall Project

The data centre building and the OSPG compound with generator flues are visible to the left-hand side from the centre of the view. The ridgeline is changed but the building is not dominating in this view. The massing of the large building has been addressed by the visual separation of the office area from the data centre - the office part of the building acts as a landmark. This softens the impact and makes the appearance of an otherwise bulky building more attractive. The negative impact is being further mitigated with new trees and green-wall screening applied along the OSPG compound.

Although the alteration of this view would be considered **negative in quality**, the effect can be described as **moderate in significance**, because it is in keeping with the existing context of large industrial buildings located throughout the area (for example Google campus to the west of the roundabout and the Digital Realty site to the south of the roundabout – both not visible in this view).

11.7.12 Visual impact View 7

The view is from the pavement at the Nangor Road roundabout at the entrance to Profile Business Park, looking east.

<u>The character of the view with permitted development (Baseline scenario for Proposed Development</u>

The subject site and the permitted building are visible on the right-hand side of the view. The site boundary is treated with existing metal railings and a hedge behind it.

On the left-hand side, there are existing office buildings, partially screened by the landscaped roundabout island. The view appears well-balanced with large-scale developments on both sides of the road. The existing and permitted vegetation softens up the appearance of the bulky buildings. The character of this view is in keeping with the character of business and industrial parks.

<u>The visual impact of the Proposed Development</u>

Proposed changes to the permitted building result in a noticeable improvement in the quality of this view. The hot air plenum towers, which were a dominating feature, are now removed and replaced with panels screening the flues at the façade. These screens have a considerably lesser visual impact. Other changes proposed are not visible in this view.

The effect can be rated as **positive in quality and significant in magnitude.**

The proposed on-site power generation plant is not visible in this view as it is located further to the right of the data centre.

<u>The character of the existing view (Baseline scenario for the Overall Project)</u>

The subject site is well visible on the right-hand side of the view. The visible site boundary is treated with existing metal railings and a hedge behind it.

On the right-hand side beyond the image boundary, there is an entrance to the Profile Business Park estate. On the left-hand side, there are existing office buildings, partially screened by the landscaped roundabout island.

The ridgeline is formed by the existing vegetation in the background and the outline of the buildings on the left-hand side. There is little left of the agricultural field character of the landscape given the intensely developed lands to the left of Nangor Road.

<u>The visual impact of the Overall Project</u>

The data centre building occupies a prominent location on the right-hand side and the landscape ridge line is significantly affected – the ridgeline formed by vegetation is fully screened. The introduction of the building into the landscape dramatically changed the character of the landscape to 'urban / developed'.

However, the external treatment of the building façade mitigates the negative impact. The office part of the proposed building is designed as a feature and as a landmark in this view, drawing attention to it. Panels screening the generator flues along the façade as well as vertical fins on the cladding assist in breaking up the massing of the dark grey façade of the data halls.

The negative effect is also further mitigated by a row of maple trees planted along the north site boundary. The trees offer a significant screening of the façade and add interest to the landscape ridgeline.

Given the context of the existing building on the opposite side of Nangor Road, the addition of the building to the opposite side of the road completes the urban / business park character of the view and is in keeping with the established trend in the area.

Therefore, the overall impact of this view may be rated **positive in quality**, and **significant in magnitude.**

11.7.13 Visual impact View 8

The view is from the pavement at road R136, east of Grange Castle Golf Course, about 570m from the subject site looking west over the golf course.

<u>The character of the view with permitted development (Baseline scenario for Proposed Development</u>

The natural golf course landscape dominates this view. Due to the distance from the site, the permitted development is fully screened by vegetation and is not visible.

<u>The visual impact of the Proposed Development</u>

None of the proposed changes is visible in this view. The impact can therefore be rated as **neutral in quality and imperceptible in magnitude**.

<u>The character of the existing view (Baseline scenario for the Overall Project)</u>

The railing fence with stone plinth and pillars occupies the foreground. In the background, there is a green area with individual trees scattered throughout.

The landscape ridgeline is rugged and formed by existing trees in the fore- and background. The landscape character would be considered quite sensitive.

<u>The visual impact of the Overall Project</u>

The impact on this view is neutral, as due to the distance from the site, the development is fully screened by the existing vegetation (please refer to the red outline).

The overall impact on this view would be rated **neutral in quality** and considered **imperceptible** in magnitude.

11.7.14 Visual impact View 9

The view is from the pavement at road R136, east Grange Castle Golf Course, about 850m from the subject site looking northwest over the golf course.

<u>The character of the view with permitted development (Baseline scenario for Proposed Development</u>

The ground berm enclosing the golf course is fully blocking the view from the viewpoint. The subject site and permitted building are not visible.

The visual impact of the Proposed Development

There is no visual impact on this view as the site is not visible, therefore it can be rated **neutral** and considered **imperceptible** in magnitude.

The character of the existing view (Baseline scenario for the Overall Project)

The railing fence with stone plinth and pillars occupies the foreground. The ground berm behind the fence blocks the view and forms the ridge line.

The visual impact of the Overall Project

The impact on this view is neutral, as due to the distance from the site and the tall berm in the foreground, the development is fully screened (please refer to the red outline).

The overall impact on this view would be rated **neutral** and considered **imperceptible** in magnitude.

11.7.15 Visual impact View 10

The view is from the pavement at road R136, east-south Grange Castle Golf Course, about 1.250km from the subject site looking northwest over the golf course.

The character of the view with permitted development (Baseline scenario for Proposed Development

The hedge along the road and railing fence with stone plinth and pillars occupies the foreground. The ground berm behind the fence blocks significantly blocks the view. The landscape ridge line is formed by trees and tree groups within the golf course protruding above the line of the berm. The site and the permitted building are fully screened by the existing vegetation.

The visual impact of the Proposed Development

None of the proposed changes is visible in this view. The impact can therefore be rated as **neutral in quality** and **imperceptible in magnitude**.

The character of the existing view (Baseline scenario for the Overall Project)

The hedge along the road and railing fence with stone plinth and pillars occupies the foreground. The ground berm behind the fence blocks significantly blocks the view. The landscape ridge line is formed by trees and tree groups within the golf course protruding above the line of the berm.

The visual impact of the Overall Project

The impact on this view is neutral, as due to the distance from the site, the tall berm in the foreground and vegetation in the background the development is fully screened (please refer to the red outline).

The overall impact on this view would be rated **neutral in quality** and considered **imperceptible in magnitude.**

11.7.16 Visual impact View 11

The view is from the pavement at the Nangor Road roundabout opposite Profile Business Park entrance, looking south.

Note: This view has only been included in the current planning application therefore the view 'as permitted' is not included in Appendix 11.2.

The character of the view with permitted development (Baseline scenario for Proposed Development

The site is very well visible in the centre of this view, with the proposed development present on the left-hand side. To the right-hand side, there is an entrance to the Profile Business Park. The vegetation included in the permitted scheme integrates very well with the existing landscape.

The visual impact of the Proposed Development

Proposed changes to the permitted building are not separately assessed here as the impact is the same as in Views 2, 3 and 7 (Refer to sections 12.7.6, 12.7.7 and 12.7.12). Their impact can be rated as **positive in quality** and **significant in magnitude**.

The proposed on-site power generation plant is located in the background behind the estate entrance. The compound enclosure is screened by the existing and proposed vegetation within the site. 2 no. structures grouping the generator flues are partially visible above the vegetation ridgeline.

The impact can be rated as **negative in quality** but **slight in magnitude**, as the flues are not significantly amending the ridgeline of this view.

The character of the existing view (Baseline scenario for the Overall Project)

From this location expansive view is offered over a flat agricultural field landscape. There is a particular value in the long-distance view with the Dublin Mountains visible at the horizon.

The site is very well visible in the centre of this view. Tree groups belonging to the hedgerow along the ditch east and south of the site, together with trees along the internal estate road (falcon Avenue) form the rugged landscape ridge line of this view.

The visual impact of the Overall Project

The development occupies a prominent location in this view. The ridgeline is significantly changed and the view towards the mountains is blocked.

However, the office part of the proposed building is designed as a feature acting as a landmark in this view, drawing attention to it.

The negative effect is also further mitigated by trees planted along the site boundary.

The on-site power generation compound is visible in this view although it is partially screened by the existing row of trees planted along the estate road.

The negative impact of the OSPG compound is further mitigated by screening achieved by birch trees planted along the compound wall and a 'green wall' applied onto the compound enclosure.

Although not visible in the image, there are other large-scale industrial developments on the opposite side of the roundabout (behind viewers' backs) which provide a vital context. The development would be considered consistent with the existing built areas.

As a result, although the overall impact on this view would be rated **negative**, it would be considered **moderate** in magnitude.

11.7.17 Visual impact View 12

The view is from the pavement at the internal estate road (Falcon Avenue), west of the subject site, looking east.

Note: This view has only been included in the current planning application, therefore, the view 'as permitted' is not included in Appendix 11.2 therefore only the Overall Project has been assessed below.

<u>The character of the existing view (Baseline scenario for the Overall Project)</u>

The foreground is occupied by the road, a hedge in the middle of the road and trees which line the estate road. The subject site is located beyond the trees.

The landscape ridge line is formed by vegetation in the fore- and background.

The agricultural field character of the landscape has already been affected by the estate road network and regularly planned vegetation.

<u>The visual impact of the Overall Project</u>

The ridgeline of the view is slightly changed, and the development is visible in between the trees. The development (the permitted building and the proposed OSPG) are visible but not very disturbing, given that they are partially screened by existing trees.

The negative effect is mitigated by birch trees planted in front of the OSPG compound and the compound wall designed as a 'green wall'.

Although not visible in the image, there are other large-scale industrial developments in the vicinity which provide a vital context. The development would be considered consistent with the existing built areas.

As a result, although the overall impact on this view would be rated **negative**, it would be considered **slight in magnitude**.

11.7.18 Potential impact of new lighting

There is a potential that the new proposed lighting for the development will cause a visual impact. External lighting for the site is required to maintain adequate lighting levels. This was the scope of the permitted development SDCC Ref. SD21A/0186. The lux levels drawings have been provided as part of that planning application.

The light fittings specified provide no upward lighting to avoid light pollution and mitigate any potential impact on biodiversity. For further information please refer to section 5.5.2.1 of this EIAR.

The proposed development does not include any changes to the lighting scheme approved as part of the previous planning application.

The visual impact of new lighting for the overall project is considered **slight in magnitude** and **negative to neutral in quality.**

11.7.19 Impact of associated infrastructure projects

The associated infrastructure projects as described in section 11.4.4 will not have a significant impact on landscape character or visual amenity. They include underground services connections to the north and northwest of the site as described in section 11.4.4.

Upon completion of the construction works all hard and soft surfaces will be reinstated. There will no impact to the existing tree line along the estate road.

- Gas connection to the west of the site within the Falcon Avenue – impact rated as **imperceptibl**e in magnitude and **neutral** in quality
- Connection to water main within the pavement along Falcon Avenue – impact rated as **imperceptibl**e in magnitude and **neutral** in quality
- Foul drainage connection - impact rated as **imperceptibl**e in magnitude and **neutral** in quality
- Fibre network connection - impact rated as **imperceptibl**e in magnitude and **neutral** in quality

There will be no visual impact resulting from any of these associated projects, as they are all underground services connections.

11.7.20 Impact of Decommissioning of OSPG Plant

As described in section 2.11 of this EIAR 3no. options are being considered for the period of operation of the OSPG plant (full description in section 2.11):

1. Medium Term option: Decommission and remove the OSPG plant after 6-8 years once the grid is upgraded by ESBN and there is sufficient capacity in the network to serve and support this development.

2. Medium Term option: Retain the OSPG after 6-8 years of full operation – the plant is retained on a permanent basis and operates on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels.

3. Long Term option: Proposed OSPG remains operational for the long term (+15 years) with no grid connection - the grid not upgraded by ESBN in the next 6-8 years and connection not available for the permitted Data Centre).

Decommissioning of the OSPG as per Option 1 will result in the operational phase visual impact as assessed in sections 11.7.5-11.7.17 and landscape impact as described in section 11.7.3 changing to **Short-term / Medium-Term** in duration.

Any construction phase visual impact associated with the decommissioning as per Option 1 would be rated as **negative**, **moderate** in significance and **short-term** in duration. It will cease upon completion of construction.

Option 2 and Option 3 do not change anything to the operational phase visual and landscape impacts described in subheadings of section 11.7 – all impacts remain **Long-term / Permanent** in duration.

11.7.21 Do-Nothing Scenario

In the event of the project not proceeding, it is considered that the site will be retained in its current state. However, given its development plan zoning (Enterprise and Employment) and inclusion in the business park, it is likely that it will be developed at some point in the future.

11.8 Remedial and Mitigation Measures

11.8.1 Incorporated Design Mitigation of Visual Impact

The mitigation of potential negative impacts has influenced the design and layout of the development. Various measures have been incorporated in the permitted scheme as well as in the proposed development.

The mitigation measures that have been considered and implemented in the design of the proposed development, as described in section 2.3.1 of this EIAR, include the following:

- Replacement of hot air plenum towers with panels screening the generator flues is an important element of the front façade design. Flues' height matches the height of the screens, so the flues are not visible from the public road. Screens concealing the flues are clad with light grey horizontally fixed cladding. They are further enhanced with stainless steel wire mesh vertical panels. The flue screens with mesh detail assist in breaking up the otherwise visually heavy massing of the long dark grey front elevation. It adds greater detail to the otherwise monolithic façade and makes it more interesting.
- Provision of a 'green wall' and additional native trees in front of the OSPG compound to conceal the solid enclosure wall and mitigate the negative visual impact of a large expanse of metal cladding. Thanks to this measure the OSPG compound merges visually into the landscape.
- There is overall 10. no flues associated with 10 no. generators located within the OSPG compound, which extend up to approx. 14-15m above ground. The flues have been grouped by 5 no. This results in a much lesser visual impact of the flues and their support structures.

The overall project, as described in section 2.3.2 of this EIAR, in addition to the measures listed below also includes the following visual impact mitigation measures:

- Due to the prominent location of the development and a requirement for a high architectural standard prescribed in the Development Plan 2016-2021 (see below), considerable effort was put to develop an attractive façade approach and reduce the effect of building massing.

  Specific objectives relating to EE-zoned land:

  ET3 Objective 5: To ensure that all business parks and industrial areas are designed to the <u>highest architectural</u> and landscaping <u>standards</u> and that natural site features, such as watercourses, trees and hedgerows are retained and enhanced as an integral part of the scheme.

- External stairs are natural features on the rear elevation which assist in breaking up the massing. External stairs are clad with stainless steel woven mesh cladding. Their steel support structure and stringers will be painted red, to add interest to the rear façade.

- Separation of building function into Data Centre and office area further assists with breaking up the massing of this large building. It has been translated into the façade design using different materials and colours:
  - The Data Centre is clad with horizontally fixed, composite flat metal panels, powder coated to a dark grey colour (RAL 7016 Anthracite). The cladding is decorated using metal fins, installed at 2.5m distances and 150mm depth. The colour of the fins matches the cladding colour, which adds texture to the large flat surface of the wall cladding.

- The office block features a curtain wall which extends across the north and west façade. There are glazing mullion feature fins, like fins used on the Data Centre elevations. Solid sections of the front-of-house facades are clad with fibre-cement cladding panels, with vertical grooved texture. Panels are in mid-grey colour (‘granite’). The curtain wall framing will be in a selected grey colour to match the cladding.

11.8.2 Landscape mitigation

Landscape mitigation includes all design measures that assist in the integration of the development within the existing landscape and further improve the visual impact.

The majority of the overall landscape design proposal as per the Landscape Masterplan drawing DB80-MA-LS-XX-DR-L-PLNT-1050, revision P04, submitted with the current planning application (Appendix 11.7), has been included in the already permitted scheme SDCC Ref. SD21A/0186. The landscape mitigation measures for the proposed development, as described in section 2.3.1 of this EIAR, include the following:

- Provision of a ‘green wall’ and additional native trees in front of the OSPG compound to conceal the solid enclosure wall and mitigate the negative visual impact of a large expanse of metal cladding (as already noted under 12.8.1). It also enhances the biodiversity of the site, providing foraging opportunities, shelter and resting habitats for the wildlife. The wire trellis system will be mounted on the wall with a combination of fast-growing climbers: Wisteria and Persian Ivy. The system can reach the full height of the enclosure.
- Addition of 2 no swales near the south and east boundary. Swales are shallow drainage channels formed in the terrain with gentle side slopes where water running off a site can collect and soak away. These have been added instead of underground attenuation tanks, which have been omitted. Swales are natural drainage elements, that assist in the protection of biodiversity on site (please refer to section 6.5.3.2 of this EIAR for further information).

The other landscape mitigation measures have already been included in the permitted scheme:

- It is proposed to maintain the existing hedgerow and protect it by the provision of an 8m landscaped protection zone along it – a bee-friendly Native Wildflower meadow. The hedgerow will be enhanced by the planting of a new hedge mix including Blackthorn, Holly and Hawthorn as well as new Birch and Oak trees. Swales and an attenuation pond will be incorporated within that protection zone. (Please refer to section 6.4.2 of this EIAR for further information)
- Introduce an attractive visual screening to the north boundary along Old Nangor Road by introducing a raised berm and trees (Field Maple) and reducing the impact of the building massing.
- Provide visually attractive planting to attenuation pond edges (Black alder and goat willow) together with paths and benches along the pond. (Please refer to section 6.5.3.2 of this EIAR for further information)
- Provide visually attractive ornamental planting to the edge of the road within the forecourt area: lavender, rosemary, and heather.
- Provide a visually attractive setting for the building entrance and landscaped break-out area for staff and visitors in the ‘Entrance Plaza’ including decorative trees and shrubs (Cherry Blossom, Japanese Maple, Magnolia and Crab Apple), screening from vehicular routes in form of raised planters and benches.
- Provide visual screening along Falcon Avenue to include a continuous hedge.
- Break up (‘soften up’) the continuous row of car parking spaces with green islands with trees every 10 spaces.
- Provide greening treatments throughout the site: In the car parking area, in the forecourt area, and the Entrance Plaza.
- The proposed development will have minimal impact on the existing tree cover on the site. Additional replanting will mitigate any loss of trees as a result of the Ash

Dieback and will be a net positive to the tree cover in this particular location. The proposed landscape plan details the planting of a significant number of new native broadleaf trees.

A detailed landscaping masterplan and Landscape Architects Design Report has been prepared by Murray Associates Ltd and submitted with the current planning application (Refer to Appendix 11.6).

11.8.3 Construction Phase Mitigation

The same construction mitigation measures are planned for the proposed development and the overall project.

Construction works will be carried out in line with the preliminary Construction Environmental Management Plan (referred to as pCEMP) prepared by Malone O'Regan Environmental Consultants and submitted with the current planning application. The specific mitigation measures have been assessed there and listed in Table 5-4 and section 3.1 of pCEMP. (Please refer to Appendix 11.8)

Mitigation measures referring to visual and landscape impact in summary include:

- Provision of solid hoarding around the site area.
- Vegetation to be retained, that will be close to the construction areas will be fenced off by construction-proof barriers before the commencement of works.
- Buffer zones of unexcavated ground will be maintained along the retained vegetation to protect root systems.
- The roof protection zone will also assist in the prevention of any significant soil compaction or root damage by machinery.
- No materials or equipment will be stored within proximity to vegetation to be retained.
- An Ecological Clerk of Works will be appointed to the project and will inspect the site monthly to ensure that works are completed in line with mitigation measures.
- Temporary construction compound lighting will be directed downwards and will not illuminate the landscape areas.

The protection measures for existing trees and hedges will be implemented in line with the Arboricultural Inventory and Impact assessment incorporating Tree Protection Strategy prepared by Murray Associates, prepared based on the survey carried out on the 21st of April 2021 and including findings of this survey and assessment of mature trees and hedgerows on the subject site, which has been submitted with the previous planning application (Refer to Appendix 11.5). It specifies the details of the tree protection fencing and signage and their locations.

Given that there were no changes to this strategy, this document has not been reissued for the current planning application.

Landscape planting works will be undertaken by a competent landscape contractor, following landscape specifications to be prepared by Murray Associates. Outline specification has been submitted for this planning application: Landscape Architect's Design Report including Landscape Specifications and Landscape Management Plan (refer to Appendix 11.6).

11.8.4 Operational Phase Mitigation

The same operational mitigation measures are planned for the proposed development and the overall project.

A preliminary Landscape Management Plan has been included in the Landscape Architects Design report submitted for this planning application (refer to Appendix 11.6).

The client will enter into a maintenance contract with the landscaping subcontractor to look after the vegetation on site upon completion.

In summary, the maintenance work will include:

- Maintaining all plants in a healthy state
- Fertilizing once a year
- Cutting pruning once per annum

11.9 Residual Impacts of the Development

The residual impacts are the final or intended effects which remain after the proposed mitigation measures (as outlined in section 12.8) have been implemented.

The proposed development as described in section 2.3.1 as well as the overall project as per section 2.3.2 of this EIAR, is located in the established business park. The site is zoned for Enterprise and Employment use and is located within a landscape of moderate sensitivity. The surrounding area includes many more developments of a similar scale and function.

The development will change the site from a greenfield to an industrial infrastructure use with associated planting.

The design of the proposed development as well as the design of the overall project, includes features, materials as well as planting that will complement and integrate the development into the landscape and the visual environment.

Once the project is completed and all landscape works are fully established, there will be no significant residual impacts on landscape character or visual amenity.

	Effect (pre-mitigation)	***Mitigation measures***	***Residual Effect (Post-Mitigation)***
Construction	*Loss of existing vegetation*	*Retain the existing hedgerow and tree groups.* *New landscape scheme to include native species.*	*The likely effect is* ***short-term, negative and moderate.*** *In the long-term will be increased biodiversity on site and visual screening, which will assist in the integration of the development into the landscape. This can be rated as a* ***long term, positive and significant effect.***
	Earthworks	*Retain soil on site to be used in the berm for screening.*	*The likely effect is* ***short-term, negative and significant*** *during the construction stage only. Once the berm is constructed and planted the effect will be* ***long-term, neutral and slight.*** *The planted berm will assist in the integration of the development into the landscape.*
Operational	*Intensification of use of the site from unused to commercial use, changing the*	*Implementation of landscape scheme as per Murray Associates design.*	*The likely effect is* ***long term / permanent, positive and moderate.*** *The subject site is located within the existing business park with other business/industrial parks located in the*

	landscape character.		*surrounding area. Therefore, the change is considered in line with established trends and is not significant.*
	The visual effect on the area.	*Refer to Design Mitigation Measures as per section 12.8.1 and Landscape mitigation measures as per section 12.8.2*	*The effects on the visual environment vary from* ***imperceptible*** *(thanks to the topography and existing vegetation in the area)* ***to significant, from neutral to positive*** *and* ***long term / permanent.***

Table 11.4: Residual Landscape and Visual impacts.

11.10 Monitoring/ Reinstatement

The main contractor will be obliged under contract to ensure good working practices to reduce any negative impact during construction. The machinery will operate within a clearly defined construction area – to be defined by the main contractor at construction stage, within the site boundaries. The site compound and materials storage areas will be located outside of the 8m protection zone along the dry ditch and existing hedgerow. The works will be continuously monitored to ensure the adequate protection of areas outside of the construction works.

An Ecological Clerk of Works will be appointed to the project and will inspect the site monthly to ensure that works are completed in line with mitigation measures.

On completion of ground works around the building the area will be prepared for soil and will be planted as per the design included in the permitted scheme with amendments as per the proposed development, prepared by Murray Associates and submitted with the planning application.

The landscape works will be completed in a single phase upon completion of the construction works.

On completion of the works, the Preliminary Landscape Management Plan as referred to in 12.8.4 will be followed and a management regime will be in place.

11.11 Cumulative Effects

Refer to Appendix 19 for the list of developments that are being taken into account in the cumulative assessment.

11.11.1 Landscape Cumulative Effects

Due to the development plan zoning the wider area comprising Profile Business Park, Grange Castle Business Park, Grange Castle South Business Park and Kilcarberry Business Park is a popular location for large-scale industrial developments.

Taking into account other developments in the area (refer to a comprehensive list of the relevant developments listed in Appendix 19) - recently completed, being under construction and still in the planning phase - the cumulative effect of all on the landscape would be noticeable. The intensification of the use of the sites in this area is an ongoing process and an existing trend. The new developments are large-scale buildings which may result in changing the landscape ridgelines. However, thanks to the mitigation measures that are being implemented, like screening using berms and native plants or woodlands, the developments integrate well into the existing landscape and increase biodiversity.

The proposed development is rather a small scale in comparison with the other developments in the area, does not affect the existing ridgelines and will be well integrated into the landscape thanks to the green living wall solution.

The cumulative effect can therefore be described as **slight in magnitude, neutral in quality, and long term / permanent in duration.**

The overall project is comparable in scale to other developments in the area. It impacts the landscape by changing the ridgeline, however, the landscape scheme will partially mitigate that impact.

The cumulative effect can therefore be described as **moderate in magnitude** (the development is in keeping with the existing trends)**, negative in quality, and long term / permanent in duration.**

11.11.2 Visual Environment Cumulative Effect

Taking into account other developments in the area - recently completed, being under construction and still in the planning phase, the cumulative effect of all on the visual amenity would be noticeable. The new developments are large-scale buildings which may result in affecting the visual receptors. Due to various design mitigation measures that are being implemented, like high standards of architectural design, use of a wide range of materials and colours, and avoiding heavy massing of the buildings, the developments attempt to mitigate the impact on visual amenity.

The proposed development is rather small in scale and is well hidden from view, which have been demonstrated on the photomontages described and assessed in sections 12.7.5-12.7.17.

The cumulative effect can therefore be described as **not significant to imperceptible in magnitude, positive to neutral in quality, and long term / permanent in duration.**

The overall project on the other hand is a development comparable to other industrial developments in the wider area. The cumulative visual effect of all may be described as significant, however, the trend has already been established and the land zoning is being followed. Various mitigation measures are applied to the projects. High quality of architecture and attention to the massing of the building as well as various screening measures are looked at and implemented.

The cumulative effect can therefore be described as **negative in quality, but moderate in magnitude** (the development is in keeping with the existing trends)**, and long term / permanent in duration.**

12 Traffic and Transportation

12.1 Background

This chapter of the EIAR assesses the likely significant effects of the proposed development in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the proposed development.

This Chapter of the EIAR has been prepared by Ronan Kearns, BA, BAI, MSc, MBA, CEng MIEI Chartered Engineer.

Ronan has drafted the Traffic and Transportation chapter, Chapter 12, of the EIAR.

Ronan is Chartered Engineer with 19 years' post graduate experience. Projects worked on include roads, drainage and civil infrastructure design and project management for residential, retail, data centres and commercial developments from feasibility through to construction.

Ronan has led numerous planning applications and infrastructure designs for a variety of developments. These developments have ranged from small scale residential projects to multimillion Euro retail and data centre projects.

Ronan specialises in transportation planning and site assessment, preliminary design and detailed design of development. Ronan has completed a number of Traffic and Transportation EIAR chapters for Data Centres located in South Dublin County Council.

The chapter describes: the methodology; the receiving environment at the application site and surroundings; the characteristics of the proposal in terms of physical infrastructure; the potential impact that proposals of this kind would be likely to produce; the predicted impact of the proposal examining the effects of the overall project on the local road network; and the remedial or mitigation measures required to prevent, reduce or offset any significant adverse effects.

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. Refer to section 2.3.1 of this EIAR for a full description of the proposed development.

The Overall Project which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156, as described in section 2.3.2 of this EIAR.

Note: the Proposed Development (no. 1) is a subset of the Overall Project (no. 2). This Chapter assesses the impact of the Overall Project.

12.2 Methodology

IEMA (Institute of Environmental Management and Assessment) Environmental Assessment for Road Traffic has been used the appraisal of traffic impacts for the proposed overall project. The Environmental Assessment for Road Traffic offers a systematic approach to the assessment of the traffic impacts for developments similar to this.

The Environmental Assessment for Road Traffic provides a checklist for the assessment of environmental impacts arising from the changes in traffic levels during the demolition, construction, operational, maintenance and decommissioning phase of the project. These impacts include driver severance and delay, pedestrian severance and delay, pedestrian amenity, accidents and safety, hazardous and dangerous roads, etc.

In the case of the Overall Project, the sensitive receptors have been considered to be pedestrians, cyclists and road users that use the local road network. The study area includes links and junctions which provided the most direct access routes to the application site and are, therefore, most likely to be affected by traveling to/from the development site.

Any links that do not meet the defined selection criteria have not been considered as part of the study area and have been excluded from further analysis.

Construction Stage

TII's Traffic and Transport Assessment Guidelines (PE-PDV-02045) sets out advisory thresholds, with respect to traffic movements, for when a Traffic and Transport Assessment is required as follows:

- 100 trips in / out combined in the peak hours for the proposed development.
- Development traffic exceeds 10% of turning movements at junctions with and on National Roads.
- Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive.

The Construction Stage assessment has been limited to roads immediately adjacent to the application site and any roads further afield where traffic would increase by greater than 10% or exceed 100 trips in / out combined in the peak hours for the proposed development.

As traffic from the site travels through the network it gets diluted the further it travels from the site. Therefore, if the first node on the network has an uplift of less than 10% no further assessment will be carried out.

Operational Stage

The proposed development is anticipated to be completed and fully operational by Q4 2025 (subject to planning/market condition), when the building will be fully occupied. The assessment would consider the full quantum of development at this opening year.

Estimated trip generation for the proposed development will be provided as part of this assessment.

Trips will be distributed on the local road network based on current directional flows, as survey in March 2023.

An initial assessment on the uplift at an adjacent node will be made. As traffic from the site travels through the network it gets diluted the further it travels from the site. Therefore, if the first node on the network has an uplift of less than 10% no further assessment will be carried out.

Pedestrian /Cyclist Impact

Pedestrian / Cyclist severance, delay, amenity, fear and intimation will be assessed by considering the baseline traffic flows and future traffic flows. The impact on Pedestrian / Cyclists is directly linked to the increase in traffic levels, the proportion of HGV traffic and vehicle speeds.

Driver Delay

This assessment considers the duration of delays or benefits i.e. less time to get through the network as a result of network improvements, occurring to the road users on the local road network based upon the estimated increase in traffic as a result of the proposed development during the construction phase and operational phase.

Accidents and Safety

An assessment of the impact of the change in traffic flows on the potential increase/decrease in the number of accidents recorded will be undertaken for both the construction phase and operational phase.

The approach to this assessment accords with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance, exemplified by a series of publications, all of which advocate this method of analysis. The following policies have been applied when developing the methodology for this assessment:

1. Environmental Protection Agency (EPA) Guidelines On The Information To Be Contained In The EIAR (2022);
2. IEMA Impact Assessment Guide to Delivering Quality Development (2016)
3. Transport Infrastructure Ireland (TII) Traffic and Transportation Assessment Guidelines (2014).
4. 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003).

5. ‘Guidelines for Traffic Impact Assessments’ The Institution of Highways and Transportation (1994)
6. Design Manual for Urban Road and Streets (2019).
7. GDA Cycle Network Plan - National Transport Authority (2013).
8. The Route to Sustainable Commuting NTA (2001)
9. Review of relevant available information including the South Dublin County Development Plan 2022-2028, existing traffic information obtained in Reg. Ref. SD22A/0420 Reg. Ref. SD21A/0241 and other relevant studies;
10. Consultations with South Dublin County Council (SDCC) Roads Department to agree the site access arrangements and determine the scope of the traffic analysis required to accompany a planning application.
11. Detailed estimation of the transport demand that will be generated by the development. The morning and evening peak times will be addressed as well as an estimation of the construction stage traffic; and
12. Assessment of the percentage impact of traffic on local junctions, car parking requirements and accessibility of the site by sustainable modes including walking, cycling and public transport.
13. TII’s Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions) DN-GEO-03060 June 2017
14. National Sustainable Mobility Policy From Department of Transport Published on 7 April 2022

Site visits were carried out in February 2021 to assess the existing local conditions.

12.3 Receiving environment

This section considers the baseline conditions, providing background information for the site in order to determine the significance of any traffic implications. This section also considers the existing accessibility of the site by sustainable modes of transport.

12.3.1 Site location

The application site is located in South County Dublin, approximately 13km west of Dublin City Centre, and around 4km west of Clondalkin Village.

The site is adjacent to the Profile Park and is bounded to the north by New Nangor Road, Greenfields to the west and Grange Castle Golf Club to the south and east.

There are currently 2 No. vehicular access points to the site via Profile Park Road. Profile Park Road connects Profile Park to the external road network via a 4-arm roundabout to the north. This then connects to the R134 New Nangor Road.

The location of the site is shown on the map extract at Figure 12.1 below.

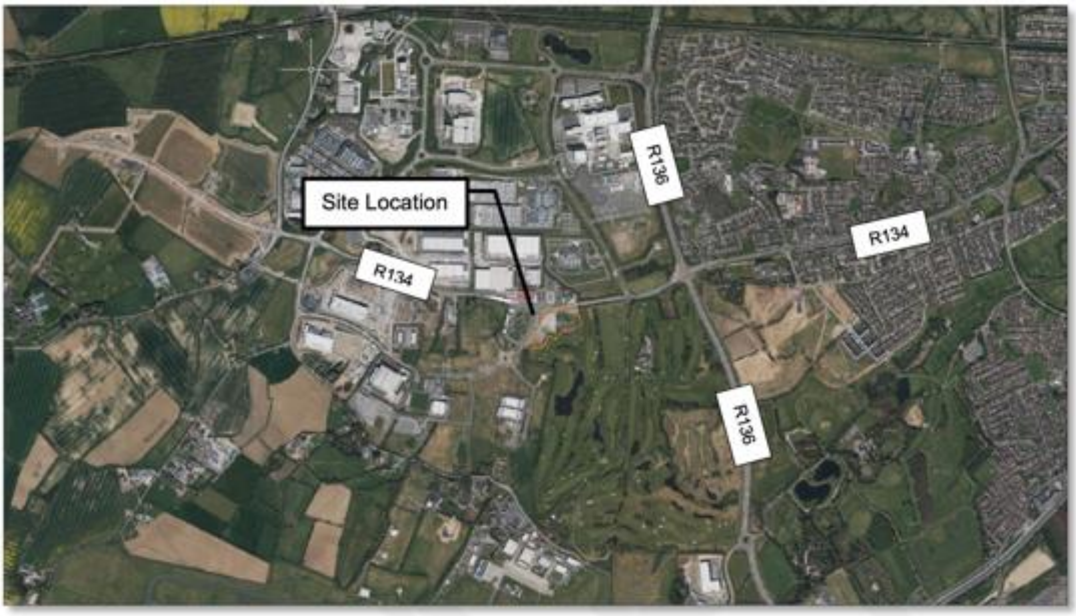


Figure 12.1: Site Location (Source: Google Maps)

12.3.2 Local Road network

Profile Park Road is a dual carriageway which connections Profile Park with the external road network via the R134 New Nangor Road. Profile Park has the benefit of a combined 3.0m footpath/cycle path and associated grass verge. Profile Park Road has a posted speed limit of 50km/h.

Profile Park Road measures c. 6.5m in each direction. The road is broken with a planted central median that measures c. 2.0m.

Profile Park Road forms a 4-arm roundabout with the R134 New Nangor Road to the northwest of the proposed development.

The R134 New Nangor Road us a two-way regional road forming junctions with the R134 to the west and the R136 to the east.

Along the northern boundary of the development, the R134 New Nangor Road measures c. 9.0, This is combined with a shared footpath/cycle path measuring c. 5.0m wide.

R134 New Nangor Road forms a junction R136 at a four-arm signalised junction located c. 1.0km to the east of the proposed development.

A 60 km/ h speed limit is in operation on R134 on approach to the junction while an 80 km/ h speed limit is in operation on approach from R136.

12.4 Baseline traffic data

To quantify the volumes of traffic movements at key points on the road network adjacent to the site, a set of classified turning movement traffic counts were commissioned.

Accordingly, classified counts were carried out on the 16th of March 2023 at the following junction locations:

- Site 1 – Profile Park/R134 Roundabout

classified counts refer to the counting and classification of vehicles i.e.

1. Motorbikes;
2. Cars;
3. Light Goods Vehicles (LGV);

4. Bus;
5. Other Goods Vehicles 1 (OGV1);
6. Other Goods Vehicles 2 (OGV2); and
7. Caravans

as they move through the count area

The surveys were carried out on the date identified above to ensure that flows were representative of normal term time and hence not affected by school holidays or other public holidays or events. As such they provide an appropriate and robust representation of a neutral month during a period of normal school and employment activity.

The surveys are designed to provide representative values encompassing AM and PM peak periods during normal traffic conditions and where not affected by Covid 19 lockdowns as the count took place after Covid 19 restrictions has been removed.

With a single access point to Profile Park, the count location was chosen as it will be directly impacted by the Overall Project.

Therefore, the location of the survey is pertinent to the proposal in terms of being at key node in the road network that would be affected by traffic assignment and distribution of flows associated with the development site.

The location of traffic counts is illustrated in the figure below.

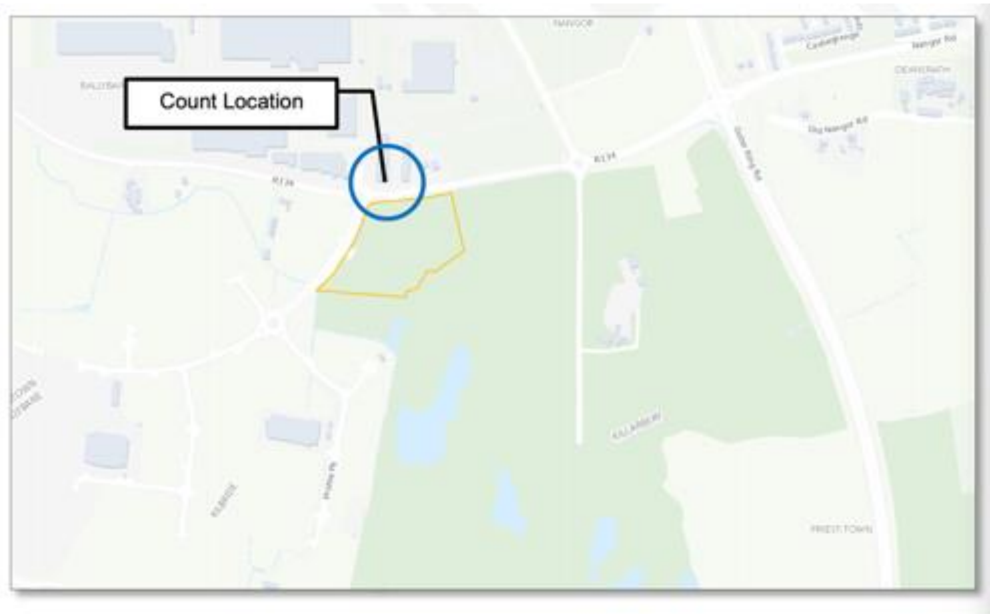


Figure 12.2 Traffic Count Location

A detailed description of the of the turning movements is provided in Figure 12.3 below.

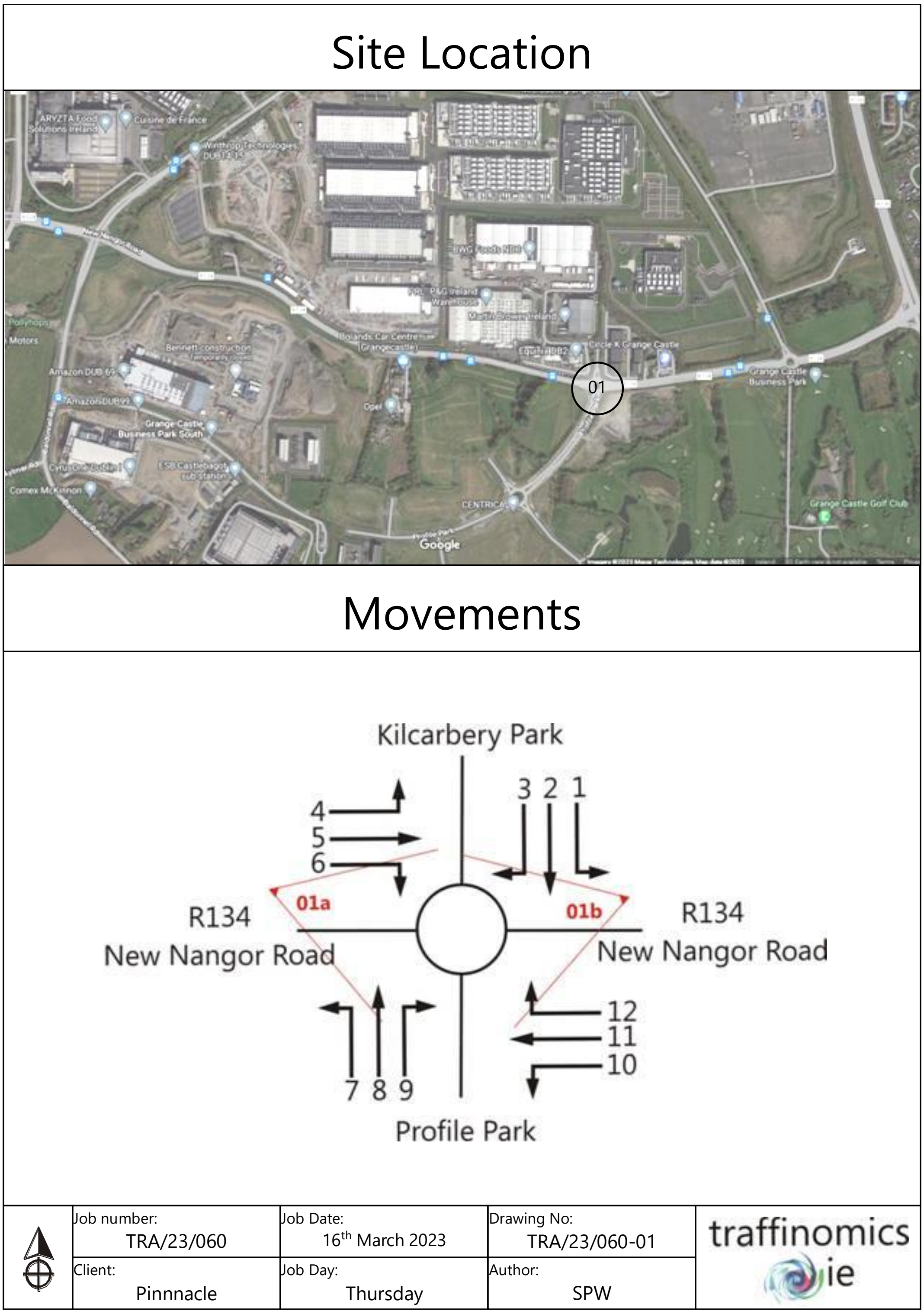


Figure 12.3 Junction Movements

Table 12.1 provides a summary of the peak time movements. The traffic surveys indiccated an AM network peak period of between 08:00 and 09:00. The corresponding PM Peak was between 16:00-17:00.

As outlined later in this chapter, the development will operate with 2 No. shifts from 07:00-19:00 and 19:00-07:00.

Based on the traffic counts, a network peak period was identified as occurring between 08:00-09:00 in the AM and 17:00-18:00 in the PM.

The shift pattern of the Overall Project and the network peak, identified via traffic counts, were data sources which were used to identify peak periods of traffic flows in the area.

As illustrated in the table below, the Overall Project will have no impact on the road network during the PM peak period.

The Overall Project AM peak is similar to the network AM peak. Therefore, the Overall Project AM peak of between 07:00-08:00 will be used in the analysis later in this chapter.

Table 12.1 Traffic Surveys

Network Peak													
Movement	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
AM (08:00-09:00)	44	0	16	34	430	0	0	0	2	2	353	133	**1014**
PM (17:00-18:00)	114	0	22	11	396	1	3	0	5	2	450	33	**1037**
Development Peak													
AM (07:00-08:00)	53	0	8.1	27	457	1	3.5	0	2	6	292.7	105.9	**956**

12.5 Pedestrian and cycling facilities

The R134 has cycle paths on either side of the R134. These cycle paths connect into other cycle paths such as those located on the R136.

A cycle greenway already runs along the Royal Canal with access on to the R136 which in turn connects to the R134.

Pedestrian and cycleways are available on all internal roads within Profile Park, and along the R136.

Existing cycle routes identified by the National Transport Authority (NTA) in the vicinity of the application are indicated in Figure 12.4 below.

Figure 12.4 Existing cycle routes (Source: NTA)

The Grand Canal Greenway runs from east to west immediately north of the site. This pedestrian and cycle route provides an 8.5km off-road route from 12th Lock, Newcastle Road to Davitt Road, Inchicore. The route also links north to Adamstown and Lucan, via a walking and cycling bridge over the Grand Canal. The route can be accessed from the R136, approximately 1km from the site.

12.6 Proposed bus improvements

The emerging Bus Connects Dublin plan (Ref: Core Bus Corridors Project Report June 2018) proposes revisions to Dublin's bus system through:

- building a network of new bus corridors on the busiest bus routes to make bus journeys faster, predictable and reliable.
- completely redesigning the network of bus routes to provide a more efficient network, connecting more places and carrying more passengers.
- developing a state-of-the-art ticketing system using credit and debit cards or mobile phones to link with payment accounts and making payment much more convenient.
- implementing a cashless payment system to vastly speed up passenger boarding times.
- revamping the fare system to provide a simpler fare structure, allowing seamless movement between different transport services without financial penalty.
- implementing a new bus livery providing a modern look and feel to the new bus system.
- rolling out new bus stops with better signage and information and increasing the provision of additional bus shelters; and
- transitioning - starting now - to a new bus fleet using low emission vehicle technologies.

The Dublin Area Bus Network Redesign (which is currently under review following the public consultation stage) aims "to provide a network designed around the needs of Dublin today and tomorrow, rather than based on the past".

Figure 12.5 below presents the proposed public transport provision in the vicinity of the subject site compared to the existing provision based on the current Bus Connects (NTA) proposals.

Figure 12.5 Bus Connects (Source: Map 2 of Bus Connects)

According to the Bus Connects (NTA) proposals, Routes Route No. 356 and Route No. 256 are radial routes which connect the application site to Dublin City Centre and Ballymount.

Bus stops for the proposed orbital Route No. W4 will be located c. 800 metres from the development site, which will provide access to/ from Castleknock to the north and Tallaght to the south. A branch of the D Spine Corridor (D1) is proposed along R136/ New Nangor Road ca. 1.0Km to the east of the site.

According to the Bus Connects (NTA) proposals, these routes will have a frequency of every 10-15 minutes during peak hours and shall connect the site to North Dublin via the City Centre.

The proposals contained within the Dublin Area Bus Network Redesign Project will improve the site's public transport connectivity from both radial and orbital destinations, however it is noted that the bus network in the vicinity of the site will continue to operate at relatively low frequency following its implementation.

12.7 Proposed cycle improvements

Under the National Transport Authority's Cycle Network Plan for the Greater Dublin, the Dublin Southwest Sector extends outward from the twin corridors of Camden Street and Clanbrassil Street in the city centre, through the inner suburbs of Rathmines and Harold's Cross, to serve the areas of Terenure, Kimmage, Walkinstown, Tallaght, Firhouse and Rathfarnham. There is considerable overlap between the West and Southwest sectors, with interconnecting routes between the two. Some radial cycle routes originate in one sector at the city centre but end up in the neighbouring sector.

In accordance with the National Transport Authority's Cycle Network Plan for the Greater Dublin area the following improvements to the local cycle networks are proposed:

- Route 7C: Camac River Greenway branch from the Grand Canal through Clondalkin Village to Corkagh Park and City West.
- Route 8A follows Crumlin Road past the Children's Hospital, Bunting Road to Walkinstown, through Ballymount to cross the M50 at Junction 10 and out to Citywest / Fortunestown via Belgard.
- Route 8C2 follows along the length of R134 New Nangor Road which will connect the site to Dublin City Centre via Crumlin. Another secondary route in vicinity to the site extends along the R136 (Route SO6), connecting the site to Lucan to the north and Tallaght to the south. Route SO6 connects to the Royal Canal Greenway which will link the proposed development to the City Centre via Adamstown, Bluebell, and Rathmines.
- Route 9C is an alternative to the Harold's Cross route from Route 8C at Clogher Road via Stannaway Road west of Kimmage and then along Wellington Lane to join Route 9A at Spawell to connect to Tallaght. It also provides a continuation from Route 9A west of Tallaght via Fortunestown and Citywest to Saggart.
- Route 9D would provide a traffic-free option branching off Route 9A at Kimmage Crossroads and following the River Poddle Greenway to Tymon Park where a new bridge is required over the M50 in the centre of the park to connect with Castletymon Road and re-join Route 9A. West of Tallaght it provides a loop through Jobstown along the N81 and then northward into Citywest.
- The Dublin South West Sector extends outward from the twin corridors of Camden Street and Clanbrassil Street in the city centre, through the inner suburbs of Rathmines and Harold's Cross, to serve the areas of Terenure, Kimmage, Walkinstown, Tallaght, Firhouse and Rathfarnham. There is considerable overlap between the West and South West sectors, with interconnecting routes between the two. Some radial cycle routes originate in one sector at the city centre but end up in the neighbouring sector.
- Orbital Route SO6 (Dun Laoghaire to Tallaght via Ballycullen and Old Bawn) is part of the Orbital Routes in the Dublin South West Central Sector. There are six orbital routes proposed under the National Transport Authority's Cycle Network Plan for the Greater Dublin area in the Dublin West South Central Sector providing cross-links between the radial routes and give access to destinations such as Camden Street and Clanbrassil Street in the city centre, through the inner suburbs of Rathmines and Harold's Cross, to serve the areas of Terenure, Kimmage, Walkinstown, Tallaght, Firhouse and Rathfarnham within this sector.

The proposed cycle routes are illustrated in Figure 12.6 below.

Figure 12.6 Proposed cycle routes (Source: NTA)

12.8 Public transport accessibility

In order to fully appreciate the levels of public transport accessibility provided adjacent to the development, representation of the catchment areas for existing transport infrastructure has been prepared. This procedure allows a picture to be developed which demonstrates the key areas which benefit from direct or semi-direct access to the site.

In order to achieve this, there are a number of catchment areas around the proposed development site and a number of public transport corridors have been assumed.

Reference is made to the NTA (formerly DTO) publication "The Route to Sustainable Commuting" while making these assumptions. This document states 4km as being a reasonable distance for a commuter to walk to work and 10km for a commuter to cycle to work.

These figures represent the higher end of the scale with regard to reasonable commuting distances. For the purpose of this report a more conservative approach has been taken to determine the catchment areas around the proposed development and key public transport corridors.

The feasibility of measures that promote cycling and walking will be influenced by factors such as the safety and ease of cycling to and from the site (perceptions counting for a lot) and the age profile of staff. Generally speaking, based on guidance in "The Route to Sustainable Commuting", a distance of up to 4 km is considered reasonable for walking, and up to 10 km for cycling. These distances are only indicative, but can help to define target groups.

The catchment areas have been defined as the distance someone is willing to travel, on foot or bike, for a desirable mode of travel. To take a conservate approach, these catchment areas will be less than the 4km for walking and 10km for cycle distances, as outlined in "The Route to Sustainable Commuting'.

The desirability of the mode of travel is influenced by ease, frequency, directness, capacity etc. The catchments are defined as follows:

- Direct bus route 500m catchment
- QBC Routes 700m catchment

- Rail 1000m catchment
- Walking 2.5km catchment
- Cycling 5km catchment

12.8.1 Bus

There are a number of bus stops within 500m / 6-min walking distance of the application site. The nearest stops (Stop 2167 and Stop 3417) are on route No. 13 and 68.

As shown in the figure below, the development site is within reasonable walking distance (less than 500m) from proposed Route No. 356 (peak hour only) and Route No. 256 with hourly services.

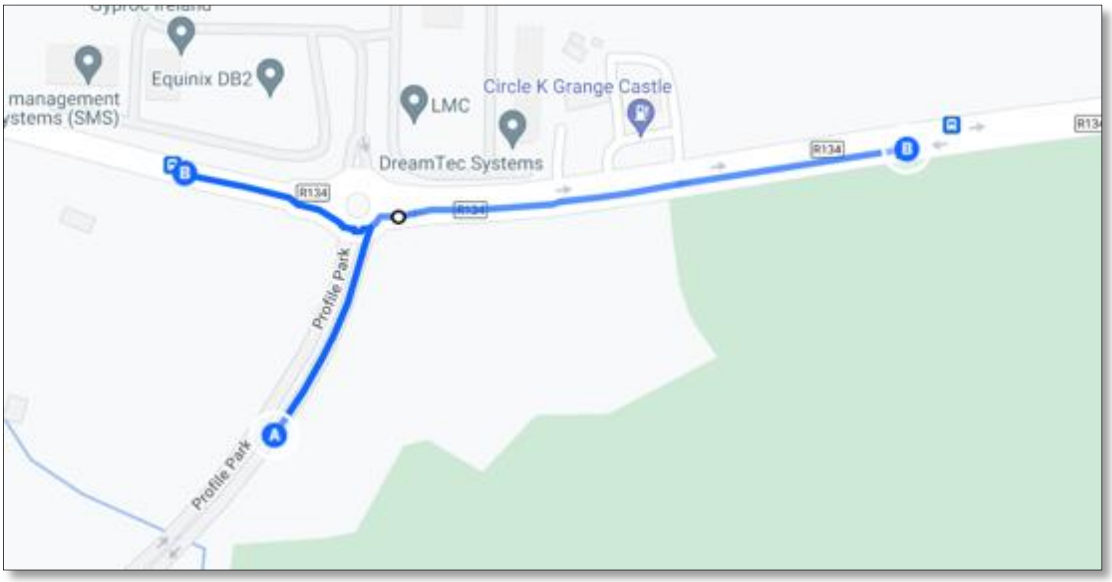


Figure 12.7 Walking Routes (Source: Google Maps)

Walking directions:

Stop 3416 -> Walk 226 m, 2 minutes.

- Start: Profile Park, Kilcarbery, Co. Dublin, Ireland
- Head northeast on Profile Park (121 m)
- At the roundabout, take the 2nd exit onto New Nangor Road/R134 (105 m)
- Finish: Kilcarberry Park, stop 3416, Kilcarbery, Co. Dublin, Ireland

Stop 2167 -> Walk 407 m, 5 minutes.

- Start: Profile Park, Kilcarbery, Co. Dublin, Ireland
- Head northeast on Profile Park (121 m)
- At the roundabout, take the 1st exit onto New Nangor Road/R134 (286 m)
- Finish: Grange Castle GC, stop 2167, Nangor, Co. Dublin, Ireland

The following table illustrates that there are regular services on all days which route to the existing bus stops on routes 13, 151 and 68.

Table 12.2 illustrates local bus routes.

Table 12.2 Local Bus Route

No.	Route	Service		Mon-Fri	Sat	Sun
13	Harristown – Dublin City Centre – Clondalkin Village – Grange Castle	Harristown	First	05:30	06:05	08:00
			Last	23:15	23:15	23:30

		Grange Castle	First	06:00	06:00	08:00
			Last	23:30	23:30	23:30
		Frequency		15min	15min	15min
151	Docklands – Dublin City Centre – Clondalkin – Profile Park – Lucan	Docklands	First	06:30	07:10	08:30
			Last	23:20	23:20	23:20
		Grange Castle	First	06:00	06:30	07:30
			Last	23:30	23:30	23:30
		Frequency		20min	20min	30min
68	Newcastle / Greenogue Business Park - Cherrywood Villas - Clondalkin Village - Bulfin Rd. - Camden St. - Hawkins St.	Newcastle	First	06:25	06:40	09:15
			Last	23:30	23:30	23:30
		Hawkins St	First	06:25	06:40	10:10
			Last	22:30	23:30	00:00
		Frequency		60min	70 min	115m

Dedicated bus lanes are provided in both directions on the R136 Outer Ring Road and the R134 Nangor Road east of the Profile Park roundabout. These routes are part of Dublin's Quality Bus Corridor (QBC) network.

12.8.2 Rail

The nearest stations are Clondalkin-Fonthill station approximately 2.8km to the northeast of the site. This station is served by around 20 suburban commuter trains in each direction during weekdays.

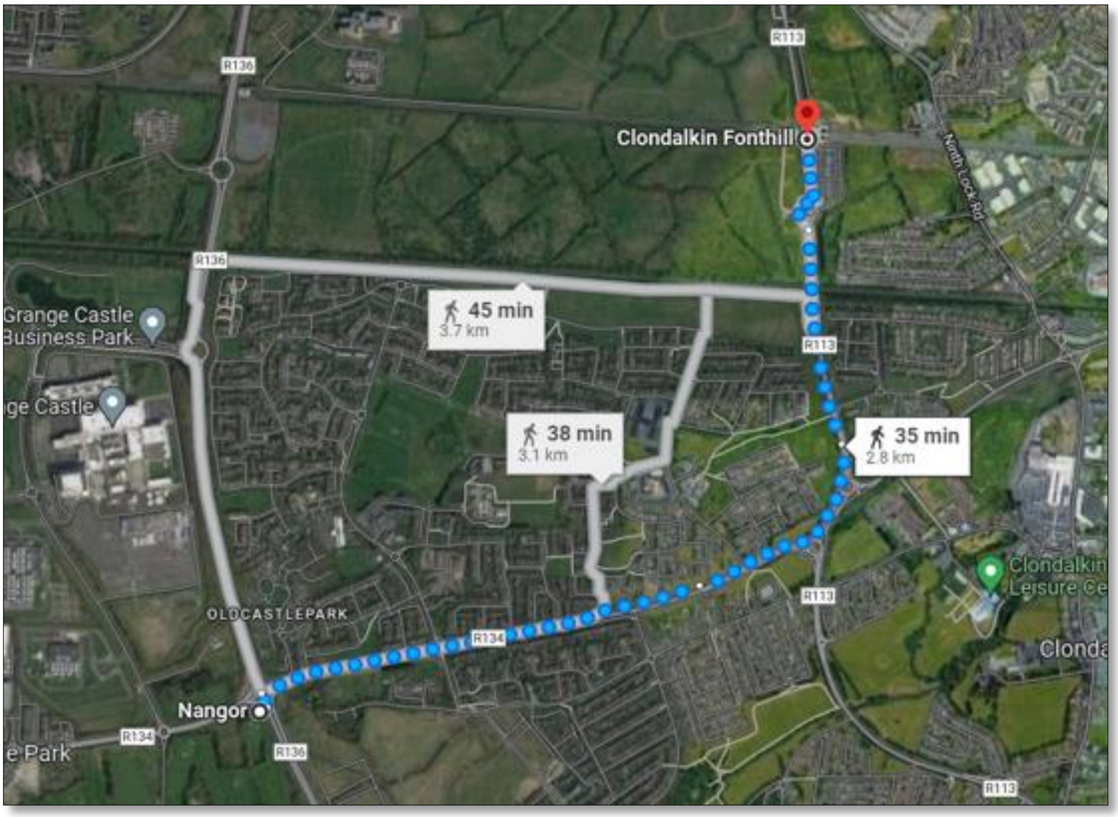


Figure 12.8 Route to Adamstown Rail Station (Source: Google Earth)

12.9 Characteristics of the proposal

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development. (Note: The Proposed Development (no. 1) is a subset of the Overall Project (no. 2))

The Overall Project which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR.

Based on the life cycle of proposal, the local road network will be impacted during the demolition, construction, operation, maintenance and decommissioning phase of the project.

12.10 Physical infrastructure

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works which will use the physical infrastructure, as they relate to highways and transportation, granted under SDCC Ref. SD21A/0186as for the Overall Project. This is summarised below.

The site will be accessed from the existing left in/left out junction (Access No. 2) from the development on to the Profile Park Road. This access is located on the southwest boundary of the development.

Note that the access (Access No. 1) located on the northwest boundary of the site is to be closed as part of this application.

The new access will provide access initially for construction traffic and car parking within the construction compound to the immediate north of the proposed entrance off the Profile Park Road, and in the longer term to facilitate employees accessing to the development.

The new access will include security gates that are located some 40m into the site thus ensuring no potential for queuing onto the public road.

It is proposed to provide 65 car parking spaces comprising 50 standard, 8 EV and 5 no. accessible spaces on site for all employee, visitors and contractors.

Provision for cycle parking will also be made.

Provision will also be made for an HGV turning area in order to allow HGV's to make deliveries to the site in a safe and efficient manner and exit the site in a forward gear.

Figure 12.9 Existing Access Location (Source: Google Earth)

12.11 Committed Development

A planning search was undertaken to identify any developments that have planning permission but are not yet implemented or any schemes that are implemented but are as of yet un-let or empty. This search was carried out to determine if there were other committed developments that would have a similar impact on the local road network.

Planning Ref: SD22A/0420

Development on a Site that includes a two storey residential property on lands to the south of the New Nangor Road (R134), Dublin 22; and on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22 on an overall site of 3.79hectares; The development will consist of the demolition of the two storey dwelling (207.35sqm) and associated outbuildings and farm structures (348.36sq.m); and the construction of 1 two storey data centre with plant at roof level and associated ancillary development that will have a gross floor area of 12,893sqm that will consist of the following, 1 two storey data centre (Building 13) with a gross floor area of 12,893sqm. It will include 13 emergency back-up generators of which 12 will be double stacked and one will be single stacked within a compound to the south-western side of the data centre with associated flues that each will be 22.316m in height and 7 hot-air exhaust cooling vents that each will be 20.016m In height; The data centre will include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator that will provide emergency power to the admin and ancillary spaces. Each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators; The data centre will have a primary parapet height of 14.246m above ground level, with plant and screen around plus a plant room above at roof level. The plant room has an overall height of 21.571m; Construction of an internal road network and circulation areas, with a staff entrance off Falcon Avenue to the east, as well as a secondary vehicular access for service and delivery vehicles only across a new bridge over the Baldonnel Stream from the permitted entrance as granted under SDCC Planning Ref. SD21A/0241 from the south-west, both from within Profile Park that contains an access from the New Nangor Road (R134); Provision of 60 car parking spaces (to include 12 EV spaces and 3 disabled spaces), and 34 cycle parking spaces; Signage (5.7sq.m) at first floor level at the northern end of the eastern elevation of the data centre building; Ancillary site development works will include footpaths, attenuation ponds that will include an amendment to the permitted attenuation pond as granted to the north of the Baldonnel Stream under SDCC

Planning Ref. SD21 A/0241, as well as green walls and green roof. The installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park. Other ancillary site development works will include hard and soft landscaping that will include an amendment to the permitted landscaping as granted under SDCC Planning Ref. SD21A/0241, lighting, fencing, signage, services road, entrance gates, and sprinkler tanks; An Environmental Impact Assessment Report (EIAR) has been submitted with this application

Development: SD20A/0124

Description: (1) Demolition of existing single storey dwelling (c.108.5sq.m); (2) construction of a Distribution Warehouse Building comprising warehousing and ancillary areas at ground floor and support offices, staff areas and plant across two floors; (3) the development will be accessed from the existing Profile Park estate road; (4) provision of car parking, cycle parking, security gatehouse, landscaping and boundary treatments (including security fencing and gates); (5) all associated site development and services works (including diversion/culverting/reprofiling of existing stream on site); (6) total gross floor area of the development c.17,006sq.m.

Status: Granted

Development: SD21A/0241

Description: Demolition of the abandoned single storey dwelling and associated outbuilding (206sqm); construction of 2 two storey data centres with plant at roof level of each facility and associated ancillary development which will have a gross floor area of 40,589sq.m consisting of 1 two storey data centre (Building 11) which will be located to the south of the site and will have a gross floor area of 24,667sq.m. including 22 emergency generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 22.3m in height; 1 two storey data centre (Building 12) which will be located to the north of the site, and to the immediate north of Building 11 and will have a gross floor area of 12,915sq.m including 11 emergency generators located at ground floor level within a compound to the western side of the data centre with associated flues that will be 22.3m in height; each of the two data centres will include data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility which will provide emergency power to the admin and ancillary spaces; each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators; the overall height of each data centre apart from the flues and plant at roof level is c. 14.23m above the finished floor level; the overall height of each data centre apart from the flues and plant at roof level is c. 14.23m above the finished floor level; single storey step-up substation (38sq.m) as well as 2 single storey switch substations (121sq.m); AGI Gas Regulator compound that include 3 single storey buildings (134sq.m); construction of a gas powered generation plant in the form of a 13m high single storey building with a gross floor area of 2,714sq.m that will contain 10 gas generators with associated flues that will be 25m in height, and grouped in pairs and threes; the Gas Plant will be located to the west of Building 11; ancillary site development works, that will include reorientation of the Baldonnel Stream, biodiversity management initiatives, attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park; other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gates, sprinkler tanks and pump room; a temporary gas powered generation plant within a fenced yard containing 21 generator units in containers, each with associated flues (each 25m high), 12 transformers and 10 containers of controls to be located to the west of, and associated with the first phase of Building 11, and will be required for a period of up to 2 years if connection to the national grid is delayed; this temporary plant will not be built if the connection to the national grid is in place prior to the operation of Building 11 at this site that includes an abandoned single storey residential property on the New Nangor Road (R134), Dublin 22; and on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22 on an overall site of 8.7 hectares.

Status: Granted. Appealed to An Bord Pleanala under Reg. Ref. ABP-313787-22. Appeal withdrawn.

Planning Ref. SD21A/0167

Construction of a gas fired power plant with an electrical output of up to 125MW with associated balance of plant, equipment and buildings including an Engine Hall building with a height of 18.9m, comprising 6 gas engines and ancillary infrastructure; an Electrical Annex Building with a height of 18.7m; a Workshop building with a height of 5. 1m; a Tank Farm building with a height of 5.68m; a Security hut with a height of 3.27m; an Exhaust Stack with a height of 31.8m; a Gas AGI including a kiosk with height of 3.3m; Radiator Coolers with a height of 8.46m; 2 electrical transformers with a height of 4.98m; Tanks including 2 x Diesel Oil Storage Tanks (volume of 2500m3 combined); SCR Urea Tank (26m3); Lube Oil Storage Tank (26m3); Lube Oil Maintenance Tank (26m3); Pilot Oil Tank (26m3); Fire Water Storage Tank (1000m3); Effluent Collecting Tank (26m3); Underground Surface Water Attenuation Tank (490m3); 2 new access onto the existing private road network with Profile Park; 12 parking spaces, footpaths, landscaping; fencing and all other associated site development plant and equipment and other works including surface water and foul wastewater drainage. An EIAR was submitted with this application.

Reg. Ref. SD21A/0241 supersedes the permission granted under Reg. Ref SD20A/0124. Therefore, the traffic figures referenced in the Reg. Ref SD20A/0124 will be used in the assessment of the impact the proposed development will have on the local road network.

These developments will be included the modelling of the impacted junctions. Where a Traffic & Transport Assessment is available the figures will be taken directly. If no Traffic & Transport Assessment is available Trip Rate Information Computing System (TRICS) or a pro rata calculation for similar developments will be used to estimate flows from the development and traffic surveys used for distribution.

These trips were assigned to the local road network and combined with the traffic counts referenced earlier in this report to form the baseline traffic data.

Table 12.4 illustrates the expected trips that will be generated by the relevant committed developments.

Table 12.4 Committed Development

Weekday Trip Generation	**AM Peak (07:00 – 08:00)**	
	Departures	Arrivals
SD22A/0420	13	11
SD20A/0124	25	11
SD21A/0167	0	12
Total	**28**	**45**
Two-way – AM	**83**	

These trips will be assigned to the network during the 07:00 -08:00 AM peak period as illustrated in Table 12.5 based on existing traffic patterns.

Table 12.5 Distribution of committed development

Two-Way Link	**AM Peak Hour (07:00hrs-08:00hrs)**
Kilcarbery Park Access Road	0
R134 New Nangor Road (Eastern Arm)	48
Profile Park Road	83
R134 New Nangor Road (Western Arm)	36

12.12 Growth Factors

Growth rates should be applied to the base network traffic flows to allow for a reflective analysis of the future year scenarios. This will account for general traffic growth within the area, which will increase the amount of traffic on the base network. In the first instance, the National Roads Authority Growth Rates should be applied. These are set out in the Project Appraisal Guidelines – Unit 5.3 'Traffic Forecasting'

Alternatively, traffic growth forecasts available from other sources, such as a regional multimodal transport models, may be used. In this case, all local forecasts should be compared to the appropriate NRA growth forecasts.

Where growth rates have not been applied to the base flows, evidence will need to be incorporated in the Transport Assessment to demonstrate the robustness of the approach adopted. Network flow diagrams should be present as part of the assessment report as a visual aid to enable the reader to discern traffic flows on the network for the various modelled scenarios**.**

The estimated opening year for the proposed development is 2025. This has therefore been the focus of the road network assessment.

The growth in traffic flows on the surrounding road network, were determined from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting). Information within these guidelines is provided for Dublin from 2016-2030 and from 2030-2040 for low, central and high growth scenarios.

The factor used is outlined below.

Table 12.6 Growth Factors

Traffic Growth Rates, NRA Project Appraisal Guidelines		
Year	To Year	Growth Factor
2023	2025	1.0474

The applicable growth factors have been applied to the survey data extracted from Reg. Ref. SD20A/0124. These figures are illustrated in Table 12.7 below.

12.13 Base Line Flows

Baseline flows are derived as the sum of traffic surveys factored up to 2025 and committed development flows. The base line flows for the roundabout are illustrated in Table 12.7.

Table 12.7 Baseline Flows 07:00-08:00

	Arm 1	**Arm 2**	**Arm 3**	**Arm 4**	**Total**
AM	70	521	43	462	1097

12.14 Potential impact of the proposal

12.14.1 Criteria

Pedestrian Amenity

IEMA Guidelines define pedestrian amenity as the relative pleasantness of a journey maybe influenced by fear and intimidation if they are relevant. As with pedestrian delay, pedestrian amenity is considered to be affected by speed of traffic, traffic volumes and volumes of HGV relative to standard traffic and long with the width of the footpath and pedestrian volumes.

The impact of the proposed development on pedestrians is outlined in the able below.

Table 12.8 Pedestrian Fear and Intimidation Criteria

Degree of Hazard	Average Traffic Flow over 18hr day (vehicles per hour)	Total 18 Hour HGV Flows	Average Speed (mph)
Extreme	1,800+	3,000+	20+
Great	1,200-1,800	2,000-3,000	12-20
Moderate	600-1,200	1,000-3,000	10-15

Driver Delay

IEMA Guidelines notes that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network is predicted to be at or close to capacity of the system.

Traffic modelling results are expressed in terms of a ratio of flow to capacity (RFC) on each approach and the maximum queue length on that approach during the period tested. If the RFC value approaches 1.0 then queuing and delay can be expected to increase. It is normal practice to ensure that the RFC is below 0.85 to achieve a theoretical reserve capacity of greater than 15%, although a value of 0.85 can be marginally exceeded in a future design year situation without any detrimental effect on the satisfactory and safe operation of the junction.

LinSig and OSCADY results are expressed in terms of queues generated and the 'Degree of Saturation' (DoS). A Dos value of 85% or below indicates that the junction is operating within capacity. A DoS value of between 85% and 100% indicates that the junction remains within capacity but is beginning to show signs of queuing and delay. A DoS value of less than 100% is desirable in urban areas during peak period traffic. However, values of greater than 100% are typical at many junctions. For the purpose of these calculations the results are reported in terms of maximising the capacity of the junction analysed.

The results of the various capacity assessments are summarised in a series of tables. For each flow condition and for each junction the PICADY or ARCADY output has been assessed and the maximum Ratio of flow to Capacity [RFC] tabulated together with the maximum (end) queue value for the relevant time segment. For signalised junctions the OSCADY/ LinSig output will be in terms of maximum (end) queue value and DoS.

Delay will be measured in seconds.

Accidents and Safety

There is no formal published guidance for the assessment of accidents and safety, rather it is left to professional judgement to assess the implications on the local infrastructure as a result of the development.

In this instance, the physical highways infrastructure that will connect the Overall Project to the local road network is in place. This will allow for the identification of road safety trend using sources of verified data such as the Road Safety Authority's Road traffic collision data.

Where there is an existing trend in traffic collision, the additional traffic generated by the Overall Project is likely to exacerbate this trend.

If no trend exists, the addition of traffic generated by the Overall Project is unlikely to lead to a significant decrease in road safety/increase in accidents as the relevant infrastructure has been designed in accordance with the relevant design standards.

Note, Profile Park provides physical infrastructure for all lands that it encompasses including the development site in question. This would have been factored into the design and analysis of the physical infrastructure.

12.14.2 Construction Phase

The likely impact of the construction works will be short-term in nature. The number of staff on site will fluctuate over the implementation of the subject scheme.

During the construction phase, the general workforce is likely to be approximately 100-120 in number, which with an allowance for shared journeys could equate to a maximum of around 60-80 arrivals and departures per day.

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 has set working hours based on the grant of permission relating to SDCC Ref. SD21A/0186.

Condition 16 of SDCC Ref. SD21A/0186 sets the working hours of between 07:00 and 19:00 on weekdays and 09:00-13:00 on Saturdays with no works on Sundays, Bank Holidays and Public Holidays.

The Overall Project which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156, as described in section 2.3.2 of this EIAR

Based on the site working hours, on-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic and depart after 19:00 avoiding the evening peak traffic.

Condition 3 H of SDCC Ref. SD21A/0186 sets out the requirement for a Mobility Management Plan 6 months within 6 months of the opening of the development. A Mobility Management Plan will be drafted to include both the operational phase and construction phase.

The Mobility Management Plan will include measures to encourage construction workers to use shared transport. The sharing of trips will be encouraged via a site-specific Travel Plan that will be development by the appointment of the Main Contractor. The purpose of the Travel Plan is to ultimately reduce the number of single occupancy car trips and promote the use of more sustainable modes of travel.

A number of the construction traffic movements will be undertaken by heavy goods vehicles.

An outline 3d terrain model has been generated to optimise the site levels. Where possible, the model seeks to balance the amount of cut and fill required on site to create a plateau. It is anticipated in the worst-case scenario that up to. 973 cu. m of soil will be exported off site.

Figure 12.10 Extract from Cut & Fill Model

Depending on size, tipper trucks can hold between 20 cu.m and 30 cu. m of soil . For the removal of cut and fill, this equates to, on average, 1-2 soil removal related trips per day/2-4 two-way trips over a 4 week period. The actual number of soil related HGV movements is expected to be lower as alternative uses is found for the soil i.e., landscaping, berm formation and used on other phases of the development.

This spoil will be mounded to create a berm and in turn will allow for the material to be deposited onto the HGVs by excavator. The HGVs will only reverse onto site to a hard standing area, receive the load and leave site. This negates the need for vehicles to drive into site to the dig site and receive the load from the point of excavation and in turn reduce unnecessary spoil being brought onto the public road. The haulage contractor will be required to organise the HGVs in an efficient manner to prevent the build-up of vehicles waiting outside the curtilage of the site.

Whilst it is not possible at this stage to accurately identify the day-to-day traffic movements associated with the construction activities, based on experience of similar sites it is considered that the number of constructions related heavy goods vehicle movements to and from the application site will be on average 2 arrivals/departures per day over a 2-year construction period.

Whilst it is not possible at this stage to accurately identify the day-to-day traffic movements associated with the collection of construction waste, based on experience of similar sites it is considered that the number of construction related heavy goods vehicle movements to and from the application site will be approximately 10 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

Materials such as steel and concrete required in the construction of the proposed development are likely to be sourced from manufacturers that are not situated within the immediate vicinity of the proposed development. Accordingly, a temporary construction material storage yard will be the source destination from which construction traffic, particularly for steel deliveries, will be generated. The temporary construction material storage yard will be located within the site boundary.

For the proposed material deliveries storage yard/site compound it is not possible at this stage to accurately identify the day-to-day traffic movements associated with the construction activities, based on experience of similar sites it is considered that the number of construction related heavy goods vehicle movements to and from the application site will be approximately 10 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

Vehicles will access the road network to/from the construction site from the motorway network (M50/M7), via the N7, R136 and R134. Return trips will be via the same route.

The construction traffic impacts of the proposed development are dependent on the capacity of the local road network to facilitate access to the development by HGV's and heavy construction machinery associated with the construction phase. The ability to accommodate temporary parking for contractors and storage of materials on site is another key consideration.

The road marshal appointed will be responsible to ensure that there is no disruption to traffic or pedestrians and that roadways and paths are kept clean and free of debris.

The potential impact during the construction phase with all the above considered would have a short-term effect on the surrounding road network, however, with the measures outlined in the Construction Traffic Management Plan, this will have imperceptible effect on the R134 and along the remainder of the haul route.

An Outline Construction Traffic Management Plan (CTMP) has been prepared as part of the planning permission for this site. It is as a key construction contract document, the implementation of which aims to reduce possible impacts which may occur during the construction of the proposed development.

The Main Contractor is responsible for ensuring construction activities are managed in accordance with this CTMP.

Objectives and measures are also included for the management, design and construction of the project to control the traffic impacts of construction insofar as it may affect the environment, local residents and the public in the vicinity of the construction works.

Key to the implementation of this CTMP is the dedication of the on-site construction manager who will regularly liaise with and update the Applicant's resident representative and associated team on all environmental and construction programming issues relating to the site. All site personnel are charged with following good practice and encouraged to provide feedback and suggestions for improvements. All site personnel are also required to ensure compliance with the requirements of the site's CTMP.

The objective of this CTMP is to ensure that the residual impacts to the public road network during the construction phase of the project which have been identified in the application documentation are minimised and that transport related activities are carried out as safely as possible and with minimum disruption to other road users.

The CTMP has also been prepared for the purpose of identifying appropriate and safe methods of access for construction traffic to the proposed development. This CTMP describes the traffic management for the transportation of construction materials, equipment and personnel along the public road network to facilitate the construction of the proposed development. Light vehicles, such as cars and vans, will be used by site operatives travelling to and from the site. Heavy Construction Vehicles (HCV) will be required to deliver general construction materials, such as concrete, to the site.

This CTMP remains a live document that will be reviewed by the contractor and expanded upon, where necessary, throughout the construction phase of the project. However, this version is considered to be wholly relevant for the expected works.

Based on available data, the number trips that will arrive/depart in each of the peak periods for the various construction activities is illustrated in the table below.

Table 12.9 Peak Construction Trips

Two-Way Link	**AM Peak Hour (08:00hrs-08:59hrs)**	**PM Peak Hour (17:00hrs-17:59hrs)**
Ground Works	10	10
D&C Waste	2	2
Deliveries	10	10
Workers	80	80
Total	**102**	**102**

The construction phase of the proposed development will increase traffic at the Profile Park Road/New Nangor Road by 8.33% in the AM Peak and up to 9.44% in the PM Peak as illustrated below. This increase is based on the baseline established in Table 12.9.

Table 12.9 Percentage Impact of Development on Roundabout

	Roundabout Flow	**Construction**	**% Increase**
AM (08:00-09:00)	1224	102	8.33%
PM (17:00-18:00)	1080	102	9.44%

These figures are the worst-case scenario and assumes that all trips to/from the development during the construction phase will arrive/depart during the peak period. This is highly unlikely to occur.

At the peak of construction, it is expected that there will be 51 two-way movements during the AM peak period and 51 movements during the PM peak period on the Falcon Avenue arm of Profile Park roundabout. Construction traffic will increase these volumes by 102 movements of which c. 22 will be HGV movements.

Access to the site will be via existing access points with minimal interface with pedestrian footpaths/cycle paths. Therefore, the development will have a moderate degree of hazard on pedestrians and not significant in EIAR terms.

The driver delay will be minimal, not significant and temporary in EIAR terms.

With no known trends in accidents and the provision visibility splays in accordance with design standards there will be minimal impact on pedestrian, cyclist and driver safety with the impact being deemed not significant in EIAR terms.

The effects of the construction phase would be temporary as summarised as follows.

- Slight negative, not significant and temporary in EIAR terms for pedestrian amenity
- Slight negative, not significant and temporary in EIAR terms for driver delay
- Slight negative, not significant and temporary in EIAR terms for accidents and safety

12.14.3 Haul Routes

Materials such as steel and concrete required in the construction of the proposed development are likely to be sourced from manufacturers that are not situated within the immediate vicinity of the proposed development.

The total number of vehicular traffic movements between site location will be determined by the contractor based on the phasing of the proposed development. The use of local roads will be minimised as much as possible, particularly to avoid / minimise the encountering of narrow road widths, poor visibility and unsuitable bearing capacities.

The proposed development is located on The Profile Park Road. The haul route has been chosen to ensure demolition waste, construction materials and construction waste is brought to the motorway network in the shortest route possible while avoiding as many schools as possible (primary, secondary and Third Level).

This will ensure that HGVs and other larger construction and delivery vehicles will spend a minimum amount of time on regional roads and local streets whilst avoiding schools.

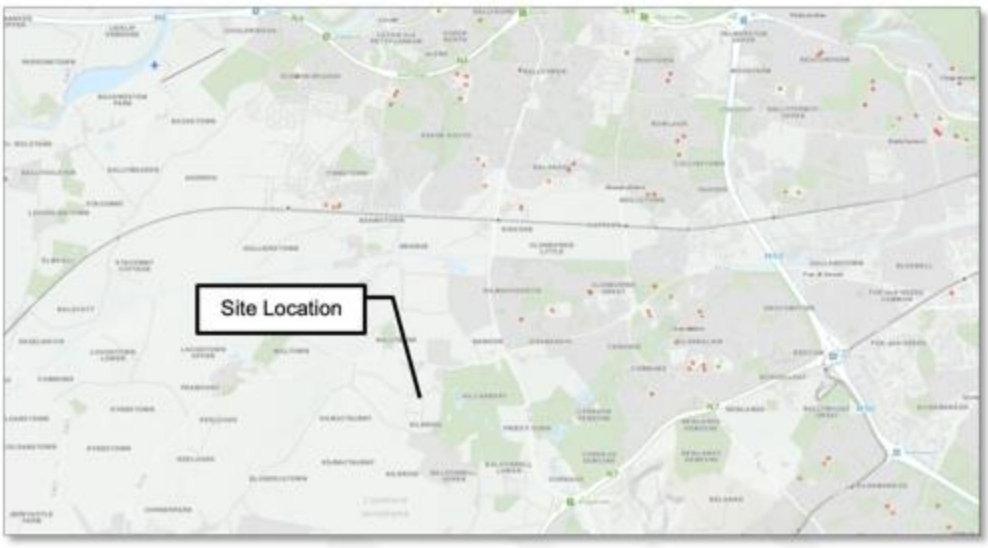


Figure 12.11 School Locations identified with red circle

Based on the most direct route to the M50 whilst avoiding as many schools as possible it is proposed the use the Profile Park Road, R134, R136 and N7 as the main haul route to/from the development to/from the M50.

A description of the haulage routes is offered below:

From Development to N7 ~ 4 km, 6 minutes.

From Profile Park ->Head southwest on Profile ParkRestricted usage road ->At the roundabout, take the 4th exit and stay on Profile ParkRestricted usage road ->At the roundabout, take the 3rd exit onto New Nangor Road/R134Go through 1 roundabout -> Turn right onto R136 ->At the roundabout, take the 2nd exit and stay on R136 -> Enter N7 at Junction 2.

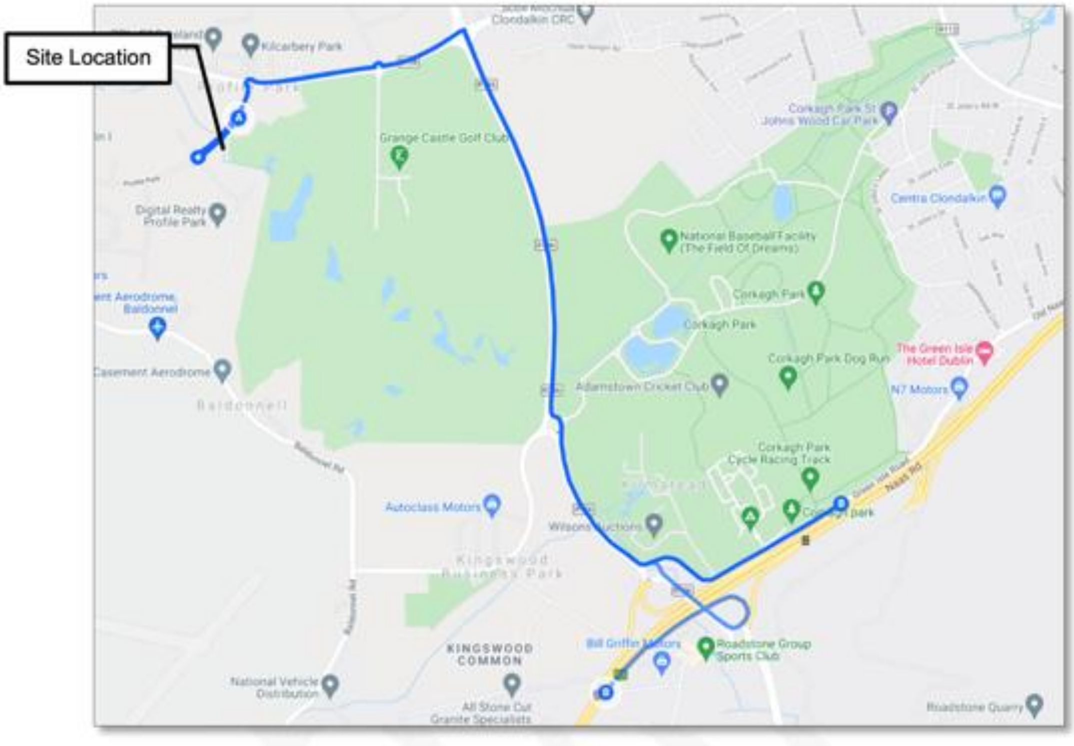


Figure 12.12 Haul route to site

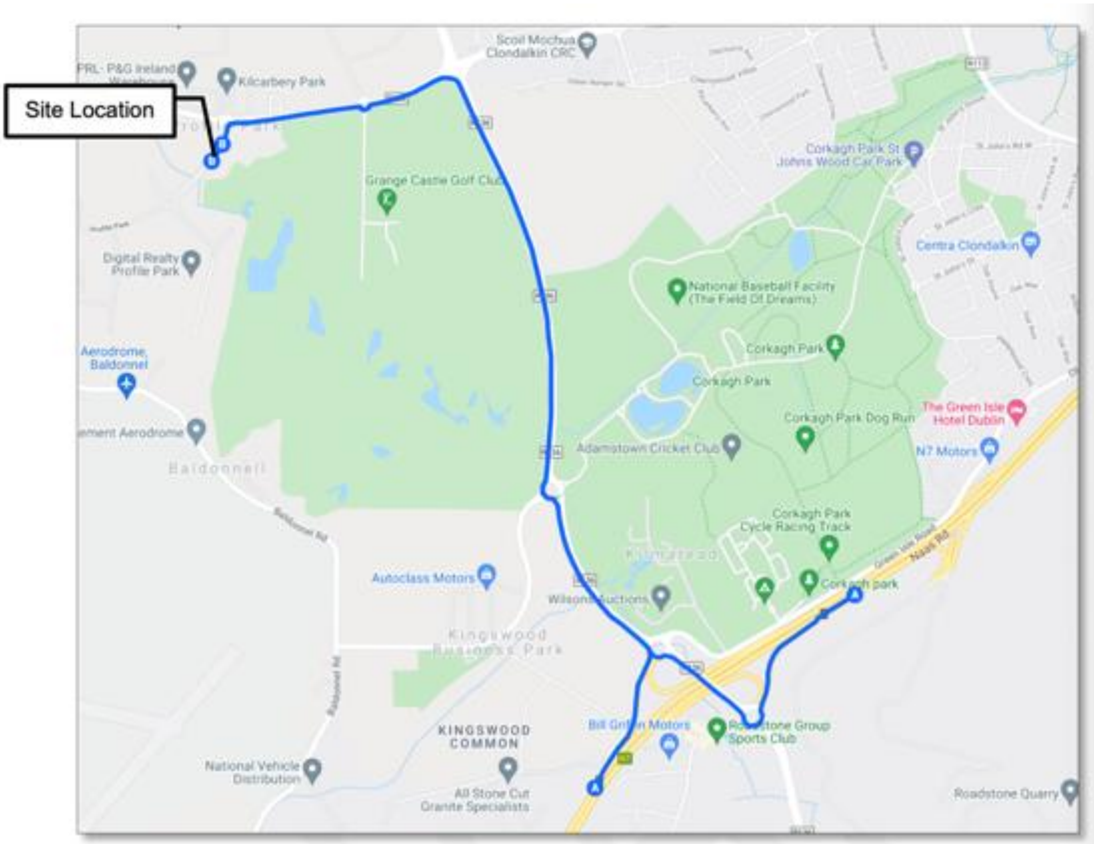


Figure 12.13 Haul route from site

From N7 to Development ~ 4 km, 4 minutes

Exit Junction 2,, N7 -> Head southwest on Naas Rd/N7 toward Exit 2 -> At junction 2, take the R136 exit to Grange Castle/Kingswood -> At the roundabout, take the 3rd exit onto R136 -> At the roundabout, take the 2nd exit and stay on R136 -> At the roundabout, take the 2nd exit and stay on R136 -> Turn left onto New Nangor Road/R134Go through 1 roundabout -> At the roundabout, take the 1st exit onto Profile Park Road.

Arrivals and departures to the site compound are to be carried out in as few vehicle movements as possible in order to minimise potential impacts on the road network.

12.14.4 Operational phase

Trip generation – Including Cumulative Assessment

In order to understand the expected trip generation of the Overall Project assumptions have been made with regard staffing levels with the proposed development, based on information provided in the application. The number of staff on site will be directly related to the number of trips generated by the site once construction is complete.

Appropriate estimates have been made, where necessary, in order to provide a robust analysis of the impact of traffic associated with the proposed development on the local road network.

The site will accommodate up to 65 employees and visitors once operational. It is assumed the permanent members of staff will be employed on a shift basis over 24-hour period seven days a week. The breakdown of personnel to accommodate the Overall Project once complete are as follows:

OSPG

The OSPG will be operated and maintained by 1 no. plant manager with 2 no. specialists to be on call duty during the night shift. In addition, there will be a remote operation team that will be available 24/7 to manage the OSPG facility if required.

Data Centre

- 14 permanent personnel of the Data Centre (operations team)
- 45 visitors / customers
- 4-6 contractors working on site.

The potential shift patterns are illustrated below.

Table 12.3 Predicted staffing requirements for proposed development.

Shift Pattern	Time			
12 Hour Shift	07:00-19:00		19:00-07:00	
	Arrivals	Departures	Arrivals	Departures
Trips	33	33	33	33
Two-Way	66		66	

For the purpose of this assessment, the data centre peak traffic generation during the AM and PM peaks will be applied to corresponding network times.

Visitors will pre-booked with security, this allows and ensures security to control the number of visitors to site. Therefore, all visitors will be scheduled outside the relevant peak periods.

Traffic generation – Operation Phase

It can be seen from Table 12.3 that the total vehicle movements generated by the proposed development will be 33 arrivals and 33 departures in the AM peak (two-way total of 66). This assumes that all staff will leave work upon completion of their shift and all staff will arrive at the start of their shift. This is a conservative assessment and presents the worst-case scenario.

Based on the traffic counts, a network peak period was identified as occurring between 08:00-09:00 in the AM and 17:00-18:00 in the PM. As illustrated in the Table 12.1, the Overall Project will have no impact on the road network during the PM peak period as the shift change occurs at 07:00 and 19:00 with the PM network peak occurring between 17:00 and 18:00. Therefore, there will be no PM peak impact.

Note, the traffic counts estimate a peak from 08:00-09:00 in the AM and 17:00-18:00 in the PM. For the purpose of the development, the network peak will be assessed against the development peak to ensure a robust assessment.

Additionally, it is assumed that all staff will travel by car, with an occupancy rate of 1 per vehicle. Again, this is unlikely in reality, but will provide a robust assessment.

A small number of deliveries such as post, couriers, IT equipment and general office supplies will be required during the operational phase of the proposed development. It is assumed that this will occur throughout the day with negligible impact on the respective peaks as these will be diverted and/or pass by trips.

Whilst provision would be made for customer service staff at the proposed data centre, this service will be undertaken via telephone / remote IT support, without the need for regular visitors to the site. It is therefore assumed that no visitors will require access to the site in the AM or PM peak hours.

To assess the resultant impact on the surrounding road network, the anticipated traffic generation and distribution through the network has been assessed to assess comparative flow levels at the surveyed locations and to analyse resultant junction performance.

To assess the resultant impact on the surrounding road network, the anticipated traffic generation and distribution through the network has been applied to the traffic model to assess comparative flow.

The flows generated by the proposed development were added to the network and their percentage impact calculated, as illustrated in the table below.

Table 12.10 Percentage Impact of Development on Roundabout

	Survey Flows	**Development Flows**	**% Increase**
AM (07:00-08:00)	1090	66	6.05%

Excluding Profile Park Road, which services a private business park and provides access to the development, the proposed development will increase traffic at the Profile Park Road/New Nangor Road by 6.05% in the AM Peak. The development has no network PM peak impact.

The TII Guilders for Transport Assessments state that the threshold for junction analysis in Transport Assessments is as follows:

- 100 trips in / out combined in the peak hours for the proposed development.
- Traffic to and from the development exceeds 10% of the existing two-way adjoining highway.
- Traffic to and from the development exceeds 5% of the existing two-way adjoining highway, where traffic congestion exists or will exist within the assessment periods or in other sensitive locations.

12.14.4 Junction Capacity Analyses

Junction capacity analyses have been undertaken at the at the key junction at which flow data had been obtained. Traffic data was collected on the 16th of March 2022. The traffic counts and associated flow diagrams are appended to this EIAR chapter.

These tests have been carried out using industry standard and approved software for the existing junctions with no development and the assumed year of opening of the development, namely 2025.

It may be the case at some nodes within the network that following the distribution and assignment of the traffic generated by the development, the actual proportional impact or change in traffic demand would not necessarily warrant further assessment. For the purpose of a robust assessment, all junctions have been put forward for assessment.

The use of the TRL capacity model programme PICADY [Priority Intersection Capacity and Delay] is well established and accepted by the South Dublin Council for the prediction of capacity and incurred delay at priority junctions, whilst ARCADY [Assessment of Roundabout Capacity and Delay] is similarly accepted and used to provide comparable measures of the operational efficiency of roundabout junctions. OSCADY (Optimised Signal Capacity and Delay: Phase-based Rapid Optimisation) is a computer program for optimising phase-based signal timings and calculating capacities, queue lengths and delays (both queuing and geometric) for traffic signal-controlled junctions. Similarly, LinSig is a computer program for optimising phase-based signal timings and calculating capacities, queue lengths and delays (both queuing and geometric) for traffic signal-controlled junctions.

With these well-established methods the results are expressed in terms of a ratio of flow to capacity (RFC) on each approach and the maximum queue length on that approach during the period tested. If the RFC value approaches 1.0 then queuing and delay can be expected to increase.

Ratio of Flow to Capacity (RFC) also referred to as Volume over Capacity (V/C) is a means to describe the capacity of each approach road to a junction.

An RFC below 0.85 implies an approach road is operating satisfactorily within capacity; between 0.85 (or 0.90 for signalised junctions) and 1.0 RFC implies the approach road is operating within capacity but at less than optimal efficiency; above 1.0 RFC the approach road is deemed to be above capacity, therefore, when a road is at capacity a slight increase in traffic volumes can have a disproportionate impact on the length of queuing and delays.

For Priority Intersections, a ‘satisfactory’ RFC depends on the speeds encountered at the junction. The capacity formulae used in PICADY were mainly developed from studies at UK major/minor junctions on public roads. Most of these junctions had major roads with speed limits of 50 mph or less. At high-speed major roads, a lower RFC (e.g. 0.75) is recommended instead.

This is echoed in TII’s ‘Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated and compact grade separated junctions) DN-GEO-03060’ (June 2017) suggests a flow to capacity ratio (RFC) of not greater than 75% is generally required when considering carriageways with design speeds of greater than 60 km/h.

For speeds lower than this a large RFC maybe used. It is normal practice to ensure that the RFC is below 0.85 to achieve a theoretical reserve capacity of greater than 15%, although a value of 0.85 can be marginally exceeded in a future design year situation without any detrimental effect on the satisfactory and safe operation of the junction.

The results of the various capacity assessments are summarised in a series of tables. For each flow condition and for each junction the PICADY or ARCADY output has been assessed and the maximum Ratio of flow to Capacity [RFC] tabulated together with the maximum (end) queue value for the relevant time segment. For signalised junctions the OSCADY/ LinSig output will be in terms of maximum (end) queue value and DoS.

The geometric parameters used for the junctions have been ascertained from the topographical survey details of the junction and other relevant sources such as OS mapping. In this way a very good approximation of the relevant geometric inputs has been used. For the proposed junction, the geometry has been obtained by reference to the initial design drawing. This has also enabled an iterative process to be adopted, if necessary, to ensure that the junction is designed in accordance with relevant design standards and to achieve enough levels of capacity.

In this case, the surveyed junctions will each be analysed to determine the extent of resultant highway impact and the need, if any, for mitigating measures. It is anticipated that the capacity analyses will show how the proposal will be accommodated with a reasonable degree of reserve capacity.

The junctions, as surveyed, have been put forward for analysis with the development traffic dispersed through the network as per the current follow conditions.

The results of this analysis are presented below.

Table 12.11 Modelling Results – Prolife Park Roundabout

	Queue (PCU)	**Delay (s)**	**RFC**	**Junction Delay (s)**
2023 -Survey				
Arm 1 – R134 East	0.3	2.48	0.24	2.47
Arm 2 – Profile Park	0.0	7.15	0.01	
Arm 3– R134 West	0.4	2.44	0.27	
Arm 4 - Kilcarbery Park	0.0	2.04	0.02	
2025 - Baseline				
Arm 1 – R134 East	0.4	2.61	0.27	2.76
Arm 2 – Profile Park	0.1	7.92	0.10	
Arm 3– R134 West	0.4	2.53	0.29	
Arm 4 - Kilcarbery Park	0.0	2.13	0.04	
2025 - Baseline with Dev				
Arm 1 – R134 East	0.4	2.67	0.29	2.98
Arm 2 – Profile Park	0.2	8.61	0.17	
Arm 3– R134 West	0.4	2.54	0.29	
Arm 4 - Kilcarbery Park	0.0	2.14	0.04	

The operation of the roundabout was modelled using Junctions 10 software, and tested with the 2023 Survey Year, 2024 Opening Year with the relevant network growth plus committed development (baseline) and, 2025 Opening Year baseline including the proposed development

The maximum RFC recorded was 0.29 with a corresponding queue of 1.4 PCUs. Delay at the junction increases from 2.47 seconds, recorded in the 2023 survey period to 2.98 seconds, recorded in the 2025 with development flows included.

The modelling illustrates that the roundabout operates within capacity in the AM peak in all scenarios. The maximum recorded RFC is 0.29 in 2025.

During the operational phase, it is expected that there will be 66 two-way movements during the development AM peak period (07-00:08:00) on the Falcon Avenue arm of Profile Park roundabout. There will be minimal impact on the network AM peak and PM Peak. Once fully operational the number of HGV movements will be minimal and less than the local network ratio of HGVs to general traffic.

Access to the site will be via existing access points with appropriate crossing facilities for pedestrians and cyclists. Therefore, the development will have a moderate degree of hazard on pedestrians and not significant in EIAR terms.

The driver delay will be minimal and not significant in EIAR terms.

With no known trends in accidents and the provision visibility splays in accordance to design standards there will be minimal impact on pedestrian, cyclist and driver safety with the impact being deemed not significant in EIAR terms.

The effects of the operational phase would be permeant summarised as follows

- Slight negative, not significant and permeant in EIAR terms for pedestrian amenity
- Slight negative, not significant and permeant in EIAR terms for driver delay
- Slight negative, not significant and permeant in EIAR terms for accidents and safety

12.14.5 Car parking provision

Provision is made for 65 car parking spaces. This level of parking is sufficient for all employee and visitor parking requirements. Provision for cycle parking will also be made.

12.14.6 Walking, cycling and public transport.

As set out earlier, the proposed development will provide suitable infrastructure to ensure the data centre is accessible by sustainable modes including walking and cycling. Additionally, the existing provision of public transport services at Profile Park and its links to Profile Park Road, the New Nagor Road and the R136 New Nagor Road is sufficient to make this mode a viable alternative for future staff at the development.

The development site is Zone 'Objective EE To provide for enterprise and employment related uses'. Such uses will generate trips by foot, cycling and by public transport.

It is a necessary part of the design framework for this type of development to ensure that there is good permeability for those staff and visitors to the development who choose not to travel by car. The development has been designed to ensure that there is good permeability for pedestrians and cyclists with connections between the internal layout and the external pedestrian and cycle networks which form part of the overall access strategy for the wider land holdings. With this development pedestrian movement is suitably catered for by footpath connections within and adjacent to the development. These provide good linkage to the surrounding urban areas.

The internal layout demands that all visitors to the site are catered for and so pedestrian routes between accesses and buildings within the development are well designed and clearly delineated. This applicant is very experienced in creating safe environments that satisfy staff 's requirements and convenience. Accordingly, every effort has been made to ensure that vehicular access will be restricted in areas where there are likely to be the highest concentrations of pedestrian/cycle movements i.e., staff and service vehicles have separate entrances.

The internal site layout will include several crossing facilities that are located along key desire lines, and which coordinate well with the circulation within the car park area to enhance the safety, visibility and convenience of those people on foot. These facilities will include features such as tactile paving and surface treatments that will benefit all users and assist those with visual and mobility impairments.

Given the desire in current planning guidance, as outlined in the Department of Transport's National Sustainable Mobility Policy (Published on 7 April 2022), is to improve accessibility for non-car modes of travel, access by cycle is increasingly important. Since the weather and topography inevitably have an influence on cycle use, the key to cycle accessibility is the existence of convenient and safe links associated with secure and carefully sited cycle parking.

The design has sought to ensure that the environment created within this development will be accessible to staff and visitors with disabilities. Footpaths will be designed in accordance with the latest design criteria to ensure safe access for those that have a mobility impairment.

12.15 "Do-nothing" scenario

Should the proposed development not take place, the access roads and infrastructure will remain in their current state and there will be no change. Background traffic would be expected to grow over time as predicted by TII who outline various growth scenarios as part of their guidance on the Project Appraisal Guidelines for National Roads.

The subject site is zoned Objective EE To provide for enterprise and employment related use. It is reasonable to assume that a similar development, with a potentially more intensive requirement for vehicular trips would be established on this site at some stage in the future e.g., Data Centre vs Distribution Warehouse Building.

12.16 Remedial or reductive measures

12.16.1 Construction phase

The Construction Management Plan incorporates a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.

To minimise disruption to the surrounding environment, the following mitigation measures will be implemented:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- A dedicated 'construction' site access / egress junction will be provided during all construction phases. This will coincide with the site access that will serve the operational phase of the development.
- Provision of sufficient on-site parking and compounding to ensure no potential overflow of construction generated traffic onto the local network. Hard standing area will be provided to accommodate the anticipated 60 to 80 car parking spaces required by site operatives, as referenced in paragraph 12.74.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.
- A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Dedicated construction haul routes will be identified and agreed with the local authority prior to the commencement of constructions activities on-site.
- Truck wheel washes will be installed at construction entrances if deemed necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
- On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff.
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

It is anticipated that the generation of HGV trips during the construction period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods.

The Main Contractor will establish a holding area on the onsite for the delivery of construction materials. The holding area will be utilised to prevent congestion of Falcon Avenue from construction traffic.

All vehicles will be tracked by the traffic marshals who will report back to the logistics manager. The logistics manager will control the deliveries with help from the traffic marshals and the gateman. Unscheduled vehicles will be turned away. If deliveries are taking longer to offload, then the following deliveries will be notified of any timing issues.

A copy of the delivery schedule will be issued to the traffic marshals, gateman and contractors' supervisors every morning so everyone is aware and can make provision for when their delivery arrives.

The traffic marshals will be trained and competent and they will undergo ongoing assessments by the logistics manager to ensure they are carrying out their duties with due care diligence.

Arrivals and departures to the sites are to be carried out in as few vehicle movements as possible to minimise parking requirements and potential impacts on the local road network.

The proposed development will have a dedicated loading and unloading area within the curtilage of the proposed development.

The site will be accessed from the existing left in/left out junction (Access No. 1) from the development on to the Profile Park Road. This access is located on the southwest boundary of the development.

Construction traffic will be restricted to the primary routes and will not be permitted to use residential routes. Material scheduling will dictate the timely delivery of supplies to site during off peck periods when traffic flow has eased, and pedestrian numbers are lower.

All offloading of deliveries to site will occur within the curtilage of the site boundaries and no roadside offloading will be permitted.

All scheduled deliveries will be supplied with the appropriate site location details in advance to prevent wandering in the locality. A dedicated site marshal will be appointed to ensure that delivery vehicles securely access and vacate the site. The site marshal shall also be responsible to ensure that clean road and pathway conditions are maintained for the public users.

12.16.2 Operational phase

The local area provides suitable infrastructure and transport services for travel by sustainable modes. A key barrier to modal shift towards sustainable modes of travel is often a lack of information about potential alternatives to the car. As such, it is proposed that staff and visitors of the proposed development are made aware of potential alternatives including information on walking, cycle routes and public transport.

The development will provide links to the existing combined footpath/cycle path on Profile Park Road. development. These connection points will provide access for pedestrians and cyclists onto the New Nangor Road.

These facilities will provide attractive, convenient and safe routes for staff & visitors. Therefore, there are good links proposed for staff to travel by more sustainable modes.

It is proposed to provide car parking that will meet the expected-on site demand.

The marketing pedestrian & cyclists' routes along with public transport information will further reinforce the efforts been made towards a modal shift away from car-based trips.

Staff will be encouraged to avail of these facilities for travel to and from work. Provision of this information would be made upon opening of the proposed development, as this represents the best opportunity to secure travel behaviour change. It is anticipated that this measure may help to reduce the level of traffic at the proposed development, thus providing mitigation against the already minimal traffic and transport effects of the development.

12.16.2 Maintenance Phase

Traffic generated by day-to-day maintenance has been included in the operational phase assessment of the development.

On occasion, on site replacement of larger equipment maybe required. For example, generator sets become end of life and require replacement. In such a scenario, end of life equipment will be extracted and brought off site using the required HGV.

Replacement equipment will be brough to site in a similar manager and installed.

On site replacements will be a planned maintenance intervention that can be carried out outside of the network peak periods.

Emergency maintenance can not be planned and may occur during the network peak periods.

In both scenarios, the effects of the maintenance phase would be temporary as summarised as follows.

- Slight negative, not significant and temporary in EIAR terms for pedestrian amenity
- Slight negative, not significant and temporary in EIAR terms for driver delay
- Slight negative, not significant and temporary in EIAR terms for accidents and safety

12.19.2 Decommissioning Phase - OSPG

Subject to a Grid Connection. The OSPG could potentially be decommissioned after 6-8 years.

Below are the potential scenarios for the OSPG:

1. Medium Term Option: Decommission the OSPG plant

   In the next 6-8 years, the grid will be upgraded by ESBN and they may decide that there is sufficient capacity in the network to serve and support this development. In this instance, OSPG plant may no longer be required.

2. Medium Term Option: Retain the OSPG with a grid connection after 6-8 years of full operation

   ESBN could request that the plant is retained on a permanent basis and operate on the terms and requirements of the CRU in order to support the security of the new de-carbonised national grid. In this case, the Consumer would have a "flex" agreement with ESBN and would be required to operate the OSPG on a limited time period to support the decarbonised grid at times when renewable energy supply to the grid is at low levels. As the OSPG hours of operation are currently unknown for this option, the hours of operation have been estimated based on an existing/similar OSPG development that is currently in a flex agreement which operates for 500 hours of the year.

3. Long Term Option: Retain the OSPG with no grid connection

   If the grid is not upgraded by ESBN in the next 6-8 years and connection is not available for the permitted Data Centre, the proposed OSPG would remain operational for the long term (+15 years). This scenario has been assessed in the Climate Chapter of the accompanying EIAR.

The likely impact of the decommissioning works will be short-term in nature. The number of staff on site will fluctuate during this phase depending on the task been undertaken.

During the decommissioning works, the general workforce is likely to be approximately 50-60 in number, which with an allowance for shared journeys could equate to a maximum of around 30-40 arrivals and departures per day.

Similar to the construction phase, on-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic and depart after 19:00 avoiding the evening peak traffic.

A number of the decommissioning traffic movements will be undertaken by heavy goods vehicles.

The effects of the decomposing phase would be temporary as summarised as follows.

- Slight negative, not significant and temporary in EIAR terms for pedestrian amenity
- Slight negative, not significant and temporary in EIAR terms for driver delay
- Slight negative, not significant and temporary in EIAR terms for accidents and safety

12.17 Residual Effects

When considering a development of this nature, the potential residual traffic impact on the surrounding area must be considered for each of two stages: the construction phase and operational phase. These two distinct stages are considered separately within this section.

12.17.1 Construction phase

All construction activities will be governed by the Construction Traffic Management Plan (CTMP), and outline CTMP is included with this application and the details of which will be agreed with the local authority prior to commencement of construction on site.

An outline CTMP has been prepared as part of this application. This document addresses a number of potential issues including the working hours of site staff, the traffic management for the site, the waste management, noise and vibration impacts as well as other issues to be addressed.

The outline CTMP provides the content of the final Construction Traffic Management Plan (CTMP) which shall be prepared by the appointed main contactor prior to construction of the proposed development. It shall be a requirement of the contract that, prior to construction, the appointed contractor shall liaise with the relevant authorities including the Transport Infrastructure Ireland (TII), Local Authorities and Emergency Services for the purpose of finalising the CTMP, which will encompass all aspects of this outline Construction Traffic Management Plan.

The CTMP shall be termed a 'Live Document ', such that any changes to construction programme or operations can be incorporated into the CTMP.

The contractor will be contractually required to ensure that the elements of this outline CTMP shall be incorporated into the final CTMP. The contractor shall also agree and implement monitoring measures to confirm the effectiveness of the mitigation measures outlined in the CTMP. On finalisation of the CTMP, the contractor shall adopt the plan and associated monitoring measures. The final CTMP shall address the following issues (including all aspects identified in this outline CTMP):

- Site Access & Egress.
- Traffic Management Signage.
- Routing of Construction Traffic / Road Closures.
- Timings of Material Deliveries to Site.
- Traffic Management Speed Limits.
- Road Cleaning.
- Road Condition.
- Road Closures.
- Enforcement of Construction Traffic Management Plan
- Details of Working Hours and Days.
- Details of Emergency plan.
- Communication.
- Construction Methodologies; and
- Particular Construction Impacts

A number of the construction traffic movements will be undertaken by heavy goods vehicles, though there will also be vehicle movements associated with the appointed contractors and their staff.

Whilst it is not possible at this stage to accurately identify the day-to-day traffic movements associated with the construction activities, based on experience of similar sites it is considered that the number of constructions related heavy goods vehicle movements to and from the application site will be approximately 15 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

Similarly, during the construction phase, the general workforce is likely to be approximately 100-120 in number, which with an allowance for shared journeys could equate to a maximum of around 60-80 arrivals and departures per day.

A construction car park for workers immediately adjacent to the new access from an existing access of Profile Park Road access via Profile Park. The construction car park will be created on the start of works by the laying of a temporary surface for vehicles.

The number of construction vehicle movements is less than the 10% of background traffic as set out in Table 2.1off TII's Traffic and Transport Assessment Guidelines (May 2014). It is therefore considered to be relatively low compared to the wider road network. It should be noted that the majority of such vehicle movements would be undertaken outside of the traditional peak hours, and it is not considered this level of traffic would result in any operational problems.

Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained. Construction hoarding will be placed at the back of the pedestrian and cycling track. Advance warning signage will be installed as per the Traffic Signs Manual. No diversions are currently anticipated. If diversions are required, pedestrians and cyclists will be diverted to the footpath/cycle path on the opposite side of Falcon Avenue, again with advance warning signage installed as per the Traffic Signs Manual. With temporary car parking provided within the site for contractor's vehicles it is likely that construction will have a negligible impact on pedestrian and cycle infrastructure.

12.17.2 Operational Phase

With a maximum uplift of 6.05% in the AM Peak traffic reaching the New Nangor Road from Profile Park Road as a result of the proposed development, the development will result in a minor uplift in congestion and delay locally with no significant effects on the wider road network. There will be no impact on the network PM peak period due to shift patterns falling outside of this time period.

There would be an increase in traffic resulting from the operation of the proposed development, specifically on Profile Park Roundabout which remains with in capacity when development traffic is assigned to it. The effects of the operation would be permeant during the operation of the proposed development including:

- Slight negative and not significant in EIA terms for Pedestrian severance, delay, amenity, fear and intimation
- Slight negative and not significant in EIA terms for driver delay
- Slight negative and not significant in EIA terms of accident and safety

Overall, it is considered that the operational phase of the development would result in a slight negative effect on the transport and identified receptors and as such would not give rise to significant effects in EIA terms.

12.18 Remedial or Mitigation Measures

12.18.1 Construction phase

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 has set working hours based on the grant of permission relating to SDCC Ref. SD21A/0186.

Condition 3F of SDCC Ref. SD21A/0186 out the requirement for the applicant to submit a Construction Traffic Management Plan to the Local Authority prior to commencement.

A Construction Traffic Management Plan (CTMP) would be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road.

The extent of the heavy vehicle traffic movements and the nature of the payload may create problems of:

- Fugitive losses from wheels, trailers or tailgates; and
- Localised areas of subgrade and wearing surface failure.

The contractors shall ensure that:

Loads of materials leaving each site will be evaluated and covered if considered necessary to minimise potential dust impacts during transportation.

The transportation contractor shall take all reasonable measures while transporting waste or any other materials likely to cause fugitive loses from a vehicle during transportation to and from site, including but not limited to:

- Covering of all waste or material with suitably secured tarpaulin/ covers to prevent loss; and
- Utilisation of enclosed units to prevent loss.

The roads forming part of the haul routes will be monitored visually throughout the construction period and a truck mounted vacuum mechanical sweeper will be assigned to roads along the haul route as required.

In addition, the contractor shall, in conjunction with the local authority:

- Undertake additional inspections and reviews of the roads forming the haul routes one month prior to the construction phase to record the condition of these roads at that particular time.
- Such surveys shall comprise, as a minimum, a review of video footage taken at that time, which shall confirm the condition of the road corridor immediately prior to commencement of construction. This shall include video footage of the road wearing course, the appearance and condition of boundary treatments and the condition of any overhead services that will be crossed. Visual inspections and photographic surveys will be undertaken of bridges and culverts that are along the haul roads.
- Where requested by the local authority prior to the commencement of construction operations, pavement condition surveys will also be carried along roads forming part of the haul route. These will record the baseline structural condition of the road being surveyed immediately prior to construction.
- Throughout the course of the construction of the proposed development, on-going visual inspections and monitoring of the haul roads will be undertaken to ensure any damage caused by construction traffic is recorded and that the relevant local authority is notified. Arrangements will be made to repair any such damage to an appropriate standard in a timely manner such that any disruption is minimised.

Upon completion of the construction of the proposed development, the surveys carried out at preconstruction phase shall be repeated and a comparison of the pre and post construction surveys carried out. Where such comparative assessments identify a section of road as having been damaged

12.18.2 Operational phase

The analysis carried out in this Chapter has confirmed that the proposed access arrangements would accommodate anticipated levels of traffic visitation and that as such the traffic generated by the development would have no material adverse impact on the operation of all junctions assessed.

It has been shown by the application` of recognised assessment techniques that there is a slight increase in traffic levels arising from the development and the distribution of resultant flows around the adjacent road.

The results in terms of flows and movements can be accommodated by the neighbouring junctions with an anticipated slight uplift in congestion and delays at these locations.

This assessment has also considered the transportation aspects of the internal arrangements of the development and has concluded that the proposals would provide enhanced facilities and improved accessibility for all users of the site.

Accordingly, no remedial or reductive measures are proposed for the operational phase.

12.19 Monitoring

During the construction stage, the following monitoring exercises are proposed.

- Compliance with construction vehicle routing practices, as outlined in Section 12.16.3Haul Routes
- Compliance with construction vehicle parking practices, as outlined in Section 12.19.1 Construction phase
- Internal and External Road conditions, as outlined in Section 12.21.1 Construction phase
- Timings of construction activities, as outlined in Section 12.16.2 Construction Phase

12.20 Reinstatement

Not applicable in respect of traffic and transport.

12.21 Potential Cumulative Effects

Potential Cumulative Effects have been assessed in relation to developments that have planning permission but not yet built or those built but not yet occupied that have the potential to travel through Profile Park Roundabout.

The following list contains proposed and permitted planning applications which have the potential for cumulative effects with the Overall Project (Proposed OSPG development and Permitted Data Centre).

The criteria for identifying cumulative developments that are likely to overlap with the construction and operational phase of the Overall Project are as follows:

- Applications that have been submitted within the last 5 years (2018 onwards), and any developments that have been granted over 5 year permission prior to 2018,
- are within 2km from the subject site, in order to include all of the Data Centre developments in Profile Park,
- Significant developments (i.e. that are likely to cause effects on the environment) which would include the following type of developments:
    - Data Centres,
    - Infrastructure projects including roads or utilities,
    - Power Plants,
    - Commercial Developments over 2000sqm GFA,
    - Residential Developments over 50 units.
- Developments that are permitted and are likely to overlap with the construction and operational phase of the Overall Project,
- Developments currently under construction and are likely to overlap with the construction and operational phases of the Overall Project,

Substantial development in the planning system (in order to capture developments that could potentially be granted before the proposed development that are likely to have an effect on the environment).

No.	Planning Ref. Applicant Distance from Site Apporx. Address/location	Application Status	Cumulative Effect Assessed
1.	SD21A/0186 Applicant Equinix Located on the Subject Site and forms part of the Overall Project	Granted 24/03/2022	No. Supersede by SD23A/0035
2.	Planning Ref: SD23A/0035 Applicant: Vantage Distance from Site: c. 20m west	Decision Due: 18/04/2023	Yes
3.	Planning Ref: SD22A/0420 Applicant: Vantage Distance from Site: c. 20m west	Further Information requested 12/01/2023	Yes
4.	Planning Ref: SD21A/0241 Applicant: Vantage Distance from Site: c. 20m west	Granted 19/06/2022	Yes
5.	Planning Ref. SD20A/0124 Applicant: Moffash Ltd. Distance from Site: c. 40m west	Granted 17/12/2020 Permission not implemented on site. Vantage DC application supersedes this application.	No, superseded by subsequent applications
6.	Planning Ref. SD21A/0167	Granted: 30/08/2022	Yes

	Applicant: Greener Ideas Limited Distance from Site: c. 115m South West		
7.	Planning Ref. SD23A/0039 Applicant: Microsoft Distance from Site: c.900m	Decision due 24 April 2023	No. Does not directly access Profile Park Roundabout. Up lift in traffic associated with this development has been included based on the inclusion of background traffic growth. This is based on guidance set out in TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
8.	Planning Ref. SD21A/0203 Applicant: Microsoft Distance from Site: c.900m	Granted 10/11/2021	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
9.	Planning Ref. SD20A/0283 Applicant: Microsoft Distance from Site: c.900m	Granted: 10/05/2021	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
10.	Planning Ref. ABP 309146 Applicant: CyrusOne Distance from Site c.700m west	Granted 19/07/2021. Altered 14/04/2023	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
11.	Planning Ref. SD20A/0295 Applicant: CyrusOne Distance from Site c.700m west	Granted 26/04/2021	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting) No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
12.	Planning Ref. SD18A/0134 ABP: 302813 Applicant: CyrusOne Distance from Site c.700m west	Granted: 18/04/2019	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)

13.			
14.	Planning Ref. SD17A/0377 Amendments to Applicant: Digital Realty Trust Distance from Site: c.160m south	Granted 30/01/2018 Constructed	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
15.	Planning Ref. SD12A/0002/EP Applicant: Digital Realty Trust Distance from Site: c.160m south	Granted: 10/04/2012	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
16.	Planning Ref. SD11A/0023 Applicant: Digital Realty Trust Distance from Site: c.160m south	Granted: 15/06/2011	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
17.			
18.	Planning Ref. ABP: 308585 Applicant: UBC Properties Distance from Site: c.700m south	Granted 07/05/2012	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
19.	Planning Ref. SD20A/0121 Applicant: UBC Properties Distance from Site: c.700m south	Granted: 09/09/2020 Construction in progress	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
20.	Planning Ref: ABP: 312793 Applicant: Vantage	Lodged 17/02/2022 Decision: Requires further consideration	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)

	Distance from Site: c. 400m southwest		
21.	Planning Ref. SD21A/0217 and ABP-314461-22 Applicant: Digital Netherlands VIII B. V. Distance from Site: c. 50m west	Granted and Appealed Decision due: 03/04/2023	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
22.	SD14A/0198 Applicant: Bernadette and Liam Kelly Distance from Site: 40m west	Granted Retension and Refuse Permission on 21/09/2015	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
23.	SD06A/0568/EP Applicant: DASNOC Limited	Granted on 30/11/2006 Extension of duration granted on 13/01/2012	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
24.	SD12A/0150 Applicant Crowe Howarth Located on the subject site.		No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
25.	SD118/0001 Applicant South Dublin	Submitted under PVIII by South Dublin County Council on 16/05/2011	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
26.	SD07A/0665 Distance from site c. 120m SW	Granted 20/11/2007	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
27.	SD08A/0239 Dasnoc Limitied Distance from Site: c. 80m South	Granted 15/06/2008	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)

28.	SD08A/0266 Dasnoc Limitied Distance from site: SW adjacent	Granted 30/07/2008	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
29.	SD07A/0280 Applicant Perham Ltd. Distance from Site: c.465m SW	Granted 23/10/2007	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
30.	SD08A/0113 Applicant Percam Ltd. Distance from Site: c.365m SW	Granted 20/05/2008	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
31.	SD08A/0052 Applicant Percam Ltd. Distance from Site: c.445m SW		No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
32.	SD11A/0121 Applicant Elume Limited Distance from Site: c.435m SW	Granted 02/08/2011	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
33.	SD14A/0023 Applicant Google Ireland Distance from Site c.405m SW	Granted 15/05/2014	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
34.	SD14A/0284 Applicant Google Ireland Distance from site c. 405m SW	Granted 27/03/2015	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)

35.	SD16A/0148 Applicant Google Ireland Distance from site c. 420m SW	Granted 03/08/2016	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
36.	SD23A/0012 Applicant: MacCabe Durney Barnes Distance from site c. 2.3km west	Application submitted 24/01/2023. Decision due 20/03/2023	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
37.	SD16A/0236 Applicant: Pfizer 10-year permission Distance from site: 500m north	Granted: 31/08/2016 10-year permission	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
38.	SHD3ABP-305267-19 Applicant; Adwood Limitied Distance from site: 750m east	Granted: 05/12/2019	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
39.	SD22A/0333 Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km northwest	Additional Information Requested 10/10/2022	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
40.	SD22A/0105 Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km Northwest	Granted: 19/06/2019	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
41.	SD22A/0289 Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km Northwest		No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)

42.	SD21A/0042 Applicant: EdgeConnex Ireland Limited Distance from site: 1.9km Northwest	Granted: 19/01/2022	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
43.	SD21A/0127 Applicant: EdgeConnex Ireland Limited Distance from Site: 1.1km	Granted permission for retention: 23/08/2021	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)
44.	SD16A/0345 Applicant: EdgeConnex Ireland Limited Distance from Site: 1.1km Northwest	Granted: 10/01/2017	No. Does not directly access Profile Park Roundabout. Up lift t in traffic associated with this development included from TII's Project Appraisal Guidelines (Link Based Traffic Growth Forecasting)

The following schemes have been included in the Cumulative Effects assessment:

- SD23A/0035 – Not granted but included in Cumulative Effects Assessment
- SD22A/0420 – Not granted but included in Cumulative Effects Assessment
- SD21A/0241 – included in Cumulative Effects Assessment
- SD21A/0167 – included in Cumulative Effects Assessment

The other schemes have not been included in the assessment as they are not accessed via Profile Park.

While there is a clear route to these developments via the New Nangor Road/Grange Castle Business Park Road, the R136 provides a more direct route and shorter travel distance from the M7/N7 and M50. It is logically to assume a direct route with shorter travel distance would be more desirable than a more circuitous route from an network assignment point of view.

There may be some trips via the Profile Park Roundabout, but this can be accounted for using TII traffic growth factors which have been applied to the model for the assumed opening year 2025. This takes into account the anticipated growth in traffic as a result of general development locally. For further detail, refer to Section 12.14 Growth Factors of this chapter.

The traffic modelling undertaken includes growth in background traffic flows which accounts for other developments in the area.

Table 12.12 illustrates the expected trips that will be in order to assess the Cumulative Effects.

Table 12.12 Peak time trips generated by committed developments.

Weekday Trip Generation	**AM Peak** **(07:00 – 08:00)**

	Departures	Arrivals
SD23A/0035	**33**	**33**
SD22A/0420	**13**	**11**
SD21/0421	25	22
SD21/ 0167	0	12
Total	71	78
Two Way Total		

The cumulative trip generation for the receiving node is illustrated Table 12.13.

Table 12.13 Cumulative Effects Assessment

	2025 Background Flows	Cumulative Effects	% Increase
AM (07:00-08:00)	1008	149	14.73%

The Cumulative Effects of the development will increase traffic at the Profile Park/R134 Roundabout by 14.73% in the AM Peak. Therefore, the roundabout has been put forward for further analysis to assess the Cumulative Effects.

The operation of the roundabout was modelled using Junctions 10 software, and tested with the 2023 Survey Year, 2024 Opening Year with the relevant network growth only and, 2025 Opening Year with the cumulative effects of committed developments including the proposed development

Table 12.14 Cumulative Effects Modelling

	Queue (PCU)	95% Queue (PCU)	Delay (s)	RFC	**Junction Delay (s)**
2023 -Survey					
Arm 1	0.3	1.3	2.48	0.24	2.47
Arm 2	0.0	0.5	7.15	0.01	
Arm 3	0.4	1.4	2.44	0.27	
Arm 4	0.0	0.5	2.04	0.02	
Arm 2	0.2	0.5	8.61	0.17	
Arm 3	0.4	1.4	2.54	0.29	
Arm 4	0.0	0.5	2.14	0.04	
2025 - Background					

Arm 1	0.3	1.0	2.41	0.21	2.42
Arm 2	0.0	0.5	6.93	0.01	
Arm 3	0.4	1.5	2.41	0.27	
Arm 4	0.0	0.5	2.11	0.04	
2025 - Cumulative Effects					
Arm 1	0.4	1.4	2.68	0.29	2.99
Arm 2	0.2	0.5	8.61	0.17	
Arm 3	0.4	1.5	2.56	0.29	
Arm 4	0.0	0.5	2.15	0.04	

The maximum RFC recorded was 0.29 with a corresponding queue of 1.4 PCUs. Delay at the junction increases from 2,47 seconds, recorded in the 2023 survey period to 2.99 seconds, recorded in the 2025 Cumulative Effects assessment.

The modelling illustrates that the roundabout operates within capacity in the AM peak in all scenarios. The maximum recorded RFC is 0.29 in 2025.

An RFC value of between 0.85 and 1.0 indicates that the junction remains within capacity but is beginning to show signs of queuing and delay. An RFC value of less than 1.0 is desirable in urban areas during peak period traffic. However, values of greater than 1.0 are typical at many junctions. An RFC value of 0.85 or below indicates that the junction is operating within capacity.

The effects of the operation would be permeant during the operation of the proposed development including:

- Slight negative and not significant in EIA terms for driver delay

12.22 Interactions

The projected increase in vehicle traffic during the operational stage may lead to a slight increase in noise levels during peak trip generation periods, however, implementation of the mitigation measures described in the Noise and Air Quality Section of this Environmental Impact Assessment Report will prevent and minimize the potential impacts of this interaction.

12.22.1 Air Quality

The Air Quality and Climate Chapter of this EIAR states that the impact of the proposed development on air quality and climate is considered Long-term and imperceptible for the Operational Stage of the proposed development.

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development.

There is the interaction between Land and Soils Chapter where the import and export of construction materials is considered. It is noted that the designs have been developed to achieve a near balance of the cut and fill materials on site, which minimise construction related traffic. The associated construction traffic has been considered in the construction stage impacts and Construction Management Plan included with the application.

Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified.

12.22.2 Risks to Human Health

During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. Measures will be put in place to reduce the risk of road traffic accidents during the construction phase through the implantation of a Construction Traffic Management Plan. Furthermore, it is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used and no unusual substance or underground tunnelling works required or predicted.

12.22.3 Construction Stage

A number of temporary risks to human health may occur during construction phase related to noise, dust, air quality and visual impacts which are addressed in other sections of this EIAR. Traffic impacts are considered to be negligible due to the implementation of mitigation measures identified.

12.22.4 Operational Stage

There will be a slight increase in traffic on the local road network.

13. Waste Management

13.1 Introduction

This chapter evaluates the likely significant effects, if any, which the proposed development may have on Material Assets as defined in the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU), the EPA Draft EIA Report Guidelines 2017 and EPA Draft Advice Notes for EIS 2015.

This chapter was completed by Chonaill Bradley. Chonaill Bradley is a Principal Environmental Consultant in the Environment Team at AWN. He holds a BSc in Environmental Science and is currently undertaking a Postgraduate Diploma, Circular Economy Leadership for the Build environment. He is an Associate Member of the Institute of Waste Management (CIWM). Chonaill has over eight years' experience in the environmental consultancy sector.

This chapter has also been prepared to address the issues associated with material assets during the construction and operational phases of the proposed development as described in Chapter 2.

A site-specific Resource Waste Management Plan (RWMP) has been prepared by AWN Consulting Ltd to deal with waste generation during the excavation and construction phases of the proposed Development and has been included as Appendix 13.1 (ref CB/227501.00238WMR01). The RWMP was prepared in accordance with the Environmental Protection Agency's (EPA) document 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government (DoEHLG)(2006).

The Chapter has been prepared in accordance with European Commissions Guidelines, Guidance on the preparation of the Environmental Impact Assessment Report (2017), the EPA Guidelines on the Information to be contained in EIAR (2022) and the EU Commission Notice on changes and extensions to projects, 2021.

These documents will ensure the sustainable management of wastes arising at the Development Site in accordance with legislative requirements and best practice standards.

13.2 Methodology

The assessment of the impacts of the proposed development, arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management, including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports.

This Chapter is based on the proposed development, as described in Chapter 2 (Site Context and Description of the Development) and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation and excavation); and
- Operational phase.

A desktop study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the Construction and Operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction and operational phases of the proposed development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 13.6

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 6 of this EIAR (Land & Soils, Geology & Hydrogeology)

13.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended). European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal) (Figure 13.1).

Figure 13.1: Waste Hierarchy (Source: European Commission)

EU and Irish National waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (CE) is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products. (Figure 13.2).

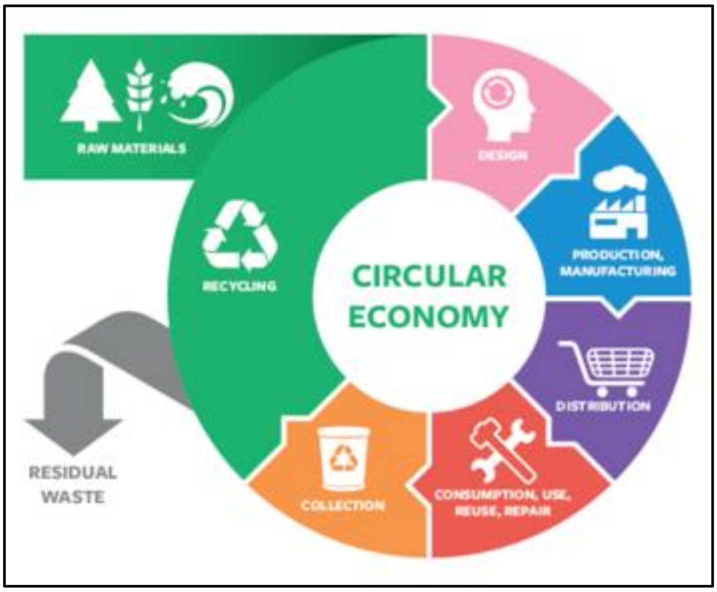


Figure 13.2: Circular Economy (Source: Repak)

The Irish government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, Waste Action Plan for a Circular Economy – *Waste Management Policy in Ireland, was published in 2020* and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national waste targets is due to the Irish and international waste context changing in the years since the launch of the previous waste management plan*, A Resource Opportunity, in 2014.*

One of the first actions to be taken from the WAPCE was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, using Less' (2021) to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021.

The Circular Economy and Miscellaneous Provisions Act 2022 was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions.

The strategy for the management of waste from the construction phase is in line with the requirements of the EPA's 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021). The guidance documents, Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects and Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers (FÁS & Construction Industry Federation, 2002), were also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the *Eastern Midlands Regional (EMR) Waste Management Plan 2015 – 2021*, *BS 5906:2005 Waste Management in Buildings – Code of Practice*, The South Dublin County Council (SDCC) County of South Dublin (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-laws (2018), the EPA National Waste Database Reports 1998 – 2020 and the EPA National Waste Statistics Web Resource.

13.2.2 Terminology

Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste - Any substance or object which the holder discards or intends or is required to discard.

Prevention - Measures taken before a substance, material or product has become waste, that reduce:

a) the quantity of waste, including through the re-use of products or the extension of the life span of products;
b) the adverse impacts of the generated waste on the environment and human health; or
c) the content of harmful substances in materials and products.

Reuse - Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse - Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment - Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery - Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling - Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal - Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I of the Waste Framework Directive sets out a non-exhaustive list of disposal operations.

13.3 Receiving Environment

In terms of waste management, the receiving environment is largely defined by SDCC as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the EMR Waste Management Plan 2015-2021 (currently under review to be replaced in 2023) and the Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland.

The waste management plans set out the following targets for waste management in the region:

- Achieve a recycling rate of 55% of managed municipal waste by 2025; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The National Waste Statistics update published by the EPA in December 2022 identifies that Ireland's current against "Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)" was met for 2020 at 54% however they are currently not in line with the 2025 target (55%).

The South Dublin County Council Development Plan 2022– 2028 set out objectives and policy objectives for the SDCC area which reflect those sets out in the regional waste management plan.

In terms of physical waste infrastructure, SDCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the EMR Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, municipal waste landfills, material recovery facilities and waste transfer stations.

13.4 Characteristics Of The Proposed Development

A full description of the proposed development can be found in Chapter 2 (Site Context and Description of the Development). The characteristics of the proposed development that are relevant in terms of waste management are summarised below.

13.4.1 The Proposed Development

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development.(Note: the Proposed Development (no. 1) is a subset of the Overall Project (no. 2))

13.4.1.1 Demolition Phase

There is no demolition required as part of this application.

13.4.1.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated.

There will be soil and stones excavated to facilitate construction of new foundations and the installation of underground services. The project engineers (Pinnacle Consulting Engineers) have estimated that c. c. 10,314.24m^3 of material will need to be excavated to do so. It is currently envisaged that there will be an opportunity to reuse c. 9,341.113m^3 of excavated material for use in landscaping and fill. The remining 973.11m^3 of material, will need to be removed offsite due to the limited opportunities for reuse on site. This will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

If any material that requires removal from the site is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020, (Previously Article 27 of the European Communities (Waste Directive). For more information in relation to the envisaged management of by-products, refer to the RWMP (Appendix 13.1).

In order to establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2019). Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste, including potential pollutant concentrations and leachability. Any surplus excavated material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.

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

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP (Appendix 13.1). The RWMP provides an estimate of the main waste types likely to be generated during the Construction phase of the proposed development. These are summarised in Table 13.1.

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	12.8	10	1.3	80	10.2	10	1.3
Timber	10.8	40	4.3	55	6.0	5	0.5
Plasterboard	3.9	30	1.2	60	2.3	10	0.4
Metals	3.1	5	0.2	90	2.8	5	0.2
Concrete	2.3	30	0.7	65	1.5	5	0.1
Other	5.8	20	1.2	60	3.5	20	1.2
Total	**38.7**		**8.8**		**26.3**		**3.6**

Table 13.1: Predicted on and off-site reuse, recycle and disposal rates for construction waste.

13.4.1.3 Operational Phase

Following construction, it is anticipated the operational phase of the development will generate a range a very small amount of mostly non-hazardous wastes with some hazardous wastes (mostly for maintenance of machinery etc.) as provided in the EPA's 2020 Construction & Demolition Waste Statistics for Ireland.

Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the Proposed Development are summarised in Section 13.6 below.

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

The main hazardous and non-hazardous waste types and quantities expected to be generated form the operational phase of the Proposed Development has been supplied from operations teams of other similar developments within Ireland and are summarised below:

Non-Hazardous Waste

Non-hazardous waste which is expected to be produced at the site includes:

- Packaging waste
- General non-hazardous waste
- Non-hazardous WEEE
- Landscaping waste

All wastes will be managed through the permitted/licenced waste contractors and in accordance with best practice and all EU and Irish waste management legislation.

Hazardous Wastes

Hazardous waste which is expected to be produced at the site includes:
Hazardous WEEE;
Waste filters, lube oil and other spares;

- Waste diesel (replaced once a year from emergency generators if not used);
- Waste batteries from the battery room; and
- Waste sludge from the petrol interceptors which will be pumped out/removed as required by a suitably permitted/licenced contractor

The above types of hazardous wastes would be expected from any industrial facility. All waste be managed through the permitted/licenced waste contractors and in accordance with best practice and all EU and Irish waste management legislation.

Table 13.2 below summarises the management strategy to be used for typical wastes to be generated at the site.

Waste Name	Hazard Y/N	On-site Storage/Treatment Method (anticipated)	Method of Treatment or disposal	Quantity
Waste Filters, Lube Oil and Other Spares	Y	Specialised container in waste storage area	Off-site recovery	1 no. Roll Cage (combined) 1 cage per year
Light Bulbs	Y	Specialised container in waste storage area	Off-site recovery	1 no. WEEE Roll Cage (combined) 1 cage per year
Waste Oil	Y	Oil drum in external waste storage area	Off-site recovery	1 Drum every 2 months
(Wet) Batteries	Y	Specialised container in waste storage area	Return to supplier	1 no. WEEE Roll Cage (combined) 1 cage per year
(Dry) Batteries	Y	Specialised container in waste storage area	Off-site recovery	1 no. WEEE Roll Cage (combined) 1 cage per year

Table 13.2: Proposed Waste Management Strategy & Estimated waste quantities

All waste receptacles stored on site are collected from the within the developments redline boundary by the permitted waste contractor and taken to registered, permitted and/or licensed facilities. No waste collection of operational waste occurs outside of the development's ownership.

13.4.2 The Overall Project

Includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR.

13.4.2.1 Demolition Phase

There is no demolition required as part of this application.

13.4.2.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated.

There will be soil and stones excavated to facilitate construction of new foundations and the installation of underground services. The project engineers (Pinnacle Consulting Engineers) have estimated that c. c. 10,314.24m^3 of material will need to be excavated to do so. It is currently envisaged that there will be an opportunity to reuse c. 9,341.113m^3 of excavated material for use in landscaping and fill. The remining 973.11m^3 of material, will need to be removed offsite due to the limited opportunities for reuse on site. This will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

If any material that requires removal from the site is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020, (Previously Article 27 of the European Communities (Waste Directive). For more information in relation to the envisaged management of by-products, refer to the RWMP (Appendix 13.1).

In order to establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2019). Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste, including potential pollutant concentrations and leachability. Any surplus excavated material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.

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

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP (Appendix 13.1). The RWMP provides an estimate of the main waste types likely to be generated during the Construction phase of the proposed development. These are summarised in Table 13.1.

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	154.0	10	15.4	80	123.2	10	15.4
Timber	130.6	40	52.3	55	71.9	5	6.5
Plasterboard	46.7	30	14.0	60	28.0	10	4.7
Metals	37.3	5	1.9	90	33.6	5	1.9
Concrete	28.0	30	8.4	65	18.2	5	1.4
Other	70.0	20	14.0	60	42.0	20	14.0
Total	**466.6**		**105.9**		**316.8**		**43.9**

Table 13.1: Predicted on and off-site reuse, recycle and disposal rates for construction waste.

13.4.2.3 Operational Phase

Following construction, it is anticipated the operational phase of the development will generate a range of mostly non-hazardous wastes with some hazardous wastes (mostly for maintenance of machinery etc.) as provided in the EPA's 2020 Construction & Demolition Waste Statistics for Ireland.

An Operational Waste Management Plan (OWMP) will be developed prior to commencement. The plan will seek to ensure the facility contributes to the targets outlined in the EMR Waste Management Plan 2015 – 2021. Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the Proposed Development are summarised in Section 13.6 below.

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

The main hazardous and non-hazardous waste types and quantities expected to be generated form the operational phase of the Proposed Development has been supplied from operations teams of other similar developments within Ireland and are summarised below:

Non-Hazardous Waste

Non-hazardous waste which is expected to be produced at the site includes:

- Packaging waste
- General non-hazardous waste
- Non-hazardous WEEE
- Canteen/ Kitchen waste
- Landscaping waste

All wastes will be managed through the permitted/licenced waste contractors and in accordance with best practice and all EU and Irish waste management legislation.

Hazardous Wastes

Hazardous waste which is expected to be produced at the site includes:

Hazardous WEEE;
Waste filters, lube oil and other spares;
Waste diesel (replaced once a year from emergency generators if not used);
Waste batteries from the battery room; and
Waste sludge from the petrol interceptors which will be pumped out/removed as required by a suitably permitted/licenced contractor

The above types of hazardous wastes would be expected from any industrial facility. All waste be managed through the permitted/licenced waste contractors and in accordance with best practice and all EU and Irish waste management legislation.

Table 13.2 below summarises the management strategy to be used for typical wastes to be generated at the site.

Waste Name	Hazard Y/N	On-site Storage/Treatment Method (anticipated)	Method of Treatment or disposal	Quantity
Packaging Waste	N	Segregated bins/skips	Recycle	380kg Cardboard 60kg Plastic 16kg Polystyrene / per month
General Non-Hazardous Waste Office/Canteen / Kitchen Waste	N	Segregated bins for metal cans, waste plastics, cardboard, general waste	Recycle/Recovery Compost food waste. Recycle dry paper, plastic and aluminium waste.	180kg Dry Mixed Recyclables 230kg Mixed Non-Recyclables 50kg Organics / per month

Waste Name	Hazard Y/N	On-site Storage/Treatment Method (anticipated)	Method of Treatment or disposal	Quantity
			Disposal of other general waste to landfill	
Non-Haz and Haz WEEE	Both Non-Haz and Haz	Segregated bins for waste electric and electronic equipment (WEEE)	Off-site recovery	1 no. WEEE Roll Cage (combined) 1 cage per Year
Landscaping waste	N	Compost waste bins	Onsite compost bins	120kg / per month
Waste Filters, Lube Oil and Other Spares	Y	Specialised container in waste storage area	Off-site recovery	1 no. Roll Cage (combined) 1 cage per year
Light Bulbs	Y	Specialised container in waste storage area	Off-site recovery	1 no. WEEE Roll Cage (combined) 1 cage per year
Waste Oil	Y	Oil drum in external waste storage area	Off-site recovery	1 Drum every 2 months
(Wet) Batteries	Y	Specialised container in waste storage area	Return to supplier	1 no. WEEE Roll Cage (combined) 1 cage per year
(Dry) Batteries	Y	Specialised container in waste storage area	Off-site recovery	1 no. WEEE Roll Cage (combined) 1 cage per year

Table 13.3: Proposed Waste Management Strategy & Estimated waste quantities

All waste receptacles stored on site are collected from the within the developments redline boundary by the permitted waste contractor and taken to registered, permitted and/or licensed facilities. No waste collection of operational waste occurs outside of the development's ownership.

13.5 Potential Impacts Of The Proposed Development

This section details the potential waste effects associated with the proposed development.

13.5.1 Construction Phase

The proposed Development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction. General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored on-site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the Development Site and in adjacent areas. The indirect effect of litter issues is the presence of vermin in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative.***

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***Long-term, significant*** and ***negative.***

Wastes arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the EMR which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the Development Site would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. The majority of construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative.***

There is a quantity of excavated material which will need to be excavated to facilitate the proposed Development. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Chapter 5. It is anticipated that c. 973.11m^3 of excavated material will need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative.***

13.5.2 Operational Phase

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy which would lead to small volumes of waste being sent unnecessarily to landfill. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative.***

The nature of the development means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas. The knock-on effect of litter issues is the presence of vermin in affected areas. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative.***

Waste contractors will be required to service the proposed development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative.***

13.5.3 Do Nothing Scenario

If the proposed development was not to go ahead (i.e. in the Do-Nothing scenario) there would be no excavation or construction at this site. There would, therefore, be a neutral effect on the environment in terms of waste.

The site is zoned for development, and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies and therefore the likely significant effects would be similar to this proposal.

13.6 Remedial And Mitigation Measures

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

The concept of the 'waste hierarchy' and 'Circular Economy' is employed when considering all mitigation measures. The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The circular economy principle aims to keep materials, components, and products in-use in the economy for as long as possible. In circularity, the key objective is to design consumption and production systems to create and retain value.

13.6.1 Construction Phase

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

As previously stated, a project specific RWMP has been prepared in line with the requirements of the requirements of The EPA, *Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)* and is included as Appendix 13.1. The mitigation measures outlined in the RWMP will be implemented in full and form part of mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (Appendix 13.1) in agreement with SDCC and in compliance with any planning conditions, or submit an addendum to the RWMP to SDCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases and should treat the document as outlined in the guidance as a live document.

  A quantity of topsoil and sub soil will need to be excavated to facilitate the proposed development. The project design team have estimated that c. 973.11m^3 of excavated material will need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

  In addition, the following mitigation measures will be implemented:

- Building materials will be chosen to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);

- A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Regulation 27 of the EC (Waste Directive) Regulations (2011-2020). EPA approval will be obtained prior to moving material as a by-product.

These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the EMR Waste Management Plan 2015 – 2021. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

13.6.2 Operational Phase

The following mitigation measures will be implemented during the operational phase of the proposed development:

All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins, skips or other suitable receptacles in a designated, easily accessible areas of the site.

- The Operator / Buildings Manager of the Site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – for the implementation of an Operational Waste Management Strategy, ensuring a high level of recycling, reuse and recovery at the Site of the proposed Development.
- The Operator / Buildings Manager will regularly audits the onsite waste storage facilities and infrastructure, and maintain a full paper trail of waste documentation for all waste movements from the site.

  The following mitigation measures will be implemented:

- The Operator will ensure on-Site segregation of all waste materials into appropriate categories, including (but not limited to):
  - Packaging Waste
  - General Non-Hazardous Waste
  - Office/Canteen / Kitchen Waste
  - Non-Haz and Haz WEEE
  - Landscaping waste
  - UV & Fluorescent Tubes
  - Waste Oil
  - (Wet) Batteries
  - (Dry) Batteries.
- The Operator will ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- The Operator will ensure that all waste collected from the Site of the proposed development will be reused, recycled or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- The Operator will ensure that all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed Project is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste Management Plan (2015 - 2021)* and the SDCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved

13.7 Residual Impacts Of The Proposed Development

The implementation of the mitigation measures outlined in Section 13.6 will ensure that targeted rates of reuse, recovery and recycling are achieved at the site of the Proposed Development during the construction and operational phases. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

13.7.1 Construction Phase

A carefully planned approach to waste management as set out in Section 13.6.1 and adherence to the RWMP (which includes mitigation) (Appendix 13.1) during the construction phase will ensure that the predicted effect on the environment will be ***short-term, imperceptible*** **and** ***neutral.***

13.7.2 Operational Phase

During the operational phase, a structured approach to waste management as set out in Section 13.6.2 will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be ***long-term, imperceptible and neutral.***

13.8 Residual Impacts

The implementation of the mitigation measures outlined in Section 13.6 will ensure that high rates of reuse, recovery and recycling are achieved at the Site of the proposed development during the construction and operational phases. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

13.9 Cumulative Impact Assessment

As has been identified in the receiving environment section all cumulative developments that are already built and in operation contribute to our characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational cumulative developments has been assessed in the preceding sections of this chapter.

13.9.1 Construction Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place in the area. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase. This would require sufficient servicing capabilities of permitted waste collection contractors and availability in suitability permitted or licensed waste facilities to receive the waste material.

Developments that potentially could overlap during the construction phase can be found in chapter 19 Cumulative Effects appendix 19.1.

Due to the high number of waste contractors in the South Dublin region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the likely effect will be **short-term, not significant and neutral**.

13.9.2 Operational Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place. All of the current and potential developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the likely effect will be a **long-term, imperceptible** and **neutral**.

13.10 Difficulties Encountered In Compiling The Chapter

Until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

There is a number of licensed, permitted and registered waste facilities in the Dublin and EMR regions and across Ireland and Northern Ireland. However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which may be more beneficial from an environmental perspective.

The ultimate selection of waste contractors and waste facilities would be subject to appropriate selection criteria proximity, competency, capacity and serviceability. The waste facilities selected will ultimately be selected to minimise the environmental impacts on the surrounding environment.

All mitigation measures as set out in this chapter and the attached RWMP will be complied with. The overall predicted impact of the proposed development when mitigation measures, local and national waste, requirements, guidance and legislation are followed will be **long-term, imperceptible** and **neutral**.

References

1. Waste Management Act 1996 - 2021 (No. 10 of 1996) as amended.
2. Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Eastern Midlands Region Waste Management Plan 2015 – 2021 (2015).
5. The Circular Economy and Miscellaneous Provisions Act 2022
6. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
7. European Commission, Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).
8. Environmental Protection Agency (EPA) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022)
9. Forum for the Construction Industry – Recycling of Construction and Demolition Waste.
10. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept 2020).
11. DCCAE, *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less*' (2021)
12. Environmental Protection Agency (EPA) *'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)*

13. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
14. FÁS and the Construction Industry Federation (CIF), Construction and Demolition Waste Management – a handbook for Contractors and site Managers (2002).
15. South Dublin County Council (SDCC) *County of South Dublin (Segregation, Storage and Presentation of Household and Commercial Waste) Bye-laws* (2018).
16. SDCC, *South Dublin County Council Development Plan 2022– 2028 (2022).*
17. BS 5906:2005 Waste Management in Buildings – Code of Practice
18. Planning and Development Act 2000 (No. 30 of 2000) as amended
19. Environmental Protection Agency (EPA), Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2015)
20. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
21. EPA, *European Waste Catalogue and Hazardous Waste List* (2002)
22. EPA, National Waste Database Reports 1998 – 2014.
23. US EPA, *Characterisation of Building Uses* (1998);
24. EPA and Galway-Mayo Institute of Technology (GMIT), EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned (2015)

14 Material Assets – Utilities

14.1 Introduction

This Chapter evaluates the likely significant impacts from the following developments:

1. **The Proposed Development** for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development.

2. **The Overall Project** which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR.

Please refer to Chapter 2 for Site Context and Detailed Description of the Developments.

14.2 Methodology

The Material Assets Assessment was prepared in accordance with the Environmental Protection Agency, Guidelines on the information to be contained in Environmental Impact Assessment Reports, published May 2022.

The EPA Guidelines (2022) states "Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils."

In this EIA Report, the impacts on some of the material assets described in the above guidance have already been considered in the following chapters and therefore these aspects will not be addressed in specific detail within this chapter.

- Chapter 6 - Land & Soil, Geology & Hydrogeology
- Chapter 7 – Water
- Chapter 8 – Noise and Vibration
- Chapter 9 – Air Quality
- Chapter 12 – Traffic and Transport
- Chapter 13 – Waste Management

This chapter assesses ownership and access, built services and infrastructure, which have not already been addressed elsewhere in this EIA Report. The subsequent sections address built services and infrastructure.

The potential impacts on built services and infrastructure, if any, are assessed in under the following subheadings:

- Land Use, Property, and Access
- Power and Electrical Supply
- Surface water infrastructure
- Foul drainage infrastructure
- Water supply

- Gas Supply
- Telecommunications

The associated built services and infrastructure in the vicinity of the site are summarised in the following sections; further detail is provided within the planning application documentation including details of consultation with utility suppliers.

The applications for Gas, water and Draiange are enclosed within the appendix for Chapter 14.

The chronology of correspondence with ESBN with regards to the power supply connection is enclosed within the Appendix for Chapter 14.

14.3 Receiving Environment and Characteristics of the Development

14.3.1 Land Use, Property and Access

The Proposed Development and Overall Project are located on the subject site which is located in Profile Park in Clondalkin, Dublin 22 on a site area of c.2.65ha.

The site is located on a corner at the entrance to Profile Park Business Park immediately bounded to the north by the Nangor Road and to the west by Profile Business Park access road, known as Falcon Avenue. The site is located within the administrative area of South Dublin County Council.

The Business Park is situated 2km west of Clondalkin village on the outskirts of Dublin City (10km south west of the city centre), approximately 16 km south of Dublin International Airport. The Business Park lies between the M4 and M7 and is proximate to the M50.

The nearest residential dwelling is located adjacent to the Circle K Filling Station approx. c.55m from the sites northern boundary. Two detached units to the west of the site are either vacant/derelict and or planned for demolition. There are some residential areas to the east at Oldcastle Drive, including traveller accommodation c.600m distant. Casement Aerodrome is located c.800m south of the subject site. The site is approximately 5km west of the M50. There is a Quality Bus Corridor QBC route on the Nangor Road and Profile Park provides feeder bus services to connecting public transport options including LUAS.

The site is free from development and is characterised by the hedgerow and ditch separating the site from Grange Castle Golf Club lands to the east and south, which will be retained and reinforced as part of the proposal. The site is largely greenfield in nature with some hardcore and bare ground visible in some areas. The ground levels within the site area appear flat however with a gradual fall from north to south. The existing site levels differ by approx. 2m between the levels along the north boundary (75.5 O.D.) and levels along the existing dry ditch along the south boundary (73.24-73.5 O.D.).

The site has been used in the past for agricultural use (before the Profile Business Park has been built in 2006).

An ESB wayleave and SDCC Watermain wayleave are located to the north and west of the site running parallel with Falcon Avenue and Nangor Road. No above ground structures are proposed at these locations.

Access to the site is provided to the west from Falcon Avenue with a secondary (unused) entrance located further south on the estate road. A splayed entrance is provided to the north on Nangor Road. Access via this northern entrance is prohibited due to the presence of a high metal railing surrounding the northern site perimeter.

The R134 Nangor Road has a single carriageway which provides a fully segregated two-way cycle lane facility. The Dublin bus 68/a runs at regular intervals along the R134.

The R134 Nagor Road connects to the R120 to the west and R136 to the west. The R136 is a dual carriageway with a speed limit of 80km/h that connects to the N4 to the north and the N7 to the south. The R136 accommodates a bus lane and comprises of a shared cycle path on both sides of the motorway.

The closest Luas stop to the site is the City West Campus Luas Tram stop which is approx. 4km southeast of the subject site. The closest railway station is Clondalkin Fonthill which is approx. 3km to the north east of the site which provides commuter services to and from Dublin City.

The site has the benefit of permission for a data centre under Application Ref. SD21A/0186.

Figure 14.1 - Aerial Photo of Site outlined in Red

Profile Park is located on the outskirts of Dublin City, the Park is easily accessible from the major arterial roads in the City.

The site has formed part of the Profile Park Business Park since its establishment in the year c.2006 which is a 100 acre (40.5 Ha) fully enclosed, private business park. The surrounding land uses comprise of similar large industrial, manufacturing and data storage buildings that are similar to the permitted and proposed development that this EIAR relates to. Existing tenants within Profile Park and the surrounding business and enterprise parks include Google, Microsoft, Digital Realty Trust, Telecity and others. Immediately adjacent to Profile Park is the Castlebaggot 110 / 220 kV substation which provides electrical transmission connectivity to the national electricity transmission grid system. Figure 2.2 illustrates the surrounding land uses in Profile Park.

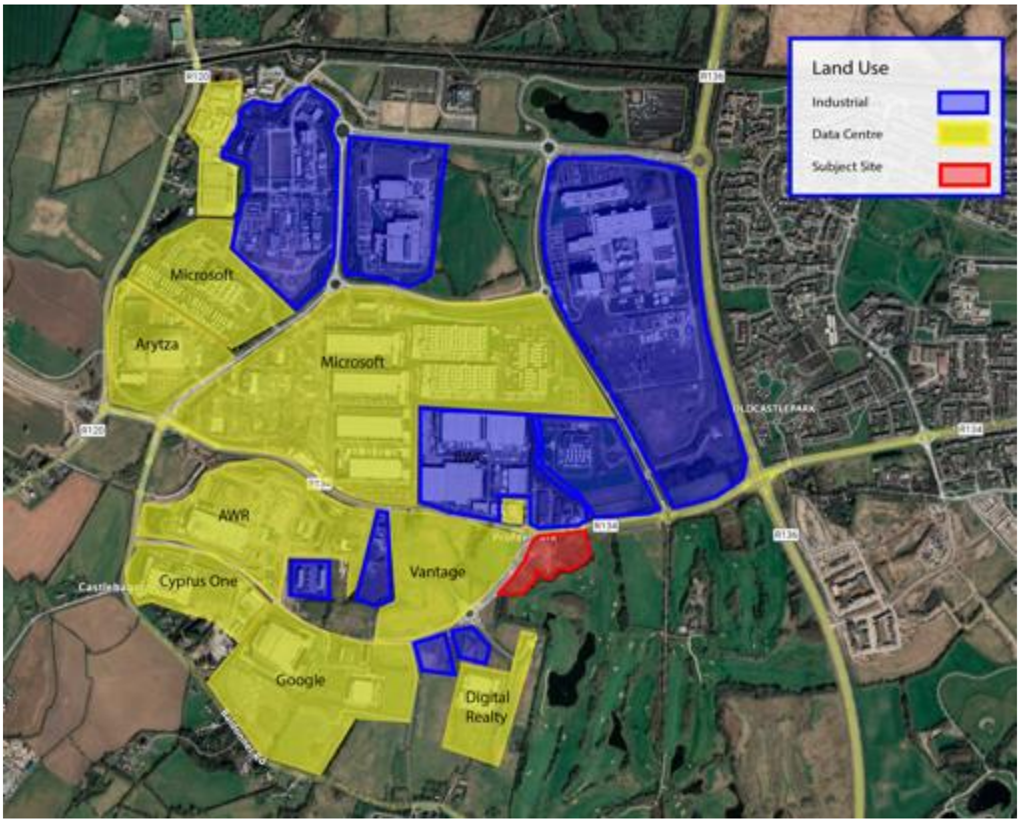


Figure 214.2 - Surrounding Land Use in Profile Park

14.3.2 Power and Electrical Supply

There are no electrical connections located in the subject site but the land does contain an ESB wayleave for a 220kV cable corridor. This is a buried utility and runs along the western and northern perimeter of the site.

No permanent structures will be constructed over the ESB wayleave zone

As detailed in Chapter 2 (Description of the Proposed Development), the proposed development's on site power generation plant is able to receive a power supply connection from ESB in order to comply with CRU requirements for Flex operation and dispatchable generation. Placeholders for ESB switchrooms have been identified and coordinated for future construction.

The power from the OSPG will distribute underground via a private 11kV cabling network arrangement to service the data centre, office areas, plant areas and fire pump room.

In the event of a loss of power to the site standby diesel-powered back-up generators will beactivated to provide power for a short period of time pending restoration of mains power.

During construction, contractors will require power for onsite accommodation, and construction equipment /plant. The power requirements will be relatively minor. A temporary low voltage connection to the grid will be made subject to relevant applications and approvals. If this supply is not available, it is anticipated that generators will be provided on site to provide temporary power.

During the operational phase the data centre, IT hardware require a consistent electrical supply to operate. Once completed is anticipated to require a maximum of 10MW to operate.

14.3.3 Surface Water Infrastructure

Storm water from the proposed development has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS)and ensures that Best Management Practice has been incorporated into the design.

It should be noted that the proposed development currently comprises a greenfield site and the proposed surface water measures are aimed at improving the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge.

Storm water from the roof areas of the proposed building units, will be directed via rain water pipes into an on-site reticulation system. The outflow from this system will be connected into the surface water drainage network collecting run-off from the road areas and will be ultimately discharged into a stormwater storage pond / below ground tanks.

Based on the contributing area for this current application, i.e. circa 22,400m2 (2.24Ha), the total attenuation volume required has been calculated as being circa 1,204m3.

Storm water from all car park areas and access roads / delivery areas will be drained as follows:-

- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers
- Porous asphalt

Prior to discharging into the proposed pond, the storm water from the car park and access roads, which is drained via the methods as described above, will be directed through an appropriately sized petrol interceptor.

The storm water drainage within the entire development has been designed to accommodate a 1:2 year storm frequency. The pond, attenuation tanks and porous asphalt areas have been designed to accommodate a 1:100 year storm event + 20% climate change.

The outflow from the proposed development, will be restricted by way of a Hydrobrake facility, which will limit the total discharge to 4.4l/s, which is the calculated QBAR greenfield run-off rate.

The surface water discharge for this application will incorporate the road areas, parking, service yard area and the roof water from the proposed data halls, which then ultimately feeds into the storm water network as previously mentioned.

The various surface areas of this application are detailed below:

- Access Road – Tarmac
- Data Hall Roof Area
- Yard Slab Area – Concrete
- Open Space / Landscaping
- Porous Asphalt & Parking Areas
- Concrete Footpath
- Standard Road Tarmac
- Gravel

14.3.4 Foul Drainage Infrastructure

South Dublin County Council record drawings have identified 3 No. 150mm / 225mm Ø spur connections, located adjacent to the western boundary of the property & Profile Park.

Figure 14.3 Map of Irish Water Connections adjacent to the Overall Project

These spur connections were left out to facilitate development of these lands. These spur connections are joined into the reticulation network for Profile Park.

As confirmed by Irish Water, the existing foul sewer reticulation network has adequate capacity to cater for the proposed effluent discharge from the proposed development. This

It is proposed to discharge foul water from the proposed development, via a 225mm Ø gravity foul sewer outfall, laid from a discharge manhole at the end of a 100mm Ø pumped main and discharge into the existing 225mm Ø spur connection laid across Falcon Avenue, which is connected to the existing foul sewer network laid along the western edge of Falcon Avenue.

Based on Irish Water's Code of Practice of 150ltr/hd/day, the peak wastewater flow will not be in excess of circa 0.66l/s.

The proposed network connects into the Profile Park reticulation network.

All on-site foul sewers have been designed to be a minimum 225mm Ø diameter pipes, with gradients designed to achieve self-cleansing velocities.

A Confirmation of Feasibility, Ref. CDS20007552, has been received from Irish Water in respect of this development. A copy of this confirmation is included in the Appendix for Chapter 14.

14.3.5 Potable Water Supply

South Dublin County Council record drawings have identified an existing 6" (160mm) Ø main located along the western boundary of the property, within Falcon Avenue adjacent to the subject site.

Figure 14.4 Map of Irish Water Connections adjacent to the Site

2No. 160mm Ø capped connections with sluice valves, have been left off the aforementioned water main, in order to facilitate development of these lands.

There is also an existing 700mm Ø trunk water main running parallel to the New Nangor Road adjacent to the northern boundary of the subject site.

It is intended to serve the proposed development via connection off the 150mm Ø network, as located in Falcon Avenue.

Hydrants will be installed in accordance with the Requirements of the Building Regulations and in accordance with the recommendations contained in the Technical Guidance Documents, Section B – Fire Safety, dated 2006.

The water demand for this development is very low and domestic in nature and is only required for staff washrooms and staff welfare facilties. There is no process on site that requires water for operational purposes.

Water demand for the development has been based on Irish Water's criteria = 0.113 litres/second.

- Avg. Demand = 0.141 litres/second
- Peak Demand = 0.705 litres/second

Water meters, sluice valves and hydrants, in line with Irish Water requirements and specifications, will be installed at the connections onto the aforementioned existing water mains, as required.

A Confirmation of Feasibility, Ref. CDS20007552, has been received from Irish Water in respect of this development. A copy of this confirmation is included in the Appendix for Chapter 14.

14.3.6 Natural Gas Supply

The proposed power plant will be connected to the Gas Networks Ireland (GNI) low pressure network.

Figure 14.5 GNI Location Map

The GNI network currently provides a natural gas supply with the sustainable decarbonising objective of blending natural gas with green Hydrogen before the end of the decade.

The power plant generators are reciprocating machines are designed to run on natural gas or any blended Natural Gas/Hydrogen mix supplied by the network. Ultimately, the power plant can operate on 100% Hydrogen which is in line wot GNI future development plans.

Once the development is connected to the Grid, it is Equinix corporate policy to purchase green energy through Corporate PPAs wherever these are available.

GNI have confirmed that the permitted development will received a 45MW Connection @400mbar. This low pressure gas supply will be served through two streams at the following rated pressures and incoming service routes are shown in the GNI network plans.

Stream A:
Outlet set pressure = 400mbar.
Relief set pressure = 592mbar.
Slamshut set pressure = 643mbar

Stream B:
Outlet set pressure = 360mbar.
Relief set pressure = 592mbar.
Slamshut set pressure = 693mbar

The drawing in Figure 14.6, shows the GNI Design Drawing which defines the local distribution network and proposed connection points for the development. The blue dotted lines are the GNI low pressure network to which the development will be connected.

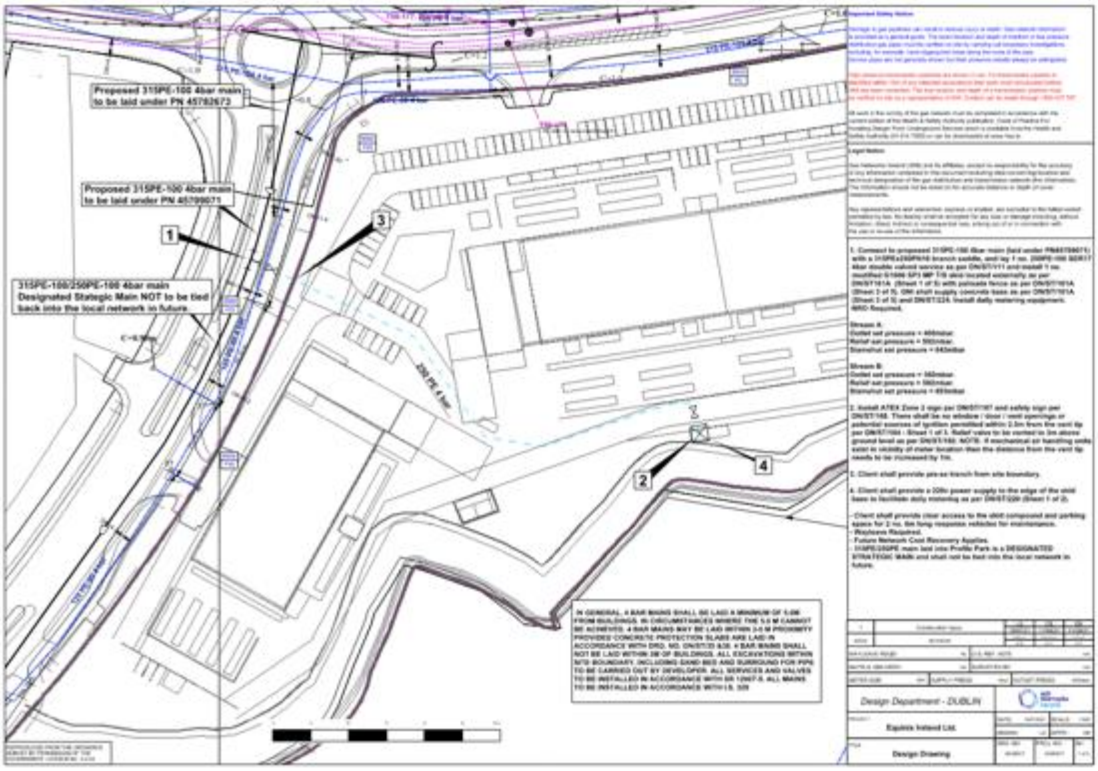


Figure 14.6 - GNI Design Drawing, Incoming Gas Supply

14.3.7 Telecommunications

Telecommunications including fibre required during the construction phase will be provided via a mobile connection or temporary connection to the nearby telephone network.

There are telecommunication lines in existence for telephone and broadband services in the area. A fibre optic cable distribution network will be installed with a separate incoming fibre infrastructure and provided to each building via underground fibre ducts.

There are existing underground carrier ducts adjacent to the site that will be utilised for the development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

Figure 14.7 Telecomm utility Landing Points

The telecommunication utilities will land on the site in three locations through the operators ducting systems.

The installation of a new fibre optic cable network on the site will be carried out in accordance with Equinix design standards.

14.4 Potential Impacts of the Development

14.4.1 Land Use, Property and Access

The Proposed Development

During the construction phase, there are potential short-term nuisances such as dust, noise, as well as the potential for pollution of groundwater or the existing drainage ditches associated with demolition, excavations and construction.

No access will be required to third party properties to allow construction works to be completed for the project. Construction practices will not impact property accessibility during the construction phase.

The Construction Environment Management Plan (CEMP) has been prepared by Malone O'Regan Environmental Consultants and is included with the EIAR (Appendix 11).

All mitigation measures outlined will be implemented, as well as any additional measures required pursuant to planning conditions which may be imposed. The potential impact associated with land use and property for the construction phase will be localised, negative, not significant and short term.

During its operations phase, the proposed power plant will operate in accordance with the operating parameters that are discussed further in the following Chapters:

- Chapter 6 - Land & Soil, Geology & Hydrogeology
- Chapter 8 – Noise and Vibration
- Chapter 9 – Air Quality

14.4.2 Public Utilities

The laying of underground electrical cables and a gas pipeline as part of project works has the potential to directly impact the electrical and gas network service. Water supply and wastewater collection infrastructure is present and has the potential to be directly impacted by construction digging works. Communications infrastructure is present external to the plot. There is potential for unidentified utilities to be damaged during the construction phase. Utilities will be further identified and mapped during the detailed design stage. Potential slight negative temporary impacts on public utilities could arise during the construction of the proposed development.

During operation the OSPG will generate electricity with an incoming gas supply and will export energy to the data centre whilst operating independently from the grid. This will be a long term neutral effect on local utilities.

When the OSPG is connected to the grid, and providing dispatchable power, this will be a long term positive effect on the utilities as this will add to the security of the grid in accordance with CRU requirements.

14.4.3 Power and Electrical Supply

During construction, contractors will require power for onsite accommodation, and construction equipment/plant. The power requirements for the construction phase willbe relatively minor. A construction compound and temporary power supply will be established in consultation with the utility suppler. Any excavations within the vicinity of existing electrical services will be carried out in consultation with EBS Networks to ensure there is no impact on existing users. The electrical connection should have no disruptions to the national grid during connection works.

The potential impact associated with power and electrical supply for the construction phase will be a neutral, imperceptible and short term.

During operations, the proposed development will be powered through an onsite power generation plant and ESB power supply when made available.

The proposed development requires emergency generators to provide back-up power in the event of loss of the main electrical supply to ensure continuity to its customers. The potential impacts of the proposed backup generators have been addressed in Chapter 8 Noise and Vibration and Chapter 9 Air Quality.

There is a potential impact on material assets during the operational phase of the proposed Data Centre development is neutral, slight and long term.

14.4.4 Surface Water Infrastructure

During the construction phase, there is potential for an increase in run-off due to the introduction of impermeable surfaces and the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses.

With mitigation in place, as outlined in the CEMP (Appendix 11) the potential impact on surface water for the construction phase is neutral, imperceptible, and short term.

The design of the proposed development has included measures to attenuate surface water to acceptable flows and treat stormwater prior to discharge.

14.4.5 Foul Drainage Infrastructure

Welfare facilities will be provided for the construction workers on site during the construction works and wastewater will be of domestic origin only.

The works contractor will be required to apply to Irish Water for connection to discharge any contaminated surface water which collects in excavations, if it is required. The works contractor will be obliged to comply with any conditions of the discharge license to control discharge quality and rate of flow.

The potential impact on foul drainage for the construction phase is negative, imperceptible, and short term.

During the operational phase the wastewater discharged from the site will ultimately discharge to the Profile Park network. Irish water have confirmed that there is available capacity in the network.

The potential impact on foul drainage for the operational phase is neutral, imperceptible, and long term.

14.4.6 Water Infrastructure

During the construction phase the water requirements for the site will be minimal and facilitated through road tanker delivery. This will serve the construction compound, welfare facilities and any other construction activities for the duration of construction works on the proposed development.

The demand during the construction phase is not expected to be significant enough to have any potential impact on the existing water supply network.

The potential impact on potable water infrastructure for the construction phase is neutral, imperceptible, and short term.

Irish water have confirmed that there is available supply within the network for the proposed development. Irish Water is the National Authority for water management and should there have been an inadequate supply this would have been confirmed to the developer during consultation.

The potential impact on potable water infrastructure for the operational phase is neutral, imperceptible, and long term.

14.4.7 Telecommunications

The proposed development will not make a connection to public network, a dedicated direct connection to services will be provided, and therefore there is no perceptible impact on the existing telecommunications infrastructure. It is assumed that there is sufficient capacity available in the network to accommodate the development, so there are no potential impacts associated with telecommunications for the proposed development for the operation phase. There are no potential impacts associated with telecommunications for the proposed development for the construction phase.

14.5 Remedial and Mitigation Measures

14.5.1 Construction Phase

Ongoing consultation with the Irish Water, EirGrid, ESB Networks, GNI and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth construction schedule without disruption to local and business community.

The general contractor will be obliged to put best practice measures in place – as set out in the CEMP appended to this EIAR – to ensure that there are no interruptions to these utilities, unless this has been agreed in advance.

Coordination and consultation between the project team and ESB and Irish Water and other relevant service providers within the locality as the design progresses.

The Construction Environment Management Plan (CEMP) has been prepared by Malone O'Regan Environmental Consultants and is included with the EIAR (Appendix 11).

All mitigation measures outlined therein will be implemented, as well as any additional measures required pursuant to planning conditions which may be imposed. These measures include surface water protection measures, including silt control features and measure for the management of spills. In order to mitigate any impact on surface water runoff, the new drainage network shall be constructed on a phased basis and temporary pipes and detention ponds shall be constructed, as required.

During construction, liquid materials should be stored within temporary bunded areas, doubled skinned tanks or bunded containers.

All mitigation measures outlined therein will be implemented, as well as any additional measures required pursuant to planning conditions which may be imposed. These measures include surface water protection measures, including silt control features and measure for the management of spills. In order to mitigate any impact on surface water runoff, the new drainage network shall be constructed on a phased basis and temporary pipes and detention ponds shall be constructed, as required.

During construction, liquid materials should be stored within temporary bunded areas, doubled skinned tanks or bunded containers.

14.5.2 Operational Phase

It is envisaged that consultation with the Irish Water, EirGrid, ESB Networks, and other relevant service providers within the locality and compliance with any requirements or guidelines they may have, will ensure that there will be no ongoing impacts on material assets.

14.6 Residual Impacts of the Development

The material assets identified in the study area are considered to be typical infrastructure frequently encountered in civil engineering infrastructure projects, in both rural and urban environments.

As such, it is considered that the resulting predicted impacts on material assets from the Overall Project will be positive, slight and permanent.

14.7 Monitoring and/or Re-instatement

No additional monitoring or reinstatement is required. Monitoring arrangements will be reached with utility suppliers as required.

14.8 Cumulative Impacts

The cumulative impact of the Overall Project with any relevant existing or permitted developments is set out in Chapter 19 – Cumulative Impacts of the EIAR unless otherwise stated.

14.9 Do Nothing Scenario

Should construction of the proposed development not be developed, there will be no impact on any of the existing material assets in the area.

15. CULTURAL HERITAGE (ARCHITECTURAL)

15.1 Introduction

This statement comprises an assessment of the architectural and cultural heritage of the site of the permitted and proposed developments, as well as the overall project, of Data Centre Equinix DB8, Profile Park, Clondalkin, Dublin 22. The assessment comprises a desk top study, and a field survey of the overall project area.

The statement was prepared in March 2023 By Dr Neil O'Flanagan MA MSc PhD. Dr O'Flanagan is a current holder of archaeological licences issued by the Archaeological Licensing Section of the Dept of Environment. He holds a doctorate on urban research, and has a long held expertise on the built heritage in Ireland and abroad. The statement was carried out on behalf of RKD (architects).

The **Permitted Development** SDCC Ref. SD21A/0186 Data Centre Equinix DB8 at Profile Park, Clondalkin, Dublin 22 includes the following:

- Construction of a 3 storey (part 4 storey) data centre known as 'DB8' to include data halls, electrical/plant rooms including internal generators, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level;
- The total gross floor area excluding hot air plenums is c.9,601sq.m and the overall height of the data centre ranges from c.16m to c.20m to roof parapet level and up to c.24.48m including roof top plant, flues which include a wire mesh cladding to rear of the front (north facing plenums) and lift overrun;
- Provision of 5 no. external generators, 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8 data centre building on the subject site ;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a water sprinkler pump room (c.23sqm), 2 sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm); total floor area of ancillary structures and plant (c.303sqm);
- 64 car parking spaces, 5 motorcycle spaces, bicycle shelter serving 14 spaces, smoke shelter, provision of a delivery yard and loading bays,
- PV panels that have an output of 0.04MV,
- Internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue;
- Additional tree planting to the northern boundary for enhanced amenity and screening purposes,
- Sustainable Urban Drainage Systems were proposed including the following SuDs We refer to the Landscape Masterplan (DB080-MA-LS-XX-DR-L-PLNT-1050) for more information;
    - Perimeter landscaping;
    - Bioretention Tree Pits;
    - Flow Control Devices;
    - Interceptors;
    - Permeable Paving;
    - Permeable Gravel Areas;
    - Green Roofs (combined area of 132sqm.);
    - Rain Water Harvesting (Office Building Area);
    - Swale 1;
    - Swale 2; and
    - Attenuation Pond

- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing;
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site;
- The area to the southwest of the site (temporary meadow) was reserved for a future data centre, subject of a separate application to South Dublin County Council on a site bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue. This application was accompanied by a Natura Impact Statement.

This statement was prepared in advance of the **The Proposed Development** for which consent is being sought under SDCC Ref. SD22A/0156 which includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development. This will include integral related projects including connections to the gas network within the estate road.

This statement was also prepared in advance of **the Overall Project** which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR. The statement will include in its assessment integral related projects required for the project to operate including connections to water main, foul drainage, storm water, and fibre connections.

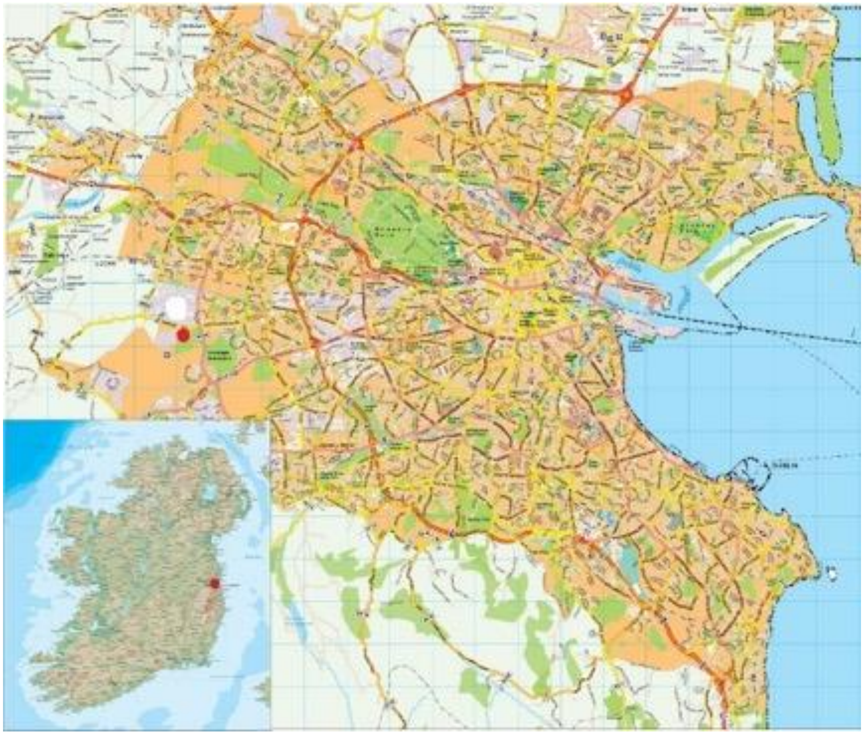


Figure 15.1. Site Location

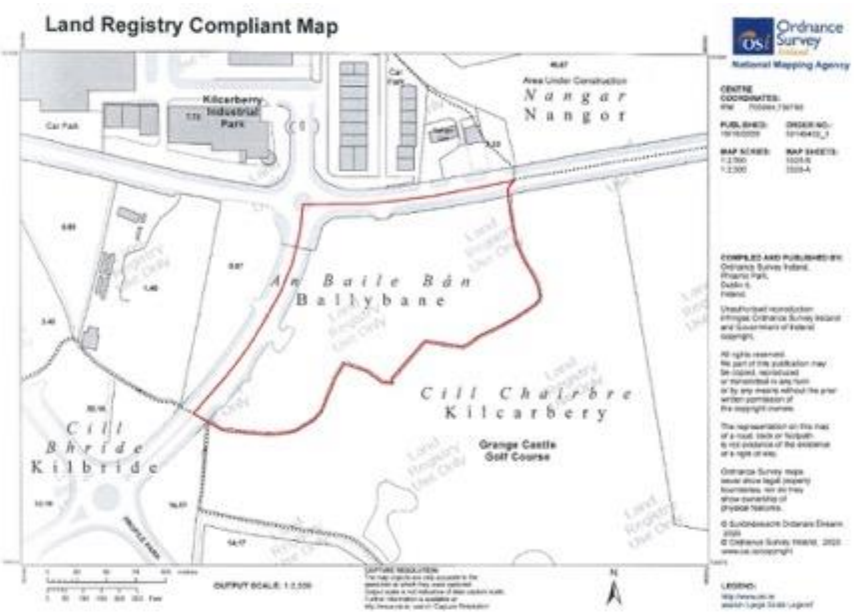


Figure 15.2. Site Plan

15.2 Methodology

The methodology adopted is grounded in the statutory requirements of legislation protecting the architectural heritage in Ireland. The legislation includes the following:

- the Architectural Heritage Act (National Inventory) 1999.
- National Monuments (Miscellaneous Provisions) Act 1999 and
- the Local Government (Planning and Development) Acts 1963-1998, now superseded by the Planning and Development Acts 2000- 2018.

The operation of the various components of the legislation is set out in the *Architectural Heritage Protection, Guidelines for planning authorities*, 2004.

The statement will identify the architectural heritage of the overall project and its environs, review the impact of the overall project on this heritage, offer mitigation measures countering such impact, within the framework of the legislation and guidelines outlined above.

15.2.1 National Inventory of Architectural Heritage

National Inventory of Architectural Heritage, as established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999, includes a number of properties in the environs of the overall project.

Of particular significance with regard to the proposed development is the inclusion of Kilcarbery House, and associated demesne. The demesne boundary forms the main part of the eastern boundary of the site. As noted in the chapter on the archaeological heritage, the north western boundary of Kilcarbery Townland, was also the ancient townland boundary between Ballybane and Kilbride Townlands.

Below is a list of the structures and demesnes within 2000m of the proposed development.

<table>
<tr><th>Number</th><th>Description</th></tr>
<tr><td>1</td><td>

Kilcarberry House, off Nangor Road, KILCARBERY, DUBLIN

View on map

Survey Data

Reg No: 11209001
Rating: Regional
Categories of Special Interest: Architectural, Artistic, Technical
Original Use: Country house
In Use As: Country house
Date: 1800 - 1820
Coordinates: 304509, 230589
Date Recorded: 28/05/2002
Date Updated: --/--/--

Description

Detached three-bay two-storey house, c.1810, with projecting diagonally-set single-storey porch. Roughcast rendered walls. Single-pane timber sash windows. Timber panelled door with Ionic doorcase having radial elliptical fanlight. Hipped slate roof with brick chimney stacks. Lower two-storey rere section with lean-to slate roof forming catslide. Stone rubble outbuildings to rere in various states of dilapidation with pitched timber-framed slate roofs.

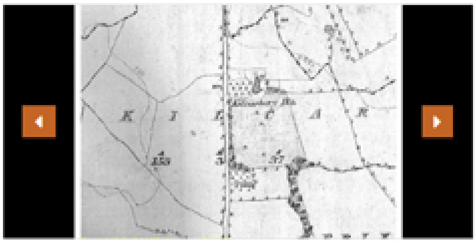
Appraisal

This attractive Georgian house is beautifully set in the rural landscape. It has been well-maintained and its unusual porch design makes it a unique and interesting building retaining its original proportions and styles of fenestration.

</td></tr>
<tr><td>2</td><td>

Kilcarbery House, Kilcarbery

Image Gallery



Survey Data

Site ID: 5742
County: 6
Townland: Kilcarbery
Present on Ordnance Survey: First Edition: Yes; Second Edition: Not checked; Revised Edition: Not checked
Present on Ordnance Survey First Edition 6" Series: [1836 to 1846] Yes
Location on Ordnance Survey 1:50,000: Sheet No: 50; Grid Letter: O; Grid Reference: 045305

Hide

Apparent visibility on current OS and general notes

</td></tr>
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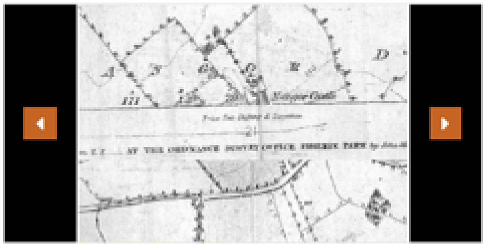
3

Nangor Castle, Uppercross, Clondalkin, Nangor

Image Gallery



Survey Data

Site ID	2228
Barony / Municipal Borough	Uppercross
Parish	Clondalkin
County	6
Former County	Dublin
Townland	Nangor

Show more

Apparent visibility on current OS and general notes

Nothing indicated,area labelled Nangor

4

2 Off Nangor Road, NANGOR, DUBLIN

View on map

Survey Data

Reg No	**11209003**
Rating	**Regional**
Categories of Special Interest	**Architectural**
Original Use	House
In Use As	House
Date	1925 - 1945
Coordinates	304909, 230952
Date Recorded	28/05/2002
Date Updated	--/--/--

Description

Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Replacement uPVC windows. Hipped slate roof with red brick chimney stack.

Appraisal

One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road. Despite some alterations, this house retains its original proportions and remains an important element of this group, the unobtrusive siting of which adds visual interest to this rural road.

5

1 off Nangor Road, NANGOR, DUBLIN

View on map

Survey Data

Reg No	11209002
Rating	Regional
Categories of Special Interest	Architectural, Technical
Original Use	House
In Use As	House
Date	1925 - 1945
Coordinates	304902, 230953
Date Recorded	28/05/2002
Date Updated	--/--/--

Description

Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Tripartite timber sash windows to front, door to side. Hipped slate roof with red brick chimney stack.

Appraisal

One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road, the unobtrusive siting of which adds visual interest to this rural road. This house is substantially intact, retaining original window, roofing and wall materials.

6

Sky Lawn, 4 Off Nangor Road, DEANSRATH, DUBLIN

View on map

Survey Data

Reg No	11209005
Rating	Regional
Categories of Special Interest	Architectural
Original Use	House
In Use As	House
Date	1925 - 1945
Coordinates	304963, 230968
Date Recorded	28/05/2002
Date Updated	--/--/--

Description

Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Replacement uPVC windows. Hipped slate roof with red brick chimney stack. Later flat-roofed porch to east with timber panelled door.

Appraisal

One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road. Despite some alterations, this house retains its original proportions and remains an important element of this group, the unobtrusive siting of which adds visual interest to this rural road.

7

3 Off Nangor Road, DEANSRATH, DUBLIN

View on map

Survey Data

Reg No	11209004
Rating	Regional
Categories of Special Interest	Architectural, Technical
Original Use	House
In Use As	House
Date	1925 - 1945
Coordinates	304955, 230965
Date Recorded	28/05/2002
Date Updated	--/--/--

Description

Semi-detached single-bay single-storey house, c.1935. Roughcast finish with smooth rendered base course. Tripartite timber sash window to front, door to side. Hipped slate roof with red brick chimney stack.

Appraisal

One of a group of four semi-detached houses set in a now peaceful location on the formerly busier Nangor Road, the unobtrusive siting of which adds visual interest to this rural road. This house is substantially intact, retaining original window, roofing and wall materials.

8

Grange Castle, GRANGE (BA. W BY.), Milltown, DUBLIN

View on map

Survey Data

Reg No	11208013
Rating	Regional
Categories of Special Interest	Archaeological, Architectural, Historical
Original Use	Castle/fortified house
Date	1740 - 1760
Coordinates	303928, 231851
Date Recorded	12/06/2002
Date Updated	--/--/--

Description

Ruinous remains of detached multiple-bay three-storey over vaulted basement former tower house, remodelled c. 1750 by addition of two-bay two-storey domestic wing attached to the west, with large supporting wall buttresses to the south. All openings blocked in roughcast walls leading to partially roofless wallheads. Earlier house, built c.1580, retains slender projecting square tower and garderobe. Large chimneybreast exposed where buildings have been demolished in the east.

Appraisal

Despite its ruinous state, many features of the two building phases can be clearly discerned, and the building remains a prominent landmark in the area.

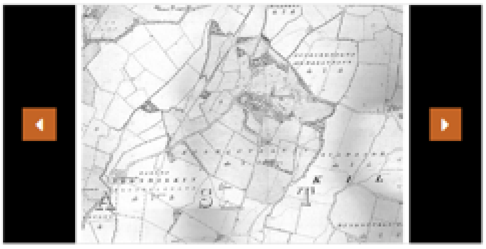
9	**Castle Bagot House, KILMACTALWAY, Milltown, DUBLIN**  View on map **Survey Data** Reg No: 11208010 Rating: Regional Categories of Special Interest: Architectural, Artistic, Historical Original Use: Country house In Use As: Office Date: 1790 - 1810 Coordinates: 302879, 230187 Date Recorded: 11/06/2002 Date Updated: --/--/-- **Description** Detached five-bay three-storey former country house, c.1800, with full-height canted entrance bay. Now in use as offices. Coursed rubble stone walls, originally rendered, with ashlar quoins. Timber casement windows with flat brick or stone arches and stone sills. Panelled timber doors with cut stone doric pilasters, fanlight and pediment. Hipped artificial slate roofs with two stone chimney stacks. Cast-iron gates with late twentieth-century cut stone piers having reused original frieze blocks with swags. **Appraisal** A fine former country house which dominates the low lying agricultural land surrounding. Though altered, it retains its original imposing form, and a good doorway and estate entrance ensemble.
10	**Castle Bagot, Newcastle, Kilmactalway, Kilmactalway** **Image Gallery**  **Survey Data** Site ID: 2214 Alternate Names: Kilmactalway House Barony / Municipal Borough: Newcastle Parish: Kilmactalway County: 6 Former County: Dublin Townland: Kilmactalway Show more **Apparent visibility on current OS and general notes** Buildings indicated, not named

Table 15.1: Structures and demesnes in close vicinity to the proposed development.

With the exception of Kilcarbery House and Demesne, all the properties listed above are sufficiently distant from the overall project area to have little or no bearing on their visual integrity, or any material change in their setting.

Kilcarbery House is described in the records of the NIAH as follows:

> *Detached three-bay two-storey house, c.1810, with projecting diagonally-set single-storey porch. Roughcast rendered walls. Single-pane timber sash windows. Timber panelled door with Ionic doorcase having radial elliptical fanlight. Hipped slate roof with brick chimney stacks.*

Lower two-storey rere section with lean-to slate roof forming catslide. Stone rubble outbuildings to rere in various states of dilapidation with pitched timber-framed slate roofs.

It is further described as being well maintained with an unusual porch design, set in a rural setting

The house included a demesne garden which can be seen in the OS map of 1837 (see fig 15.10. as excerpt from Griffiths Valuation). It is noticeable that the garden of the house is laid out to the south of the house, away from the site of the proposed development.

Kilcarbery House is situated some 400m from the boundary of the proposed development and overall project and is obcured from the site by tree and vegetation cover. The garden of the house lay to the south and is therefore a further distance from the proposed development and overall project. The demesne garden, and the remains of the demesne are not set out as a golf course, and any remains of the garden have probably been disturbed or removed as a result (see fig 15.11 aerial photograph)

The visual integrity of the house will not be affected by the construction of the Data centre. Furthermore, the townland boundary will not be breached or materially affected by either the proposed development or the over all project. During the construction phase, there may be some potential impact on the townland boundary and mitigation measures are outlined in the recommendations of this chapter below.

15.2.2 County Development Plan

Architectural Conservation Areas (ACA)

There are no designated ACA’s within the site, or in the vicinity, of the proposed development.

Records of Protected Structures

In addition to the NIAH, Kilcarbery House is listed as a Protected Structure enshrined in the Planning and Development Act, 2000 (Part II, Section 10) in the County Development Plan 2022-28. Below is a list of protected structures in the vicinity of the proposed development.

MAP REF	***RPS REF***	***ADDRESS/LOCATION***	***DESCRIPTION***
132	132	Grange Castle, Clondalkin	Stone Town House (Ruin) (RM)
173	173	Kilcarbery House, Off Nangor Road, Kilcarbery	House
180	180	Castle Bagot House, Kilmactalway	House
184	184	Kilbride	Stone Church (Ruin) & Graveyard, Ringfort (Rath / Cashel), Earthwork(s) (RM)
188-90	188-90	Casement Aerodrome, Baldonnell	Various

192	192	Baldonnell House, Baldonnell	Three Storey House
202	202	Baldonnell House, Baldonnel	Two Storey House

Table 15.2: Record Of Protected Structures in vicinity of proposed development.

15.2.3 Record of Monuments and Places

There are several upstanding monuments in proximity of the proposed development (SMR site zones for the purposes of notification under Section 12 of the National Monuments Act (1930-2004)). They are not however in close proximity to the site.

In the case of the overall project, the closest monument listed in the RMP is Du017-037 Nangor Castle, c.460 to the north of the proposed development. It is separated by Nangor Road and the overall project will not materially affect the castle, the remains of which were demolished in 1948. Kilbride Church and cemetery Du021-004 lies c.700 to the south and will not be materially affected by the proposed development.

SMR NUMBER	***CLASS***	***TOWNLAND***	***LOCATION***
DU017-034	Castle	Grange	**Description**: Attached to a farmhouse in flat, low-lying ground. Shown as a castle on the Down Survey (1655-6) map. This is a rectangular tower house with a square tower that's projects to the N in the NE corner. The tower house is three storeys high. The walls are plastered but where stonework is visible it is coursed limestone with roughly dressed quoins. The windows are all later insertions. Entrance is in the N wall through a round-headed doorway. There is a murder hole over the entrance lobby which leads into a vaulted ground floor (int. dims. L 7.08m; Wth.5.2m). Access to stair turret is off the lobby through a round-headed doorway. First floor not accessible. Second floor is accessed through a two-centred arched doorway. There is a garderobe chute in the SE corner which is supported by corbels and entered through a narrow round-headed door to a small circular chamber lit by a single ope. The jambs are hammer-dressed. There is a square stair tower or cap house which rises above parapet level (Healy 1974, 22; Mc Dix 1897, XXXIX, 22). A drawing by Beranger in 1773 shows stepped crenellations at parapet level (Harbison 1998, 168-9). In 1997 monitoring and excavation were undertaken in the vicinity of the castle, in advance of the construction of an access road and the excavation of foul sewers for a Business Park at Grange Castle. A curving ditch was identified orientated north-east/south-west. It was 30m in length, 0.8-0.9m deep, and 1.2-2.4m wide. The upper fills contained charcoal, mortar, flint and animal bones, and were aceramic. A decorated bone comb, stick-pin and knife gave the later ditch phase a terminus ante quem of from the 12th to the 13th century AD. A stone causeway, 0.5-0.6m wide and 0.06-0.1m deep, crossed the ditch. The evidence suggests that extensive early medieval and post-medieval activity survives in this area; the ditches can be interpreted as medieval field boundaries (O'Brien, R. 1998, 26-7).

DU017-037	Castle	Nangor	**Description**: Located in flat terrain. Named 'Nangor castle' on the 1837 edition OS 6-inch map and 'Nangor castle on site of castle' in the later edition. This indicates that the castle had been incorporated into an 19th-century mansion. All buildings on the site have been recently demolished leaving no surface trace of the earlier building. In 1532 Ffinian Bassenett was residing at Nangor (Ball 1906, 112; Healy 1974, 22; D'Alton 1976, 345 (2nd ed.). There are earthworks in the field to the south of the castle. Pre-development testing in the vicinity of the castle in 1996 produced evidence for a substantial ditch and an associated shallower linear feature of uncertain date. Trial-trenching in the field bounding the castle site to its south uncovered several lignite cores and slivers, early medieval pottery and metal slag suggesting a date in at least the early medieval period- twelfth/thirteenth century. Several trenches cut through a large ditch located on both the east and west of the field. Human skeletal remains were also uncovered, as were numerous charcoal-flecked irregular features (McConway 1997, 17).
DU021 004	Castle	Castle – not visible	Situated in a narrow valley. There are farm buildings on the site. There is no visible trace above ground (Ball 1906, 66)
Du021 004001	Church	Kilbride	Located in a circular raised graveyard (L 42m, Wth 30) on the edge of a valley (DU021-005002-). This may be the remains of an early ecclesiastical enclosure (DU021-005003-). In 1228 the archbishop of Dublin granted the church of Kilbride to Andrew de Monevea as a prebend and later conferred it on the Canons of St Patrick's Cathedral (Mc Neill 1950, 75). In 1630 it was described as ruinous (Ronan 1941, 80). This church was attached to St. Patrick's Cathedral and was described at the dissolution in 1547 as an old chapel (Ball 1906, 68-70). Consists of a small rectangular building (int. dims L5.8m, Wth 3.63m, T 0.85m) with a NW turret in ruinous condition. Formerly entered through an opening in the W end (now damaged). Built of randomly coursed masonry. There is an aumbry in the E end of the N wall of the church. The E window has a S jamb of tufa. There are remnants of another window in the W end of the S wall. The NW turret (L1.35m, Wth 0.77m, H1.78m) is entered through a lintelled doorway off the church. It has a corbelled roof. There are traces of a stairwell on the S side of the turret (Ni Mharcaigh, 1997, 268-269).

Table 15.3: Record of Monuments and Places in the vicinity of proposed development.

15.2.4 Cartographic Sources

For the purposes of this study, the following historic maps listed below were consulted. The maps provide a narrative of the development of the site and its environs since the mid 1700's and enable an identification of the evolution of the landscape and the build heritage during this period.

- Down Survey Parish Map 1659
- John Roque's map of County Dublin 1760;
- Taylor's Map 1816;
- Duncans Map 1821
- First edition Ordnance Survey 6" Maps circa 1837; and
- Second edition Ordnance Survey 25" Maps circa 1900.

Figure 15.3. Extract from Down's Parish Survey 1656

It is difficult to locate with any great accuracy the site of the proposed development. Note the absence of any reference to Kilcarbery suggesting that the estate was set after the mid 1700's.

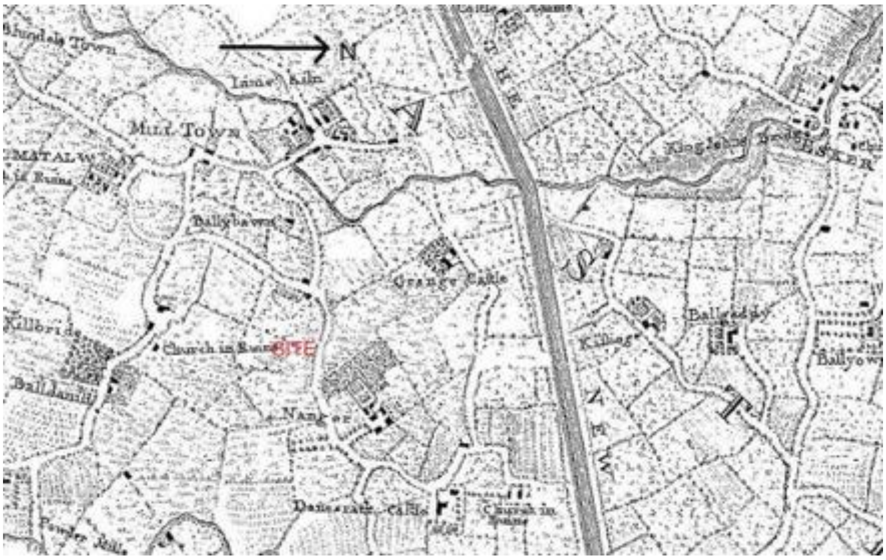


Figure 15.4. Extract from Rocque's survey of County Dublin 1760

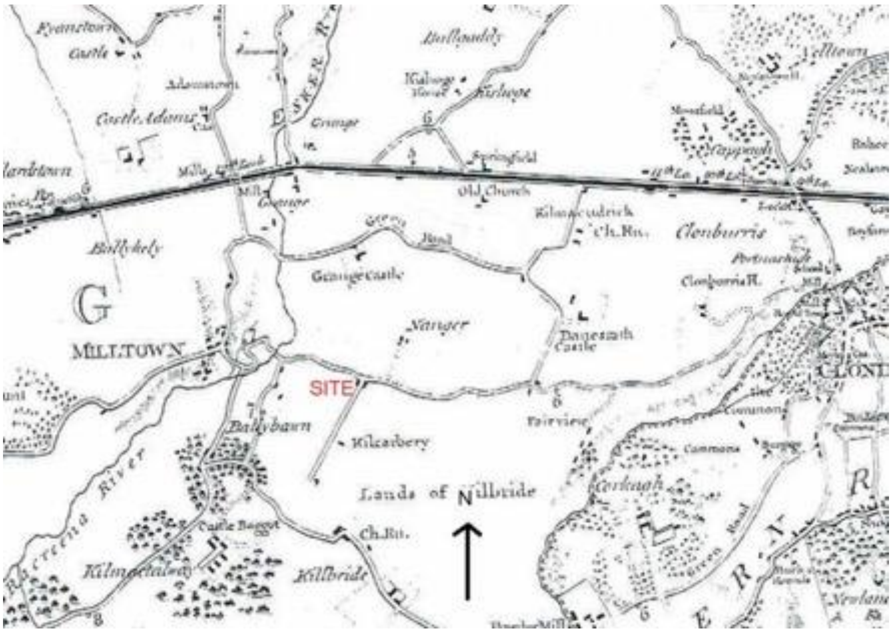


Figure 15.5. Extract from Taylors Map of Dublin 1816

Kilcarbery House, and the road leading up to it, is demonstrated but it appears to have been situated in Kilbride Td, with Kilcarbery Td being created at a later stage. This suggests that Kilcarbery estate was established sometime in the late 18th or early 19th century, followed thereafter by the construction of Kilcarbery House, and the laying out of the garden and demesne.

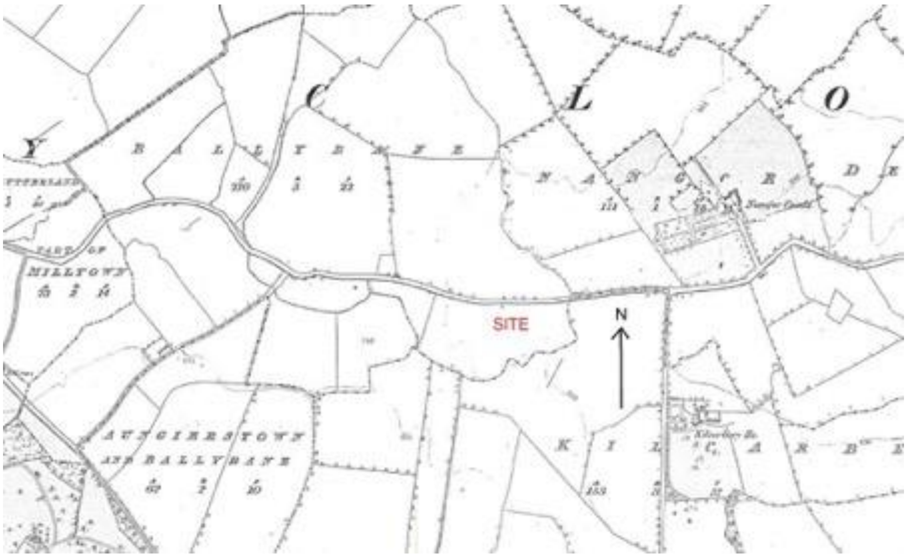


Figure 15.6. OS 6-inch map 1837

Lands associated with Kilcarbery House have been designated Kilcarbery Townland.

15.2.5 Historical Research

<u>Ballybane Townland</u>

The site is situated entirely in Ballybane, within the parish of Clondalkin, and the barony of Uppercross. The name of Ballybane is intriguing. While it appears to be a derivation of the Irish *Baile Ban* or White Town, the lands were commonage in the aftermath of Anglo-Norman settlement, suggesting that they were set aside for pasture, and unfenced. There is no indication that there was a town or small village there. Perhaps the name is derived from a settlement that existed in the early medieval era. There is also the possibility that the townland name is derived from *bealach*, meaning route. It may be referring to the Old Nangor Road which cuts through area in an east west direction, forming the current southern boundary of Nangor and Ballybane townlands. The road is believed to reflect the route of the ancient *Slighe Dhala*, one of the five great roads of Ireland, culminating in Tara, County Meath (O'Loughlin 1940). The road was also known as *Bealach Muighe Dhala* and this may explain the townland name. The 'bane' or *ban* may in fact refer to forest clearance, or open lands, which would certainly reflect the local landscape by the Early Medieval period.

Ballybayne', in the 17th century was a townland of some 101 plantation acres, belonging to the Dean, in both 1641, and in 1670.

Ballybane continued to be sparsely occupied in 1851, with Mr Graydon continuing to lease the land from the Kiernan family, who then rented out a property to a William Leonard, possibly the herdsman, as there were only two dwellings there, adjacent to the Old Nangor Road (Griffth Valuation . In 1911, the sole occupants of the townland were the 5 members of the Sheridan family. (Census Enumerators Returns 1911).

Kilbride Townland:

The proposed site is situated adjacent to Kilbride, within the parish of Kilbride, and the barony of Newcastle. The townland name is derived from an ecclesiastical centre Cill Bríde, meaning a small cemetery of St Bridget, situated immediately south of the proposed development. The Kilbride ecclesiastical complex (RMP DU021:005), survives as a church and graveyard, and it is likely to have dated to the early medieval period.

In the aftermath of the Anglo-Norman invasion the lands of Kilbride were held by a William Comyn in 1295, residing in Balgriffin in North Dublin. A rent of 5 shillings was paid to him for the rent of Kilbride and Nangor, the latter an adjacent townland to the north. The Comyn family appeared to have lost control of this land at some stage in the 13th century, for in 1307 when it was noted that the tenements of 'Kilbryde and the Naungre' were held by Walter de Kekley from William, son of John de Gabarry, for a rent of 20 pounds[11]. By this stage the church of Kilbride, presumably now the ruins visible from the site, had been granted as a prebend to an Andrew de Monevea, and later to the canons of St Patrick's Cathedral. This began its long association with St Patrick's Cathedral, similar to the nearby townlands of Ballybane, Nangor, and Aungierstown. At the time of the dissolution, the church was described as an 'old chapel' (McNeill 1950, 75), and by 1630 it had become ruinous (Ronan 1941). The church is now overgrown with vegetation, and only limited features can be observed.

Nearby are the remains of a farmyard and stables that have been designated RMP (RMP DU021:004) on account of several references to a Kilbride Castle on this location. The channel of water through the proposed development, emanates from a watercourse entering the farmyard from the south, under the Baldonnell Road. Much of the fabric of the remaining farmyard walls are of large limestone blocks, and it is possible that some of the fabric belonged to an earlier structure. It is important to note that although the church remains are referred to in earlier maps, there is no reference to a castle.

Figure 15.7. View of Kilbride Cemetery wall

Figure 15.8 Interior of Kilbride Church

Figure 15.9. Remains of Kilbride 'Castle'

Kilcarbery Townland:

The adjacent townland Kilcarbery, now the location of a Golf Course, seems to have been derived from Coill Chairbe, or the forest of Cairbe. The earliest cartographic reference to it appears to be in Taylor's Map of Dublin 1816, and it may well be a relatively modern, or at least unoccupied, townland until the modern era. Kilcarbery House is shown as a demesne type house at the end of a long straight entrance way from the Old Nangor Road. The lands adjacent to the proposed site form part of Grange Golf.

Kilcarbery Townland appears to have been carved out of the more ancient Kilbride Townland, probably in the early 19th century. The house seems to have been constructed in the first or second decade of the same century and following this a demesne garden laid out adjacent to it. In addition, a lengthy roadway was laid from the Nangor Road, bypassing the house. Presumably the intention was to link the house with the Baldonnel Road to the south, although this was never achieved. At the time of Griffiths valuation in the 1850's was occupied by Henry Phillips and let from Richard Mills. Three indivduals were listed as living on the demesne, presumable as employees of the demesne, Peter Murphy, Terence Neill, and Thomas Christian.

It is notable that the outline of the demesne gardens lay east of the road, away from the proposed development.

Figure 15.10 Extract from Griffiths Valuation 1850's

Figure 155.11. Current layout of Kilcarbery Demesne showing golf course surrounding house.

Nangor Townland:

Nangor townland lies on the northern side of the Nangor Road, opposite the proposed development. A series of recent excavations in 2002-1 in the vicinity of Nangor Castle in Grangecastle Business Park yielded field enclosures, and assorted artefacts. The gardens stretched out to the west of the castle, extending almost as far as the existing Grange Castle Business Park road, near the Old Nangor Road entrance13. Nangor Castle (RMP DU017-134) survived until 1948.

15.3 Receiving Environment

The site comprises a large area under a hardcore surface, another area disturbed with a substantial berm and a relatively undisturbed area to the south. The site is likely to become overgrown with vegetation in the absence of any development. The Nangor Road forms the northern boundary, and the internal Profile Park Road the western boundary.

Figure 15.12. Aerial view of site

The southern and eastern boundary is formed of the Kilcarbery / Ballybane townland boundaries, i.e. a treelined ditch. Although disturbed in some portions the boundary ditch is well-preserved for the most part.

Figure 15.13. The northern part of the site from south

Figure 15.14. View of hardcore area from southwest

Figure 15.10. Greenfield area in south, from southwest

15.4 Characteristics of the proposed Development & Overall Project

The proposed development will disturb most of the lands within the site and will encroach the townland boundary separating Ballybane TD from Kilcarbery Td. This boundary forms part of Kilcarbery demesne, listed in the National Inventory of Architectural Heritage. Furthermore, this boundary was previously the ancient boundary separating Ballybane from Kilbride. There are no upstanding architectural features on the site. Furthermore, there is no recording of any structure to have existed on the site.

15.5 Potential Impacts of the Proposed Development & Overall Project

15.5.1 Construction Phase.

There is a potential risk to the visual integrity, and long term preservation, of the south and east portion of the boundary caused by the movement of plant, adjacent trenching etc. The historical significance of this is that the boundary, formed currently by ditch, banks, stream, and vegetation, is the remains of the boundary between the ancient townlands of Ballybane and Kilbride, possibly dating to the Bronze Age when the site and its environs was first settled comprehensively.

15.5.2 Operational Phase

Additional changes to the configuration of services / utilities could affect the townland boundary.

15.5.3 Do Nothing Scenario

Incremental works, utility provisions, litter, dust, etc could have a material damage on the ancient boundary where works are not subject to planning controls or a strategy of preservation.

15.6 Remedial and Mitigation Measures.

15.6.1 Construction Phase

The preservation of the townland boundary and its associated vegetation and ditch must be a priority measure. Any limited breaches of the vegetation, banks, or ditch should be limited in nature, in consultation with archaeologist / architectural historian. A buffer zone of 10m should be in place to ensure constriction works will not damage the boundary more substantially.

15.6.2 Operational Phase

Any works affecting the boundary should be preceded by consultation with archaeologist / architectural historian. A buffer zone of 10m should be arranged.

15.7 Predicted Impact of the Proposed Development & Overall Project

15.7.1 Construction Phase

Some disturbance to the ditch and vegetation to the boundary will likely occur. A clean up of the ditch and vegetation should be considered as part of the final stage of construction.

15.7.2 Operational Phase

Serious damage to the boundary is unlikely with a buffer zone arranged in advance of any handover after the completion of construction works.

15.8 Residual Impacts.

Litter, decay and weather erosion may affect the boundary ditch / banks / vegetation.

16. CULTURAL HERITAGE (ARCHAEOLOGICAL)

16.1 Introduction.

The statement comprises an assessment of known archaeological monuments and areas of archaeological potential on the site of the proposed development, the overall project, and the environs of both. The statement will also outline the impact upon the archaeological remains, and suggest how to mitigate any such impact in keeping with the statutory requirements of the protection of archaeological monuments, and in line with current best practices.

The statement was prepared in March 2023 by Dr Neil O'Flanagan MA MSc PhD, of Reliqua Archaeology. Dr O'Flanagan is a current holder of archaeological licences issued by the Archaeological Licensing Section of the Dept of Environment, and has long time experience in the assessment of sites for archaeological purposes.

The statement was carried out on behalf of RKD (Architects) in preparation for the following developments.

The **Permitted Development** SDCC Ref. SD21A/0186 Data Centre Equinix DB8 at Profile Park, Clondalkin, Dublin 22 includes the following:

- Construction of a 3 storey (part 4 storey) data centre known as 'DB8' to include data halls, electrical/plant rooms including internal generators, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level;
- The total gross floor area excluding hot air plenums is c.9,601sq.m and the overall height of the data centre ranges from c.16m to c.20m to roof parapet level and up to c.24.48m including roof top plant, flues which include a wire mesh cladding to rear of the front (north facing plenums) and lift overrun;
- Provision of 5 no. external generators, 8 no. fuel tanks and ancillary plant contained within a plant yard to the north of DB8 data centre building on the subject site ;
- Provision of a water tank plant room, air cooled chillers and ancillary plant contained within a chiller plant yard to the south of DB8;
- Provision of a water sprinkler pump room (c.23sqm), 2 sprinkler tanks (c.12m high each), heat recovery plant room (c.17sqm), ESB substation (c.44sqm), waste/bin stores (c.52sqm); total floor area of ancillary structures and plant (c.303sqm);
- 64 car parking spaces, 5 motorcycle spaces, bicycle shelter serving 14 spaces, smoke shelter, provision of a delivery yard and loading bays,
- PV panels that have an output of 0.04MV,
- Internal access roads and footpaths, vehicular and pedestrian access to the west from Falcon Avenue and closure of an existing vehicular entrance from Falcon Avenue;
- Additional tree planting to the northern boundary for enhanced amenity and screening purposes,
- Sustainable Urban Drainage Systems were proposed including the following SuDs We refer to the Landscape Masterplan (DB080-MA-LS-XX-DR-L-PLNT-1050) for more information;
    - Perimeter landscaping;
    - Bioretention Tree Pits;
    - Flow Control Devices;
    - Interceptors;
    - Permeable Paving;
    - Permeable Gravel Areas;
    - Green Roofs (combined area of 132sqm.);
    - Rain Water Harvesting (Office Building Area);
    - Swale 1;
    - Swale 2; and
    - Attenuation Pond

- All associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including berming, hedgerow protection areas and security fencing;
- No buildings are proposed above the existing ESB wayleave and SDCC watermain wayleave to the west and north of the site;

- The area to the southwest of the site (temporary meadow) was reserved for a future data centre, subject of a separate application to South Dublin County Council on a site bounded to the east and south by Grange Castle Golf Club, to the north by Nangor Road (R134) and to the west by an estate road known as Falcon Avenue. This application was accompanied by a Natura Impact Statement.

The statement was prepared in advance of the **The Proposed Development** for which consent is being sought under SDCC Ref. SD22A/0156 which includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development. This will include integral related projects including connections to the gas network within the estate road.

The statement was also prepared in advance of **the Overall Project** which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR. The statement will include in its assessment integral related projects required for the project to operate including connections to water main, foul drainage, storm water and fibre connections.

Figure 16.1. Site Location

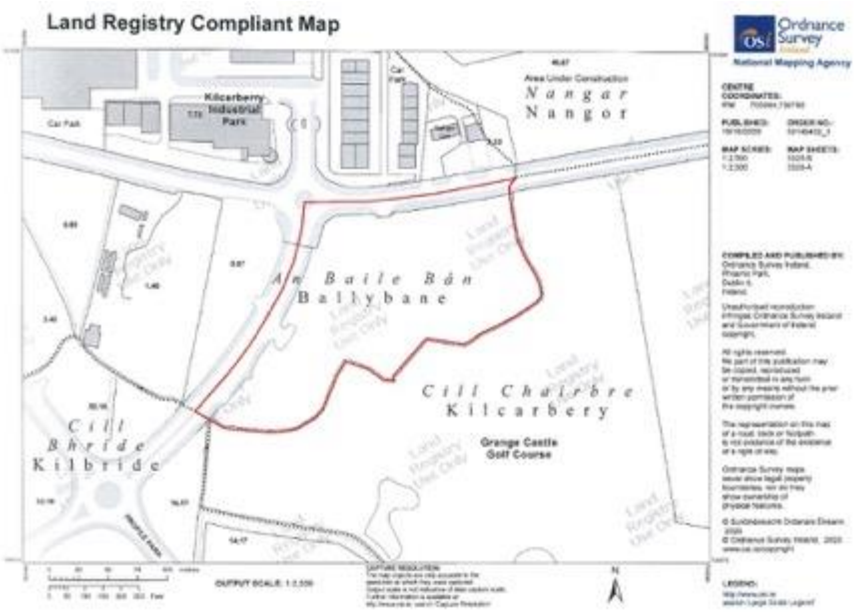


Figure 16.2. Site Plan

16.2 Methodology.

The statement was prepared in line with national policy on the protection of the archaeological heritage in the course of development is set out in the *Framework and Principles for the Protection of the Archaeological Heritage* (Government of Ireland 1999). This outlines the requirements of statutory legislation in assessing the archaeological heritage, and the steps required for dealing with it in the context of proposed developments.

The assessment below will identify the baseline conditions of the overall project, and its environs, with particular reference to National Monuments Acts, 1930-2014, and the National Cultural Institutions Act 1997, outlining statutory responsibilities for archaeological monuments, and for archaeological artefacts. The anticipated changes to the baseline receiving environment, and the sensitivity of the sources used to outline the baseline, will inform any recommended mitigation measures.

Known archaeological monuments are listed in the Record of Monuments and Places provided for by **Section 26 National Monuments Acts**. This includes monuments identified through a variety of methods, including field walking, aerial photography, cartographic sources, and archaeological excavations. The topographical files of the National Museum of Ireland, Kildare Street, include the inventory of known archaeological artefacts, and are listed under townland names, enabling them to be linked to development projects where they exist.

The assessment also includes an examination of the list of recent archaeological excavations contained in www.excavations.ie containing a synopsis of the findings of excavations. The latter are listed under townland names.

The evolution of the site in the historic era from the mid 17th century to the 19th century is narrated primarily through the use of cartographic sources. The maps demonstrate the outline of the townland, field, and property boundaries over the course of several centuries, as well as highlighting some archaeological monuments in the vicinity visible above the ground. The maps are sourced from the Trinity College Dublin Map Collection, the Down Survey, and the Ordnance Survey of Ireland.

Aerial photographs are also examined to identify the existence of archaeological monuments, and the more modern alterations to the site. Sources include the Geological Survey of Ireland, Bing & Google Maps.

A range of documentary material is also examined to outline the known historical features of the site and its environs. The sources include local histories, local heritage orientated social media, published histories where available, as well as academic publications with broad focus in the historical and archaeological fields, but containing information pertinent to an understanding of the evolution of the site of the overall project and its environs.

16.2.1 Record of Monuments and Places

Sites that are not in state care are listed in the Record of Monuments and Places. This inventory consists of a nationwide set of 6" maps with an accompanying index which shows all the sites, monuments and zones of archaeological potential, recorded to date. The inventory concentrates on sites predating 1700 AD. The position of the monuments can be viewed on the Historic Environment Viewer (HEV), online interactive map/search facility, providing access to all records stored on the national database of the National Monuments Service of sites and monuments. It is available at: https://www.archaeology.ie/ archaeological-survey-ireland/historicenvironment-viewer-application.

Archaeological monuments in state care are listed in Section 5 National Monuments Act 1930. The upkeep and maintenance of such monuments are the responsibility of the state. There are no such monuments in the vicinity of the overall project.

It should be noted that although the RMP is protected by the National Monuments Act, the care and preservation of these features depend largely on the interests and respect of the individual landowners.

Section 12 National Monuments Act 1930-2014 provides for 'zones of notification', whereby the National Monuments Service is notified when developments are proposed in the proximity of a known archaeological monument.

In the case of the overall project, the closest monument listed in the RMP is Du017-037 Nangor Castle, c.460 to the north of the proposed development. It is separated by Nangor Road and the overall project will not materially affect the castle, the remains of which were demolished in 1948. Kilbride Church and cemetery Du021-004 lies c.700 to the south and will not be materially affected by the proposed development. The infill of lands in the general vicinity of Kilbride will have a limited impact on the visually integrity of Kilbride Church and Cemetery.

The table below comprises a list of monuments known in the vicinity.

List of archaeological monuments in RMP within 1500m of proposed development:

SMR NUMBER	*CLASS*	*TOWNLAND*	*DESCRIPTION*

DU017-034	***Castle***	***Grange***	**Description**: Attached to a farmhouse in flat, low-lying ground. Shown as a castle on the Down Survey (1655-6) map. This is a rectangular tower house with a square tower that's projects to the N in the NE corner. The tower house is three storeys high. The walls are plastered but where stonework is visible it is coursed limestone with roughly dressed quoins. The windows are all later insertions. Entrance is in the N wall through a round-headed doorway. There is a murder hole over the entrance lobby which leads into a vaulted ground floor (int. dims. L 7.08m; Wth.5.2m). Access to stair turret is off the lobby through a round-headed doorway. First floor not accessible. Second floor is accessed through a two-centred arched doorway. There is a garderobe chute in the SE corner which is supported by corbels and entered through a narrow round-headed door to a small circular chamber lit by a single ope. The jambs are hammer-dressed. There is a square stair tower or cap house which rises above parapet level (Healy 1974, 22; Mc Dix 1897, XXXIX, 22). A drawing by Beranger in 1773 shows stepped crenellations at parapet level (Harbison 1998, 168-9). In 1997 monitoring and excavation were undertaken in the vicinity of the castle, in advance of the construction of an access road and the excavation of foul sewers for a Business Park at Grange Castle. A curving ditch was identified orientated north-east/south-west. It was 30m in length, 0.8-0.9m deep, and 1.2-2.4m wide. The upper fills contained charcoal, mortar, flint and animal bones, and were aceramic. A decorated bone comb, stick-pin and knife gave the later ditch phase a terminus ante quem of from the 12th to the 13th century AD. A stone causeway, 0.5-0.6m wide and 0.06-0.1m deep, crossed the ditch. The evidence suggests that extensive early medieval and post-medieval activity survives in this area; the ditches can be interpreted as medieval field boundaries (O'Brien, R. 1998, 26-7).
DU017-084	***Fulacht Fiadh***	***Kilmactawley***	**Description**: Monitoring of topsoil-stripping in 2000 revealed the remains of a small fulacht fiadh. This consisted of a small pit or trough, a spread of heat-cracked stone and a linear feature to the south-west of the trough. The pit/trough consisted of a subcircular cut into natural, 0.56m by 1.25m. This spread measured 1.92m north-south x 1.18m with a maximum depth of 0.05m. Approximately 6m to the west of the spread a linear gully feature was revealed. This gully consisted of a cut into natural boulder clay measuring 2.57m north-south x 0.28-0.54m. This had a depth of 0.16m with sharply sloping sides and a flat base. The cut was filled with a moderately compact, mid-brown clay containing frequent pieces of oxidised clay and occasional flecks of charcoal. Infrequent fragments of burnt bone were noted in the fill (Doyle, 2001)
Du017-82	***Field System***	***Nangor***	Excavations in 2001 revealed a medieval ditch complex. This appeared to represent the remains of medieval field boundaries with associated water management gullies. Some 1600 sherds of local medieval pottery were recovered and two sherds of imported ware
DU017-037	***Castle***	***Nangor***	**Description:** Located in flat terrain. Named 'Nangor castle' on the 1837 edition OS 6-inch map and 'Nangor castle on site of castle' in the later edition. This indicates that the castle had been incorporated into an 19th-century mansion. All buildings on the site have been recently demolished leaving no surface trace of the earlier building. In 1532 Ffinian Bassenett was residing at Nangor (Ball 1906, 112; Healy 1974, 22; D'Alton 1976, 345 (2nd ed.). There are earthworks in the field to the south of the castle. Pre-development testing in the vicinity of the castle in 1996 produced evidence for a substantial ditch and an associated shallower linear feature of uncertain date. Trial-trenching in the field bounding the castle site to its south uncovered several lignite cores and slivers, early medieval pottery and metal slag suggesting a date in at least the early medieval period- twelfth/thirteenth century. Several trenches cut through a large ditch located on both the east and west of the field. Human skeletal remains were also uncovered, as were numerous charcoal-flecked irregular features (McConway 1997, 17).
DU021 004	***Castle***	***Castle – not visible***	Situated in a narrow valley. There are farm buildings on the site. There is no visible trace above ground (Ball 1906, 66)
Du021 004001	***Church***	***Kilbride***	Located in a circular raised graveyard (L 42m, Wth 30) on the edge of a valley (DU021-005002-). This may be the remains of an early ecclesiastical enclosure (DU021-005003-). In

			1228 the archbishop of Dublin granted the church of Kilbride to Andrew de Monevea as a prebend and later conferred it on the Canons of St Patrick's Cathedral (Mc Neill 1950, 75). In 1630 it was described as ruinous (Ronan 1941, 80). This church was attached to St. Patrick's Cathedral and was described at the dissolution in 1547 as an old chapel (Ball 1906, 68-70). Consists of a small rectangular building (int. dims L5.8m, Wth 3.63m, T 0.85m) with a NW turret in ruinous condition. Formerly entered through an opening in the W end (now damaged). Built of randomly coursed masonry. There is an aumbry in the E end of the N wall of the church. The E window has a S jamb of tufa. There are remnants of another window in the W end of the S wall. The NW turret (L1.35m, Wth 0.77m, H1.78m) is entered through a lintelled doorway off the church. It has a corbelled roof. There are traces of a stairwell on the S side of the turret (Ni Mharcaigh, 1997, 268-269).
Du021 108	***Enclosure***	***Ballybane***	Not indicated on any OS map a large concentric enclosure is visible as a crop-mark on an aerial photo. A second enclosure (DU021-109----) is visible to the SW (recently excavated)
Du021 109	***Enclosure***	***Ballybane***	Not indicated on any OS map this enclosure is as a crop-mark on an aerial photo. A second larger enclosure (DU021-108----) is visible to the NE (recently excavated)

Table 16.1: Nearest archaeological sites.

16.2.2 Recorded Archaeological Finds

Previous archaeological fieldwork in the vicinity (within 1500m of proposed development):

SITE	***LICENCE***	***DIRECTOR***	***TYPE***	***INVESTIGATIO N***
SDCC (triangle) site, Grangecastle Park	19R0113	Joanna Leigh	Disturbed ground	Geophysical Survey
Castlebaggot Sub-Station, Grangecastle S outh Business Park	17E0394	Neil O'Flanagan	Prehistoric ditch	Excavation
Grangecastle South Business Park	18E0282	James Hession	Brunt mounds & medieval ditches	Excavation
Grangecastle South Business Park	16E0531	Stirland, O'Siorai n & Breen	Early medieval enclosures	Excavation
DSF, Grange Business Park	14E0453	Neil O'Flanagan	Various Medieval - Prehistoric	Excavation

DUB06 et al, Grange Business Park	13E0471	Neil O'Flanagan	Various Medieval - Prehistoric	Excavation
Grange Business Park	13E043	Gill McLoughlin	Iron Age clamp / furnace	Monitoring
Grange, Grange International Business Park	04E0299	Red Toibin	Burnt Mounds	Excavation
Grange International Business Park	05R032	Joanna Leigh	Various	Geophysical Survey
Kishogue, Grange International Business Park	01E0061	Ed O'Donovan	Neolithic House	Excavation
Grange/Kilmahuddrick/ Nangor (Grange Castle International Business Park)	00E0718	Ian Doyle	Fulacht Fiadh	Monitoring
Grange/Kilmahuddrick/ Nangor (Grange Castle International Business Park)	00E0448	Ian Doyle	Ringbarrow	Excavation

Table 16.2: Previous archaeological fieldwork.

16.2.3 Topographical Files

There are no finds listed in the Topographical files of the National Museum pertaining to the townlands within the vicinity of the Overall Project. The entry of finds into the topographical list is a slow process as the finds from excavations can remain in the keeping of conservators or individual archaeologists for lengthy periods. A brief description of finds from various excavations in the vicinity of the site is often included in the entries into the excavations bulletin www.excvations.ie

16.2.4 Cartographic Sources

Analysis of historic mapping shows how the landscape has changed over time. The comparison of historic maps can show how some landscape features have been created, altered, or removed. Occasionally features that appear on these early maps are found to be of archaeological significance. For this study, the historic maps listed below were consulted. They provide a narrative on the evolution of the overall project area, and lands in its vicinity since the 17th century.

- Down Survey Parish Map
- John Roque's map of County Dublin 1760;
- Taylor's Map 1816;
- Duncans Map 1821
- First edition Ordnance Survey 6" Maps circa 1837; and
- Second edition Ordnance Survey 25" Maps circa 1900.

Figure 16.3. Extract from Down's Parish Survey 1656

It is difficult to locate with any great accuracy the exact site of the proposed development.

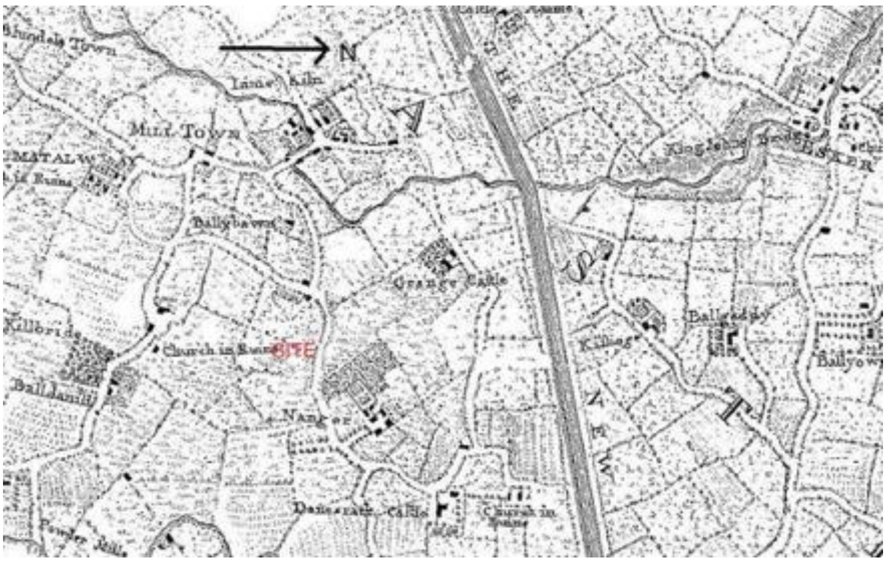


Figure 16.4. Extract from Rocque's survey of County Dublin 1760

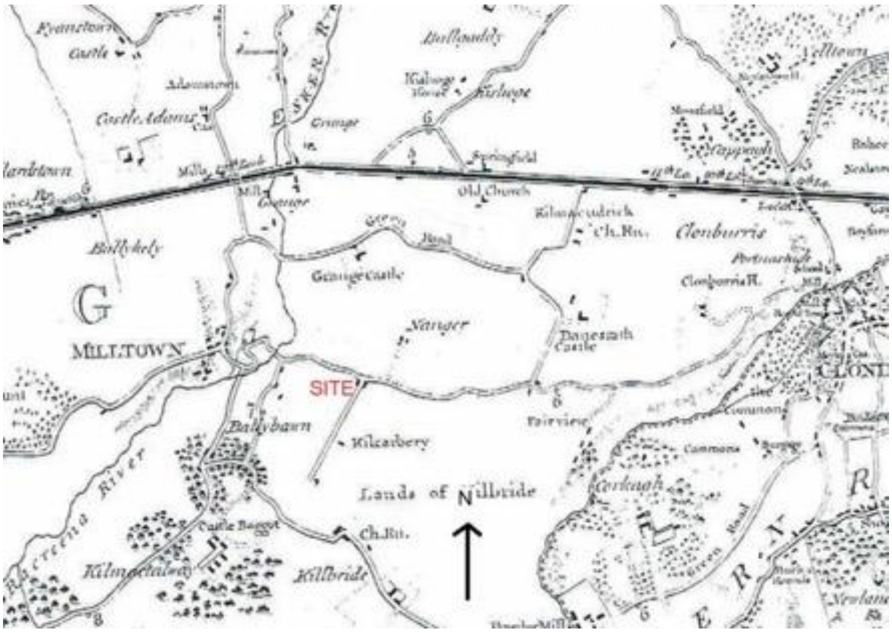


Figure 16.5. Extract from Taylors Map of Dublin 1816

Kilcarbery House and the road leading up to it is shown here in Kilbride Td, suggesting that Kilcarbery Td was created at a later stage.

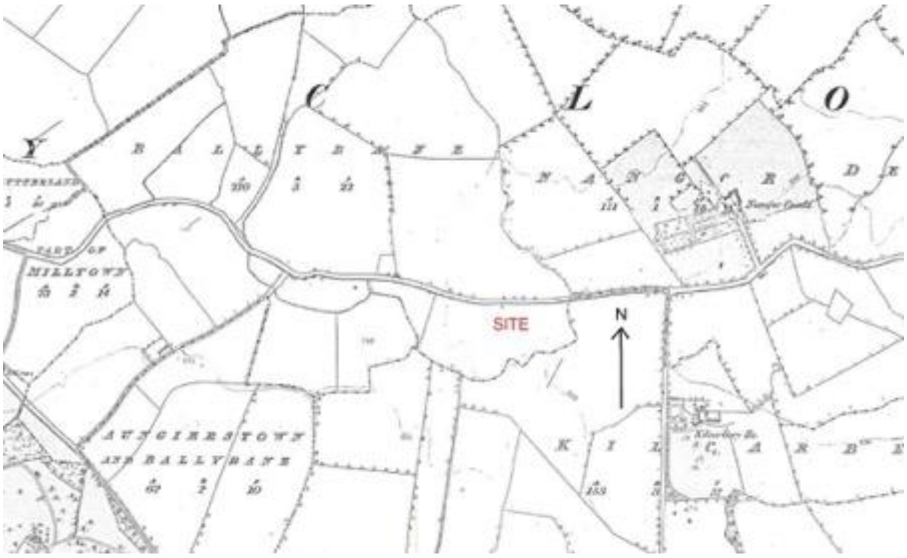


Figure 16.6. OS 6-inch map 1837

Lands associated with Kilcarbery House have been designated Kilcarbery Townland.

16.2.5 Aerial Photography

Aerial archaeology provides a high-level view of the historic environment based on conventional photography and a range of remote sensing technologies. It is relevant to all stages of archaeological work particularly reconnaissance, interpretation, and analysis.

A review of online images via the Ordnance Survey website, Google and Bing Maps depict the alterations to field boundaries that have taken place in recent years. They also demonstrate the more recent changes that have taken place associated with Profile Park, and lands in its vicinity.

16.2.6 Historical Research

Townlands

The site is situated entirely in Ballybane, within the parish of Clondalkin, and the barony of Uppercross.

The name of Ballybane is intriguing. While it appears to be a derivation of the Irish *Baile Ban* or White Town, the lands were commonage in the aftermath of Anglo-Norman settlement, suggesting that they were set aside for pasture, and unfenced. There is no indication that there was a town or small village there. Perhaps the name is derived from a settlement that existed in the early medieval era. There is also the possibility that the townland name is derived from *bealach*, meaning route. It may be referring to the Old Nangor Road which cuts through area in an east west direction, forming the current southern boundary of Nangor and Ballybane townlands. The road is believed to reflect the route of the ancient *Slighe Dhala*, one of the five great roads of Ireland, culminating in Tara, County Meath (O'Loughlin 1940). The road was also known as *Bealach Muighe Dhala* and this may explain the townland name. The 'bane' or *ban* may in fact refer to forest clearance, or open lands, which would certainly reflect the local landscape by the Early Medieval period.

Ballybane has long been part of the lands of the Dean of St Patrick's Cathedral. 'Ballybaune', in the 17th century was a townland of some 101 plantation acres, belonging to the Dean, in both 1641, and in 1670.

Ballybane continued to be sparsely occupied in 1851, with Mr Graydon continuing to lease the land from the Kiernan family, who then rented out a property to a William Leonard, possibly the herdsman, as there were only two dwellings there, adjacent to the Old Nangor Road (Griffth Valuation . In 1911, the sole occupants of the townland were the 5 members of the Sheridan family. (Census Enumerators Returns 1911).

The adjacent townland of Kilcarbery seems to have been derived from *Coill Chairbe*, or the forest of Cairbe, in contrast to Ballybane which was associated with flat open lands suitable for grazing. The earliest reference to it appears to be in Taylor's Map of Dublin 1816, and it may well be a relatively modern, or at least unoccupied, townland until the modern era. Kilcarbery House is shown as a demesne-type house at the end of a long straight entranceway from the Old Nangor Road. The lands adjacent to the proposed site form part of Grange Golf Course.

Below is a summary of the different historical stages in Irish history and their possible influence on the study area.

Mesolithic Period (8000-4000 BC)

The Mesolithic (middle stone age) people were the first inhabitants of Ireland, arriving about 9000 years ago. They were a mobile society relying on wild resources for food, which was hunted and gathered using stone tools as well as boats, nets and traps. The settlement was in temporary and semi-permanent groups of huts constructed of wood slung with hide, which may have operated as seasonal or hunting camps.

It is estimated that throughout the Mesolithic period, the population of Ireland was probably never more than a few thousand. Due to the transitory nature of Mesolithic encampments evidence for settlement activity can be scarce and, in many cases, can only be determined by flint scatters. Flint scatters have been found as stray finds throughout Dublin, particularly near waterways.

There has been no evidence to date for Mesolithic presence in the immediate vicinity.

Neolithic Period (4000-2500 BC)

The Neolithic Ballybane is indicated by the presence of Neolithic houses, one excavated in 2001 in the adjacent Kishogue Townland, and other in Ballybane, excavated in 2016, both of which were in Grange Castle Business Park. The Kishogue house was situated in the northern portion of the Grange Castle Business Park, excavated in advance of the construction of a large attenuation pond. The house was roughly rectangular in shape measuring 6.05m in length by 4.5m in width and was constructed of oak posts and planking inserted into a foundation trench. Other domestic activity in the vicinity of the dwelling included several pits with inclusions of charcoal while artefacts recovered included scrapers, waste flint and a single sherd of Neolithic pottery. Radiocarbon analysis from the site returned dates of between 3941and 3659 BC (O'Donovan 2003)

Another Neolithic and possible house structure was excavated in advance of Data Centres DUB 12 & 13 of the Grangecastle Business Park in 2016. The structure was identified by six irregularly spaced post-holes in a roughly hemispherical shape, with several other pits and post-holes scattered around them. The maximum internal dimensions may have been as large as 9.15 metres in diameter. Dating was achieved by the analysis of numerous sherds of early neolithic pottery with clay derived from the Dublin Mountains to the south. The pottery is a carinated bowls type, found also in Dalkey Island, and Feltrim Hill, North Dublin, and is likely to date to 3850-3750 BC. It is associated with the earliest Neolithic settlements In Ireland. Burnt hazel nut shells were recovered suggesting hazel was used as food stuffs. 36 stone implements were recovered, including flakes and blades. (O'Flanagan & Coen, 2018)

Neolithic activity has been recovered in the vicinity and it is, therefore, possible that neolithic remains exist on the site.

The Bronze Age (2500 -500 BC)

As stone tools were replaced by the use of copper, later combined with tin to make bronze, the structure of society also changed over centuries. In a domestic context, dwellings changed from a general rectangular plan, typical of the Neolithic, to circular arrangements evidenced on excavation by postholes and slot trenches. Middle Bronze Age and Late Bronze Age settlements are usually located on well drained soils suitable for agriculture and near rivers or fording points for ease of transport and communication.

The volume of the Bronze Age remains indicates a substantial presence in the general area. The remains are primarily in the form of burnt mounds, and/or *Fulacht fiadh*, (cooking pits), used for heating water by placing heated stones in water-filled pits or troughs. Although they range in date from the Neolithic to the Iron Age they are most common in the Bronze Age (Waddell 1998 177). There were also several dry cooking pits present. Both burnt mounds and cooking pits are particularly to be found in the vicinity of the Baldonnell Stream, and the Griffeen River.

Two burnt mounds were excavated in Grange Castle Business Park in July-August 2014 on the Microsoft campus. The first mound included a series of pits, a probable well, several stakeholes and the shallow, scattered remains of the associated burnt mound material. The most significant findings were human bone fragments from the well, suggesting some form of ritual activity. The second site comprised the relatively shallow remains of a burnt mound that sealed much of a cluster of features. These included six pits, two probable troughs, a well with an associated gulley, several postholes and a significant quantity of stakeholes, a large number of which were concentrated in one large cluster. Smaller cooking pits and burnt mound spreads were identified nearby in advance of DUB 12 & 13. (O'Flanagan & Coen 2016 and O'Flanagan & Andrews, 2016)

Other contemporary sites in the broader vicinity include three burnt mound sites recorded to the north during realignment work on the Griffeen River in the townland of Grange (Tobin, 2004).

Another burnt mound was located in the townland of Nangor and excavated in a greenfield area (SMR no.: DU017-084) (Doyle, 2000a).

Excavations in advance of the Microsoft Campus also revealed a U-shaped enclosure comprising a curvilinear ditch and an elongated pit or short ditch, with a possible hearth. The cuts may represent slot trenches holding a line of posts or stakes and were of such a depth (0.32m – 0.44m) and width (0.7m – 0.94m) that they could have held load-bearing roof supports. The function of the structure may well be ceremonial due to its unusual shape and absence of any domestic features. (O'Flanagan) & Coen 2018). Three sherds of prehistoric pottery came from the upper fill of the pit alongside several pieces of possible debitage (or very small remains of pottery). The pottery is likely to be Bronze Age 1600-1400 BC.

East of the Microsoft complex, a Bronze Age ring barrow monument was excavated in advance of what is now the Pfizer pharmaceutical plant in the townland of Kilmahuddrick (DU 017-080---). Ring barrows are generally characterised by a slightly raised, central circular mound surrounded by a fosse and external bank and the mound is generally no higher than the surrounding bank (Newman, 1997, p157). The ring-barrow at Kilmahuddrick consisted of an uninterrupted circular ditch cutting into the natural subsoil and had an external diameter of 12.2m north-south by 12.4m east-west (Doyle 2005, p46). The interior of the enclosure as well as several of the ditch fills contained a number of cremated human bone deposits and the radiocarbon analysis produced a range of dates which show that the monument was first constructed in the Bronze Age but continued in use into the Iron Age (Doyle 2005 43-75).

Two cremation pit cemeteries were excavated in 2015-16 prior to the construction of the DSF in Grangecastle Business Park date centre in Nangor Townland. The pits contained some of the residues of a ritual burning of human remains of such intensity as to whiten the fragment of the bones. They are generally dated to the Middle Bronze Age and Late Bronze Age (c.1500-500BC), (O'Flanagan & Coen 2017)

There are a range of Bronze Age finds recently excavated in the vicinity including *Fulachtai Fiadh*, and cremation pits. *Fulachtai fiadh* are common adjacent to streams and townland boundaries such as the boundary on this site, and there is high possibility of the remains of a *Fulachtai fiadh* existing in lands close to the townland boundary.

Iron Age (500 BC-500 AD)

The Iron Age is an elusive period in Irish prehistory. Iron objects are found rarely and political life in the Iron Age seems to have been defined by continually warring petty kingdoms vying for power.

Features in the wider vicinity which may have an Iron Age date include a bowl furnace and probable charcoal clamp which were discovered during the monitoring of the Grangecastle link road forming the northern boundary of the Microsoft campus (McLoughlin 2013).

Iron Ages sites are rare although a recent discovery in Grangecastle Business Park reminds us of their existence.

Early Medieval Period (c.500 AD-1200 AD)

Settlement during this period is defined by the ringfort, thought to be small farmsteads, enclosing houses, farm buildings and animal pens, enclosed as protection against raiders or wild animals. Excavations of the interiors suggest that the houses were small circular huts, built of stakes with a double skin of wattle and a thatched roof. Their distribution in the region is dispersed and widespread. Many of these sites have been destroyed in modern times but survive as crop marks.

An imposing series of early medieval monuments have been uncovered in the general vicinity. In the Grangecastle Business Park, a north-south alignment of three enclosures was excavated in 2014-15. They included a large double-ditched penannular enclosure, a D-shaped enclosure attached to it, and a circular domestic structure at the southern end. The burial of male and female skeletons of two bodies buried in the enclosures have been dated to the 8-10th century AD. (O'Flanagan & O'Hora, 2016). The entire complex measured 180m north-south and appears to have determined the boundary between Ballybane and Nangor.

Additional early medieval enclosures were excavated recently in Grangecastle South Business Park although not on the same scale.

The range of Early Medieval enclosures in the area demonstrates the extent of settlement in the area, ideal as a flat well drained landscape for agriculture, including pasturage.

<u>Medieval Period to Late Medieval (c.1100AD-1650AD)</u>

The late medieval period coincides with the arrival of the Anglo-Normans in 1169. Their impact on the archaeological, cultural and political landscape transformed the country and over time a feudal system emerged ruled by lords and barons. Towns began to develop and monument types associated with this period include motte and baileys, moated sites and later stone castles, in particular tower houses.

The nearest examples of post-invasion medieval settlement nearby are the now demolished Nangor Castle, on the northern side of the Old Nangor Road, and Grange Castle, both of which lie within Grangecastle Business Park. The earliest reference to Nangor is in 1307 when it was noted that the tenements of 'Kilbryde and the Naungre' were held by Walter de Kekley from William, son of John de Gabarry, for a rent of 20 pounds. According to Dalton, Nangor belonged in the early 14th century to the De Verdon family, who had extensive landholdings in County Dublin (Dalton J, 1838).

Mr Joseph Budden acquired Nangor Castle and its lands in 1703 (Dalton J. 1819), and passed it to his son-in-law, Mr John Falkiner, who embarked upon the renovation of the castle, adding to it a large Queen Anne-style residence. Falkiner served as High Sheriff of Dublin for a time, and his grandson, Mr Daniel Rogers, inherited the property upon his death. Falkiner's renovations survived at least until 1843 when surveyed by the Ordnance Survey and depicted in the 1st edition six-inch map. The castle was demolished in 1848.

Grange Castle is still in existence and is expected to be open to the public in the near future. Less is known of the structure although it appears to have been built in the 15th century.

Medieval remains, e.g. field boundaries, may be extant under the surface

<u>Modern Period</u>

Ireland in the seventeenth century saw massive social and political upheaval a result of the Confederate wars, the Cromwellian invasions, and the Battle of the Boyne. The impact on the local population was catastrophic resulting in a third of the population dying from warfare, famine and plague. Much of the native population was displaced, and the Williamite victory in Ireland ensured English and Protestant dominance over Ireland that continued until 1922. Much of the rural landscape became dominated by large demesnes, at least until the second half of the 19th century.

The site forms part of the eastern and southern limits of Ballybane townland, which has been a largely unpopulated pastoral landscape until very recently. Developments associated with Profile Park have been the only significant alterations over the course of several centuries.

16.3 Receiving Environment

The site comprises a large area under a hardcore surface, another area disturbed with a substantial berm, and a relatively undisturbed area to the south. The Nangor Road forms the northern boundary, and the internal Profile Park Road the western boundary.

Figure 16.7. Aerial view of site

The southern and eastern boundary is formed of the Kilcarbery / Ballybane townland boundaries. The boundary comprises a tree lined bank and ditch, or ditches. Although disturbed in some portions the boundary is well-preserved for the most part. Townland boundaries survive in large portions throughout Ireland, and their significance is owing to the age of the boundaries. It is possible that some were originally set out in the Bronze Age (2300 – 500 BC), often following the route of local streams and rivers.

Figure 16.8. The northern part of the site from south

Figure 16.9. View of hardcore area from southwest

Figure 16.10. Greenfield area in south, from southwest

16.4 Characteristics of the proposed Development.

The proposed development, and overall project, will remove the ground within the boundaries of the site almost entirely. It will include a connection for gas in the Profile Park estate road. It will also include connections for main water, foul and storm water, and fibre connections to the estate road, and Nangor Road. Both the estate road, and Nangor Road, have been subject to heavy disturbance in the past and archaeological remains are unlikely to survive under them.

The proposed development, and overall project, includes a portion of the townland boundary between Ballybane and Kilcarbery Townland, previously the boundary between Ballybane, and the ancient boundary of Kilbride Townland. The boundary is expressed by a ditch, earthen banks and trees or other such vegetation. Although townland boundaries are not always listed in the RMP, their origins can often be traced back to the prehistoric era, and are therefore best considered as archaeological monuments.

The overall project will include mitigation to ensure they are retained and protected.

16.5 Potential Impacts of the proposed Development

16.5.1 Construction Phase

Archaeological remains within the overall project are likely to be disturbed by associated ground works. In advance of the groundworks, a series of test excavations may be carried out to assess the site for archaeological potential. The findings of the test excavations will determine if additional archaeological excavations will be required, in consultation with the National Monuments Service. All further groundworks will be monitored under the supervision of a licensed archaeologist.

16.5.2 Operational Phase

If the proposed mitigation measures are followed through, it is unlikely that there will be any significant impact upon any archaeological remains during the operational phase. Any archaeological remains that might have existed on site will have been treated as set out in the *Framework and Principles for the Protection of the Archaeological Heritage* (Government of Ireland 1999).

The integrity of the townland boundary will be protected by a buffer zone between the boundary and the overall project.

16.5.3 Do Nothing Scenario

The continuation of the current status of the lands set aside for the overall project will leave any sub surface archaeological remains intact. The integrity of the townland boundary may however suffer as a result of neglect, due to litter, dust, and unsupervised nearby activities.

16.6 Remedial and Mitigation Measures.

16.6.1 Construction Phase

The most appropriate method of responding to potential archaeological remains is a) a series of test trenches prior to construction to assess if any archaeological material is present under the surface and b) monitoring of the groundworks by a licensed archaeologist during the construction phase. Excavations and monitoring will be subject to conditions attached to the issuance of an archaeological licence under Section 26, National Monuments Acts 1933-2004.

Should any archaeological remains be exposed during the course of either the test excavations, and / or monitoring, the treatment of such remains will be outlined following consultation with the National Monuments Service.

16.6.2 Operational Phase

It should not be necessary to have mitigation measures during the operational phase if the mitigation measures outlined in paragraph **16.6.1.** are implemented.

16.7 Predicted Impact of the Development.

16.7.1 Construction Phase

Test excavations and archaeological monitoring under licence issued by National Monuments Service under Section 26 National Monuments Acts 1933-2004 will determine the impact of the overall project on the archaeological remains.

16.7.2 Operational Phase

There are no impacts predicted during the operational phase.

16.8 Residual Impacts.

All licensed excavations and monitoring are subject to conditions outlined in the terms of the licence issued to the archaeologist by the National Monuments Service

16.9 Final Summary and Recommendations

The area in the vicinity of the site has yielded a considerable amount of archaeological features, particularly in advance of the nearby development of Grange Castle Business Park, and Grangecastle South Business Park, ranging from the Neolithic period to the medieval era. There is therefore a high possibility that archaeological remains are extant below the surface of the proposed development.

The southern and eastern boundary of the proposed development is formed by the townland boundary separating Ballybane and Kilcarbery Townlands. The latter townland is a modern construct, previously part of the more ancient townland of Kilbride.

Recommendations:

- A buffer zone between the townland boundary and structures proposed in the overall project should be created. A zone comprising an area of 10 metres in width from the boundary will be sufficient to ensure its visual integrity.
- Test excavations should be carried out by a licensed archaeologist prior to construction work to assess what, if any, archaeological remains are likely to survive under the surface. Test excavations will require a licence issued by the National Monuments Service to a licensable archaeologist. A report of the test excavations will be forwarded to the National Monuments Service and to the developers within 4 weeks of the completion of works.
- All sub-surface works on site should be monitored under the supervision of an archaeologist issued with an archaeological licensed granted by National Monuments Service. Where archaeological remains are uncovered further archaeological

investigations will be required following consultation with the National Monuments Service and the developer.

17. Daylight, Sunlight and Overshadowing

17.1 Introduction

Digital Dimensions have been commissioned to assesses any potential impact on the Daylight, Sunlight and Overshadowing of the neighbouring buildings as part of this EIAR. This section has been prepared by John Healy - Diploma Architectural Technology, M.Sc Environmental Design of Buildings, PG Dip Digital Media. John has experience of working as a daylight and sunlight consultant for in excess of 10 years.

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development. (Note: the Proposed Development (no. 1) is a subset of the Overall Project (no. 2))

The Overall Project which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR.

A model was produced based on the drawings of RKD Architects. The analysis contrasts the existing vacant site against the Overall Project, assessing for any potential impact on daylight, sunlight and overshadowing.

17.2 Results Overview

The preliminary analysis for daylight and sunlight in Figure 17.2 established that there are no buildings within the Zone of Influence of the Overall Project, i.e. within 3 times the height of the structures measured in plan. Any reduction in available daylight or sunlight from the Proposed Development will be negligible and meets the recommendations of the BRE guidelines BR209:2022 (third edition). Any reduction in available daylight or sunlight from the Overall Project will be negligible and meets the recommendations of the BRE guidelines BR209:2022 (third edition).

The shadow study plots are presented for the existing vacant Baseline site, the Proposed Development and the Overall Project for comparative assessment of any potential overshadowing. It shows that there is no additional shading to any of the adjacent buildings on the 21st March. There is limited shadows cast from the proposed development to a small area of ground in Grange Castle Golf Club in the late afternoon on the 21st March. The impact of overshadowing from the proposed development and the Overall Project will be negligible.

17.3 Standards and Guidelines

The following documents have been used in preparation of this chapter of the report.

- Building Research Establishment (BRE) BR209: 2022 "Site Layout Planning for Daylight and Sunlight" (Third Edition), also referred to as the BRE guidelines.
- Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency 2022
- Environmental Impact Assessment of Projects European Commission 2017

17.4 Methodology

17.4.1 Defining a baseline

Preliminary assessment of the site and its environs is undertaken through mapping software, like Google maps and Bing, topographical survey, architectural models and drawings, photographic studies and the Local Authority planning portal. The project is examined in plan form to establish which sites and buildings would have the possibility to experience an impact on their Daylight or Sunlight as a result of the proposed development.

Establishing if a building or land may be impacted through proximity.

A proposed development could potentially have a negative effect on the level of daylight or sunlight that a neighbouring property receives, if the obstructing building is large in relation to its distance from the existing property.

BR209:2022 states that: *"Loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. In these cases, the loss of light will be small."*

In this chapter we refer to this area as the 'Zone of Influence'.

This preliminary assessment records the building and land use, height, mass, window size and position, in the sites and structures within and around the zone of influence. From this a 3-dimensional computerised model is created.

17.4.2 Identifying the sensitivity of receptors with potential to be affected by changes in the baseline conditions.

Establishing if a building or land may be impacted through their use.

BR209:2022 states that: "*The guidelines given here are intended for use for rooms in adjoining dwellings where daylight is required, including living rooms, kitchens, and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas, and garages need not be analysed. The guidelines may also be applied to any existing non-domestic building where the occupants have a reasonable expectation of daylight; this would normally include schools, hospitals, hotels and hostels, small workshops, and some offices."*

17.4.3 Predicting the magnitude of likely changes to the baseline receiving environment.

If a relevant building with windows to a window wall facing the proposed development is within the Zone of Influence described above, then BR209:2022 directs that the following assessment for an impact on daylight that window can receive is made:

"d*raw a section in a plane perpendicular to each affected main window wall of the existing building. Measure the angle to the horizontal subtended by the new development at the level of the centre of the lowest window. If this angle is less than 25° for the whole of the development, then it is unlikely to have a substantial effect on the diffuse skylight enjoyed by the existing building. If, for any part of the new development, this angle is more than 25°, a more detailed check is needed to find the loss of skylight to the existing building. Both the total amount of skylight and its distribution within the building are important."*

This sectional analysis is also valid for assessing a potential impact on the sunlight that a window can receive. BR209:2022 states that: *"Obstruction to sunlight may become an issue if some part of a new development is situated within 90° of due south of a main window wall of an existing building.*

In the section drawn perpendicular to this existing window wall, the new development subtends an angle greater than 25° to the horizontal measured from the centre of the lowest window to a main living room. "

17.4.4 Shadow Study

Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions. The BRE guidelines does not specify criteria for quantifying the effect of additional shadowing. It states that is illustrative to prepare a shadow plan at different times of the day or year.

BR209:2022 states that: "*Where there are existing buildings as well as the proposed one, 'before' and 'after' shadow plots showing the difference that the proposed building makes may be helpful. In interpreting the impact of such differences, it must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected.*

If a space is used all year round, the equinox (21 March) is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (21 September) will be the same as those for 21 March, so a separate set of plots for September is not required.

Shadow plots should state clearly whether the time of the plot is in Greenwich Mean Time (GMT) or BST. If a local clock time is used outside the UK, this should also be stated.

As an optional addition, plots for summertime (for example 21 June) may be helpful as they will show the reduced shadowing then, although it should be borne in mind that 21 June represents the best case of minimum shadow, and that shadows for the rest of the year will be longer. Conversely if winter shadows (e.g. 21 December) are plotted, even low buildings will cast long shadows. In a built-up area, it is common for large areas of the ground to be in shadow in December."

17.4.5 Definition of Effects

BR209:2022 sets out criteria for classification of impact from a new development, in relation to an Environmental Impact Assessment. The guide does not give a specific range or percentages but sets out parameters as below.

Where the loss of skylight or sunlight fully meets the guidelines in this document, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines, and a larger number of windows or open space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.

Where the loss of skylight or sunlight does not meet the guidelines in this document, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:

- only a small number of windows or limited area of open space are affected
- the loss of light is only marginally outside the guidelines
- an affected room has other sources of skylight or sunlight
- the affected building or open space only has a low level requirement for skylight or sunlight
- there are particular reasons why an alternative, less stringent, guideline should be applied, for example an overhang above the window or a window standing unusually close to the boundary.

Factors tending towards a major adverse impact include:

- a large number of windows or large area of open space are affected
- the loss of light is substantially outside the guidelines
- all the windows in a particular property are affected
- the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, e.g. a living room in a dwelling or a children's playground.

Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space. Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact.

17.5 Subject Site Characteristics

The subject site is identified in Figure 17.1 below. It is currently a vacant greenfield site, with some hardstand areas. It is bounded to the North by the New Nangor Road and to the West by Falcon Avenue, the access road to Profile Park business estate. To the East and South is Grange Castle Golf Club.

Opposite the site, across the New Nangor Road, are two commercial buildings in Kilcarbery Business Park. There is a residential building, 'Nangor Lea' and a fuel garage and retail unit. Across the road to the West is a currently green field site.

Figure 17.1 – Application Site, taken from Google maps

17.6 Description of the Characteristics of the Proposed Development

We refer to section 2.3.1 of this EIAR for a full description of the proposed development. (Note: the Proposed Development (no. 1) is a subset of the Overall Project (no. 2))

17.7 Characteristics of the Construction and Operation Phases

Site Preparation Works and Establishment of construction Services

The site is currently vacant; there is no demolition phase. The likely effects on the daylight and sunlight to adjacent *properties* would steadily increase over the construction phase, given that the completed mass of the building would cause an increased level of obstruction.

Construction Phase

During the works the presence of a crane or bore equipment would be considered imperceptible due to their slender size and temporary nature. The completion of the whole structure of the data centre and the OSPG, complete with cladding and mechanical plant represents the greatest mass on site. It is considered that this mass represents the greatest obstruction when assessing the effect on daylight, sunlight and overshadowing to neighbouring sites and buildings.

Operational Phase

The completion of the whole structure, with cladding and mechanical plant represents the greatest mass on site and therefore the greatest obstruction when assessing the effect on daylight, sunlight and overshadowing to neighbouring sites and buildings. This is not projected to change over the operational phase of the development.

17.8 Preliminary assessment of potential impact on Daylight & Sunlight in neighbouring structures from the Proposed Development.

Analysis in Plan

The BRE guidelines recommend that loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. The zone of influence 3 times the height of the proposed structures, fence and mechanical plant of the Proposed Development are plotted in yellow in Figure 17.2.

Figure 17.2 also notes the direction of the walls with windows in the closest neighbouring properties. These are all opposite the data centre building to the north of the site.

- Location A identifies ‘Nangor Lea’, a residential building.
- Locations B & C are commercial buildings in Kilcarbery Business Park.

Figure 17.2 – Proposed site plan showing the zone of influence from the Proposed Development and the direction of the window walls in relevant properties.

<u>*Analysis in Section*</u>

If a relevant building with windows facing the proposed obstruction falls within the Zone of Influence described above, then BR209:2022 directs that the following assessment for an impact on daylight that window can receive is made:

"d*raw a section in a plane perpendicular to each affected main window wall of the existing building. Measure the angle to the horizontal subtended by the new development at the level of the centre of the lowest window. If this angle is less than 25° for the whole of the development, then it is unlikely to have a substantial effect on the diffuse skylight enjoyed by the existing building. If, for any part of the new development, this angle is more than 25°, a more detailed check is needed to find the loss of skylight to the existing building."*

This sectional analysis is shown in Figure 17.3 below, the rectangle in green represents a section through the Proposed Development.

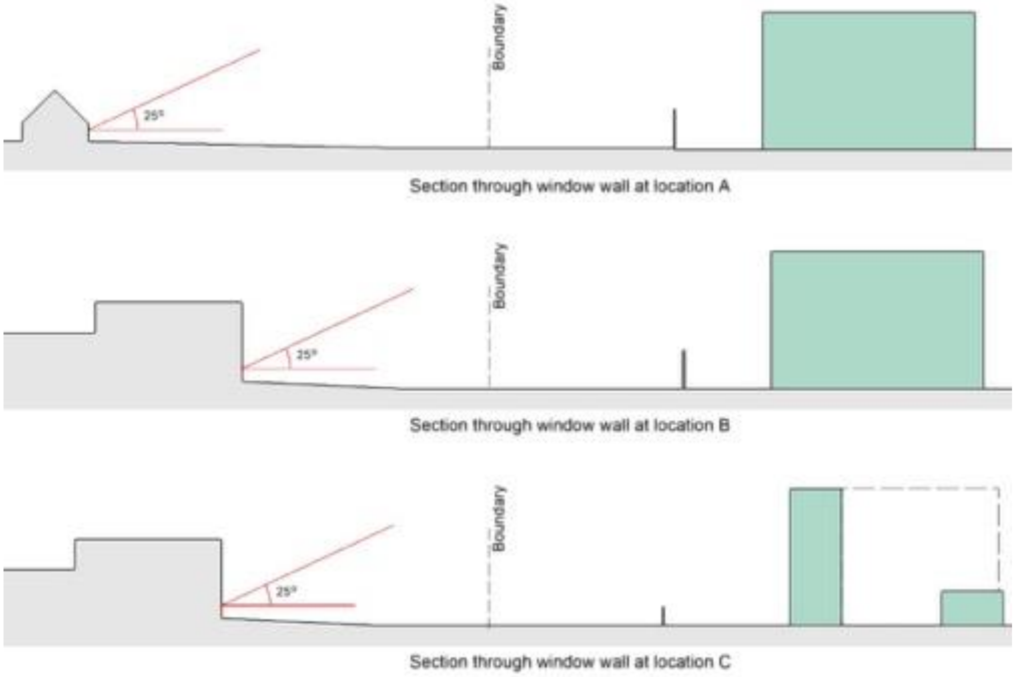


Figure 17.3 – Section perpendicular to window walls of existing buildings at locations A – C, which are identified on plan in Fig.2

17.8.1 Comment on Preliminary Assessment of the Proposed Development.

The preliminary analysis in plan indicates that the projection of 3 times the height of the Proposed Development, does not reach the window wall of any adjacent dwelling, or any of the commercial buildings, (see Fig. 2).

Preliminary analysis in section A (see Fig.3) show the following:

Locations A perpendicular to the window wall of 'Nangor Lea', a residential building. The 25° line would not be subtended by the Proposed Development, indicating any reduction in available daylight will be negligible and imperceptible. No further assessment required.

Locations B & C through the elevations of the commercial buildings in Kilcarbery Business Park. The 25° line would not be subtended by the Proposed Development, indicating any reduction in available daylight will be negligible and imperceptible. No further assessment required.

17.8.2 Results of Preliminary Assessment of an impact on Daylight from the Proposed Development.

Any reduction in available daylight from the Proposed Development will be negligible and imperceptible. This meets the recommendations of the BRE guidelines BR209:2022 (third edition). A detailed assessment of the Vertical Sky Component (VSC) is not required.

17.8.3 Preliminary Assessment of an impact on Sunlight from the Proposed Development.

The BRE guidelines (2022) recommend assessing the main living rooms and conservatories if they have a window wall facing within 90° of due south. If the proposed obstruction is fully North of the existing window, then sunlight need not be assessed.

17.8.4 Results of Preliminary Assessment of an impact on Sunlight from the Proposed Development.

Fig. 2 shows that the residential building, 'Nangor Lea' is not within the Zone of Influence of the Proposed Development. Sectional analysis at location A in Fig 3 shows that the 25° line would not be subtended by the Proposed Development, indicating any reduction in available sunlight will be negligible and imperceptible. No further assessment is required. Additionally the shadow diagrams indicate that the shadows cast by the Overall Project do not extend beyond the site to the North during the day on the 21st of March.

Commercial buildings need not be assessed for a potential impact on their sunlight unless they have a specific requirement for sunlight. However, it can also be noted that the buildings in Kilcarbery Business Park are also beyond the Zone of Influence of the Proposed Development, and their internal sunlight would not be affected by it.

17.9 Preliminary assessment of potential impact on Daylight & Sunlight in neighbouring structures from the Overall Project.

<u>*Analysis in Plan*</u>

The BRE guidelines recommend that loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. The zone of influence 3 times the height of the proposed structures, fence and mechanical plant of the Overall Project are plotted in yellow in Figure 17.4.

Figure 17.4 also notes the direction of the walls with windows in the closest neighbouring properties. These are all opposite the data centre building to the north of the site.

- Location A identifies 'Nangor Lea', a residential building.
- Locations B & C are commercial buildings in Kilcarbery Business Park.

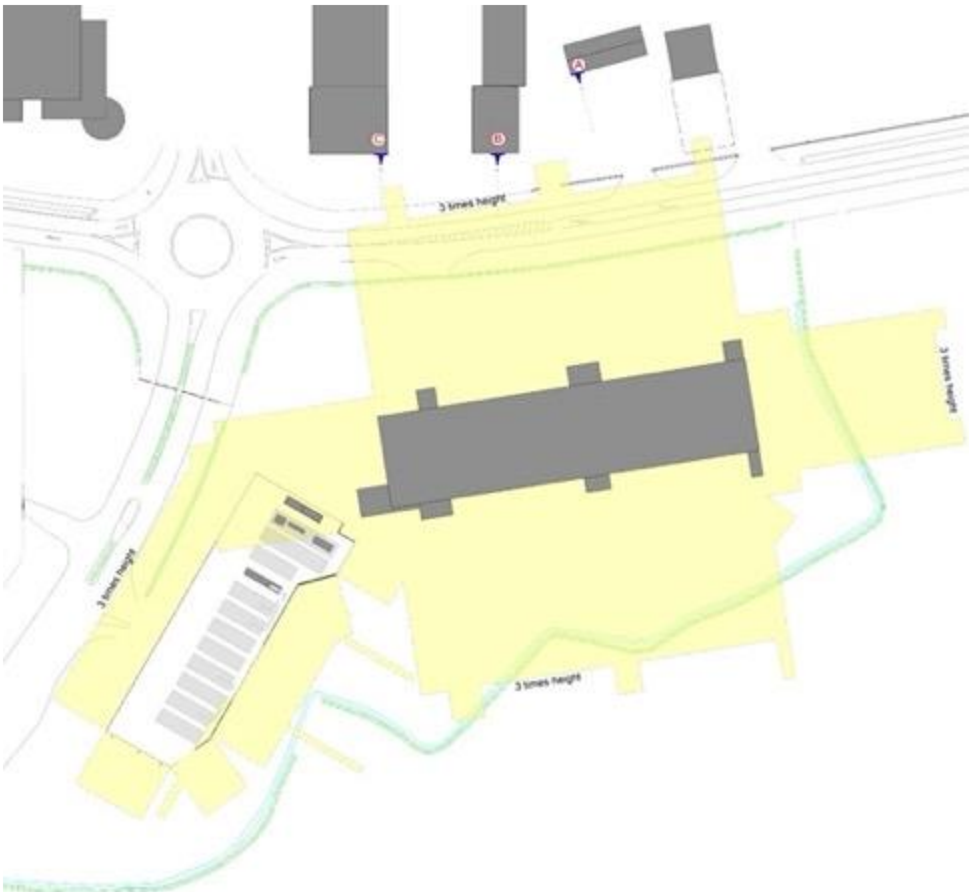


Figure 17.4 – Proposed site plan showing the zone of influence from the Overall Project and the direction of the window walls in relevant properties.

Analysis in Section

If a relevant building with windows facing towards the proposed obstruction falls within the Zone of Influence described above, then BR209:2022 directs that the following assessment for an impact on daylight that window can receive is made:

"d*raw a section in a plane perpendicular to each affected main window wall of the existing building. Measure the angle to the horizontal subtended by the new development at the level of the centre of the lowest window. If this angle is less than 25° for the whole of the development, then it is unlikely to have a substantial effect on the diffuse skylight enjoyed by the existing building. If, for any part of the new development, this angle is more than 25°, a more detailed check is needed to find the loss of skylight to the existing building..*"

This sectional analysis is shown in Figure 17.5 below.

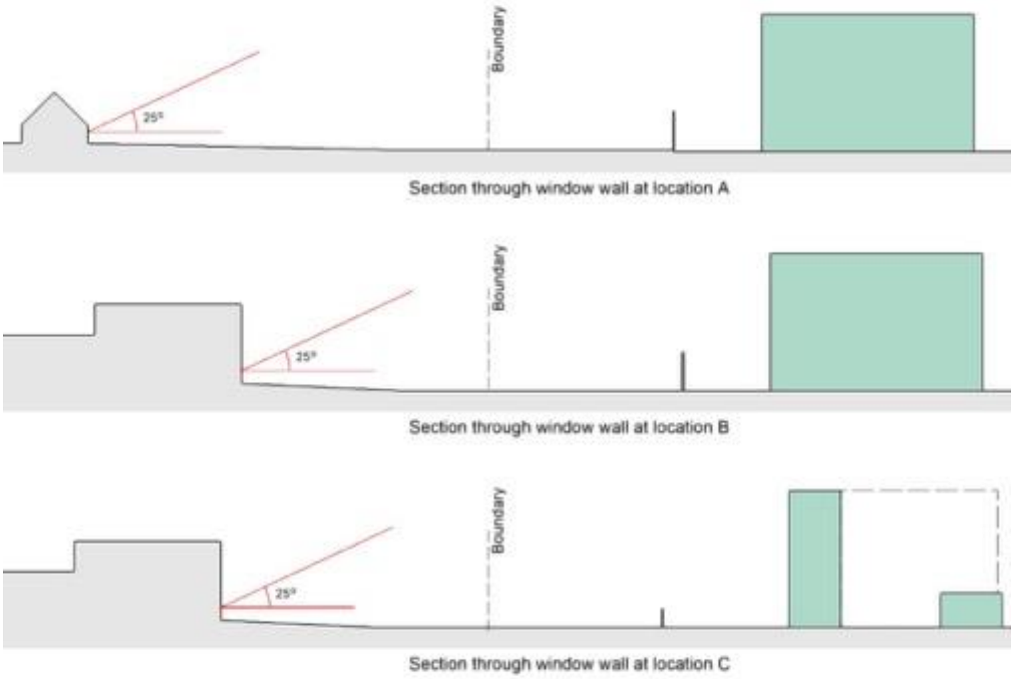


Figure 17.5 – Section perpendicular to window walls of existing buildings at locations A – C, which are identified on plan in Fig.4

17.9.1 Comment on Preliminary Assessment of the Overall Project.

The preliminary analysis in plan indicates that the projection of 3 times the height of the Overall Project, does not reach the window wall of any adjacent dwelling, or any of the commercial buildings, (see Fig. 4).

Preliminary analysis in section A (see Fig.5) show the following:

Locations A perpendicular to the window wall of 'Nangor Lea', a residential building. The 25° line would not be subtended by the Overall Project, indicating any reduction in available daylight will be negligible and imperceptible. No further assessment is required.

Locations B & C through the elevations of the commercial buildings in Kilcarbery Business Park: The 25° line would not be subtended by the Overall Project, indicating any reduction in available daylight will be negligible and imperceptible. No further assessment is required.

17.9.2 Results of Preliminary Assessment of an impact on Daylight from the Overall Project.

Any reduction in available daylight from the Overall Project will be negligible and meets the recommendations of the BRE guidelines BR209:2022 (third edition) and a detailed assessment of the Vertical Sky Component (VSC) is not required.

17.9.3 Preliminary Assessment of an impact on Sunlight from the Overall Project.

The BRE guidelines (2022) recommend assessing the main living rooms and conservatories if they have a window wall facing within 90° of due south. If the proposed obstruction is fully North of the existing window, then sunlight need not be assessed.

17.9.4 Results of Preliminary Assessment of an impact on Sunlight from the Overall Project.

Fig. 4 shows that the residential building, 'Nangor Lea' is not within the Zone of Influence of the Overall Project. Sectional analysis at location A in Fig 5 shows that the 25° line would not be subtended by the Overall Project, indicating any reduction in available sunlight will be negligible and imperceptible. No further assessment is required.

Commercial buildings need not be assessed for a potential impact on their sunlight unless they have a specific requirement for sunlight. However, it can also be noted that the buildings in Kilcarbery Business Park are also beyond the Zone of Influence of the Overall Project, and their internal sunlight would not be affected by it.

17.10 Sunlight to Areas of Amenity

The BRE document indicates that for an amenity area to have good quality sunlight throughout the year, 50% should receive in excess of 2 hours sunlight on the 21st of March. It also states that front gardens need not be assessed for sunlight.

17.10.1 Preliminary Assessment of an impact on Sunlight to areas of amenity from the Proposed Development.

Fig. 2 shows that the amenity of the residential building, 'Nangor Lea' is not within the Zone of Influence of the Proposed Development, therefore a detailed assessment of their amenity is not required. Additionally the shadow diagrams indicate that the shadows cast by the Overall Project do not extend beyond the site to the North during the day on the 21st of March.

Grange Park Golf Club, is a large area of open space which is predominantly south of the Proposed Development. Any impact on its potential sunlight will be negligible and imperceptible.

17.10.2 Results of Preliminary Assessment of an impact on Sunlight to areas of amenity from the Proposed Development.

There is no private amenity within the Zone of Influence of the proposed development. The Proposed Development meets the recommendations of BR209:2022 (third edition).

17.10.3 Preliminary Assessment of an impact on Sunlight to areas of amenity from the Overall Project.

Fig. 4 shows that the amenity of the residential building, 'Nangor Lea' is not within the Zone of Influence of the Overall Project, therefore a detailed assessment of their amenity is not required. Additionally the shadow diagrams indicate that the shadows cast by the Overall Project do not extend beyond the site to the North during the day on the 21st of March.

Grange Park Golf Club, is a large area of open space which is predominantly south of the Overall Project. Any impact on its potential sunlight will be negligible and imperceptible.

17.10.4 Results of Preliminary Assessment of an impact on Sunlight to areas of amenity from the Overall Project.

There is no private amenity within the Zone of Influence of the Overall Project. The Overall Project meets the recommendations of BR209:2022 (third edition).

17.11 Overshadowing

Appendix 17 Figures 1 – 15 show the shadow study for the 21st of March. June and December.

The site is a greenfield site, there is no shadow cast from any structures in the baseline scenario.

The BRE guidelines states that *"if a space is used all year round, the equinox on the 21 March is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (21 September) will be the same as those for 21 March, so a separate set of plots for September is not required."*

June 21st and December 21st are provided below for information, but it should be noted that the summer solstice is the best-case scenario with shadows at their shortest.

The guidelines recommend that "Sunlight at an altitude of 10° or less does not count". In Winter even low buildings will cast long shadows and it is common for large areas of the ground to be in shadow throughout the day especially in a built-up area as the sun barely rises above an altitude of 10° during the course of the day. Below are the times for the Equinox and Solstice that the sun is above 10° altitude rounded to the nearest half hour.

- Equinox: Between 8:30 and 17:30
- Summer Solstice: Between 6:30 and 20:00
- Winter Solstice: Between 10:30 and 14:00

17.11.1 Comment on the shadow study.

Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions. The BRE guidelines state that *"In interpreting the impact of such differences , it must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is the be expected."*

The BRE guidelines recommends that March 21st is the best date to prepare shadow plots as it gives an average level of shadowing. On March 21st there is no additional shading on any of the adjacent buildings from the Overall Project. At an average level of shadow over the course of the year, the effects from shadows of the Overall Project are unlikely and imperceptible.

17.12 Mitigation Measures

During the design process the position and mass of the building, the finished floor level, the height of parapets and mechanical plant of the Overall Project were technically assessed to mitigate any potential effect on the daylight, sunlight and overshadowing of the adjacent properties, by prevention and reduction. This informed the final design.

17.12.1 Construction Phase

During the construction phase all scaffolding, hoarding and cranes would only be in use for as long as necessary to facilitate the construction of the Overall Project. The impacts of these are considered negligible.

17.12.2 Operational Phase

As the completed structure of the Overall Project would represent the greatest mass on site, it is considered that the Overall Project represents the worst-case in terms of assessing the effect on daylight, sunlight and overshadowing. This is not projected to change over the operational phase of the development.

17.13 Residual Impacts

The effect of the Overall Project was mitigated through design. Any residual impact on the daylight, sunlight and overshadowing of the adjacent properties from the Overall Project is not significant.

17.14 Interactions and Cumulative Effects

17.14.1 Interactions

No interactions are predicted with any other section in this Environmental Impact Assessment Report.

17.14.2 Cumulative Effects

An assessment of cumulative effects was made in a shadow study plotted in Appendix 17 Figures 16-30. It compares the Baseline scenario with that of the Overall Project in the context of adjacent developments which are permitted or currently in the planning process.

BR209 states that "*Sunlight at an altitude of 10° or less does not count, because it is likely to be blocked by low level planting anyway.*" The shadow from a 20m high structure at 10° extends to less than 115m on level ground. The extent of the cumulative assessment is limited to a radius of 500m from the site because the effects of the proposal and cumulative influence will not extend beyond this.

The adjacent projects considered relevant are as follows:

- Reg. Ref.: SD21A/0241 for Vantage
- Reg. Ref.: SD22A/0420 for Vantage
- Reg. Ref.: SD21A/0167 for Greener Ideas
- Reg. Ref.: SD21A/0217 for Digital Realty

The duration and frequency of effects will be momentary and will occur at the same time each day. The effect will extend further at the Winter Solstice and less at the Summer Solstice. BR209 states the best date for preparing shadow plots is the March Equinox which indicates the average level of shadowing.

BR 209 sets out criteria for findings in Environmental impact assessment. "*Where the loss of skylight or sunlight fully meets the guidelines in this document, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate.*"

The loss of sunlight is well within the guidelines and a classification of negligible is appropriate.

18. Climate

18.1 INTRODUCTION

This chapter evaluates the impacts which the Proposed Development may have on Climate as defined in the EPA EIA Report Guidelines 2022 (EPA, 2022a). The assessment has been undertaken for the Permitted Development (data centre), the Proposed Development (OSPG) and the Overall Project – data centre and OSPG.

This chapter has been prepared by AWN Consulting Limited – Dr Edward Porter (BSc PhD C Chem MRSC MIAQM). Dr. Edward Porter is Director with responsibility for Air Quality and Climate with AWN Consulting. He holds a BSc from the University of Sussex (Chemistry), and a PhD in Environmental Chemistry (Air Quality) in UCD where he graduated in 1997 and is a Full Member of the Royal Society of Chemistry (MRSC CChem) with 25 years' experience. He specialises in the fields of air quality, climate and air dispersion modelling.

18.2 METHODOLOGY

The climate assessment has been carried out in line with the guidance outlined below:

- EPA (2022a) Guidelines on the Information to be contained in Environmental Impact Statements,
- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment,
- European Commission (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report,
- IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction,
- IEMA (2010) Principles Series on Climate Change Mitigation & EIA,
- IEMA (2020a) EIA Guide to: Climate Change Resilience and Adaptation,
- IEMA (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance, and
- UKHA (2019) Design Manual for Roads and Bridges Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 – Climate.

In the absence of specific Irish or United Kingdom (UK) guidance in relation to industrial facilities, the guidance from the UK Highway Agency (UKHA) "*Design Manuals for Roads and Bridges (DMRB) - LA 114 Climate*" (hereafter referred to as LA 114 Climate) (UKHA, 2017) has been consulted which is still relevant to GHG emissions from industrial sources. LA 114 Climate advises that the assessment of a Proposed Development should describe the likely significant effects on the environment resulting from both the:

- Impact of a project on climate (GHG emissions); and
- Vulnerability of a project to climate change (adaptation).

The assessment methodology has been derived with reference to the most appropriate guidance documents relating to climate which are set out in the following sections of this Chapter. An overview of the methodology undertaken for the climate impact assessment is outlined below:

- A detailed baseline review of GHG emissions has been undertaken in order to characterise the baseline environment. This has been undertaken through review of available published GHG emission data;
- A review of the most applicable guidelines for the assessment of GHG emissions has been carried out in order to define the significance criteria for the Construction and Operational Phases of the Proposed Development. These guidelines describe appropriate methods for quantifying the emissions of GHG emissions from the Proposed Development;
- Predictive calculations and impact assessments relating to the likely Operational Phase climatic impacts of the Proposed Development have been undertaken;
- An assessment of the vulnerability of the Proposed Development to climate change has been undertaken; and

- A schedule of mitigation measures has been incorporated where required to reduce, where necessary, the identified potential climatic impacts associated with the Proposed Development.

18.2.1 Relevant Guidelines, Policy and Legislation

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and 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 whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions was based on Nationally Determined Contributions (INDCs) which formed the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013* (the Regulation) relating to the non-ETS sector and Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 relating to the ETS sector. These measures. These measures aim to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading System (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels. The Sharm el-Sheikh Implementation Plan was drafted at COP27 in November 2022. This plan included a new funding arrangement for "loss and damage" for vulnerable countries hit hard by climate disasters. No significant agreements were made regarding the phasing out of fossil fuels or limiting global heating to 1.5°C above pre-industrial levels, however the plan resolves to pursue further efforts to limit the rise to 1.5°. In order to limit global warming to 1.5 °C rapid, deep and sustained reductions in global greenhouse gas emissions of 43% by 2030 relative to the 2019 level will be required.

Following on from the recently published European Climate Law (EU, 2021), and as part of the EU's "*Fit for 55*" legislative package where the EU has recently committed to a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 levels by 2030, *Regulation (EU) 2018/842 Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013* (the Effort Sharing Regulation) is proposed to be strengthened with increased ambition by the year 2030. The proposal for Ireland is to increase the GHG emission reduction target from 30% to 42% relative to 2005 levels whilst the ETS market will also have more stringent reductions from the currently proposed reduction of 43% by 2030 compared to 2005 to a 61% reduction by 2030 based on annual reductions of 4.2% compared to the previous annual reduction level of 2.2% per year (EU, 2021) with levels in 2021 reducing to 1,307 million tonnes CO_{2eq}.

18.2.1.1 Emission Trading System

The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing, heavy industry and facilities which have greater than 20MW thermal input capacity (which is applicable to the Proposed Development). Under the ETS, there are no country-specific targets. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS and thus includes GHG emissions from transport, residential and commercial buildings and agriculture. In contrast to the ETS, Ireland has a country-specific obligation under the Regulation of a 42% reduction in non-ETS GHG emissions by 2030 relative to its 2005 levels.

As outlined in European Commission publication "*Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*" (EC, 2013) the assessment of the impact of the project on climate should be context-specific. Within the context of global or EU-wide emissions, the

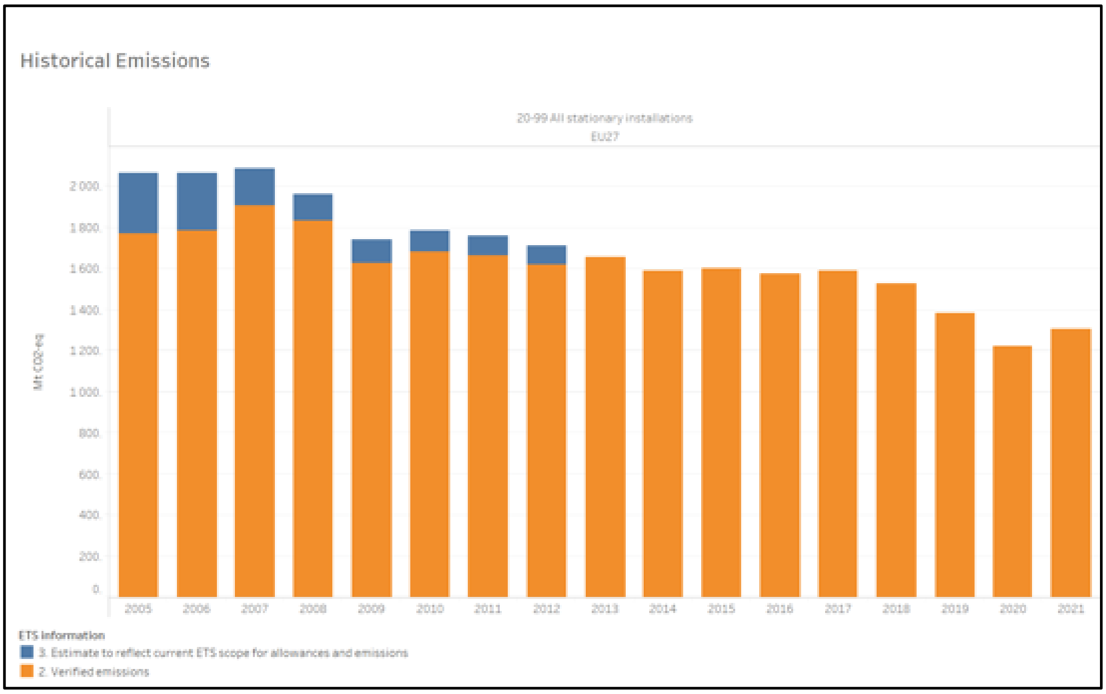
GHG emissions associated with the proposed development should be assessed in the context of the ETS. The approach that has been adopted at EU level is the EU Climate and Energy Package. In this regard, the EC guidance (EC, 2013) has stated that:

"The EU Emissions Trading System, the backbone of the EU mitigation effort, which sets a cap on emissions from the most polluting sectors including over 11,000 factories, power plants and other installations, including airlines. By 2020, the cap should result in a 21% reduction relative to 2005 levels. The EU ETS covers about 40% of all EU emissions." (EC, 2013).

As outlined in the EU publication "*The EU Emissions Trading System in 2020: trends and projections*" (EU, 2020), the European Union's energy system is decarbonising rapidly. The report states:

"*Total ETS emissions from stationary installations declined by 9.1% between 2018 and 2019, the largest drop in a decade, driven by a strong decrease in coal use for power production*" (EU, 2020)

As shown in Figure 18.1 in the most recent verified emissions from the ETS covering 2005 – 2021 this trend is continuing with the exception of 2020 due to COVID.



Taken from https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1

Figure 18.1 Historical ETS Verified Emissions 2005 - 2021

The European Topic Centre on Climate report entitled "*Trends and projections in the EU ETS in 2020*" (ETC, 2020) in reference to additional electricity capacity states:

"In the revised ETS Directive 2018/310, Article 10(c) now requires that "where an investment leads to additional electricity generation capacity, the operator concerned shall also demonstrate that a corresponding amount of electricity-generation capacity with higher emission intensity has been decommissioned by it or another associated operator by the start of operation of the additional capacity". This clause aims at ensuring that overall electricity generation capacity becomes less carbon intensive over time."

The report (ETC, 2020) further indicates that the reduction in GHG emissions is predicted to continue up to at least 2030 due to current policies in place. As shown in Figure 18.2, both the energy industries and "other industries" are predicted to decrease significantly by 2030.

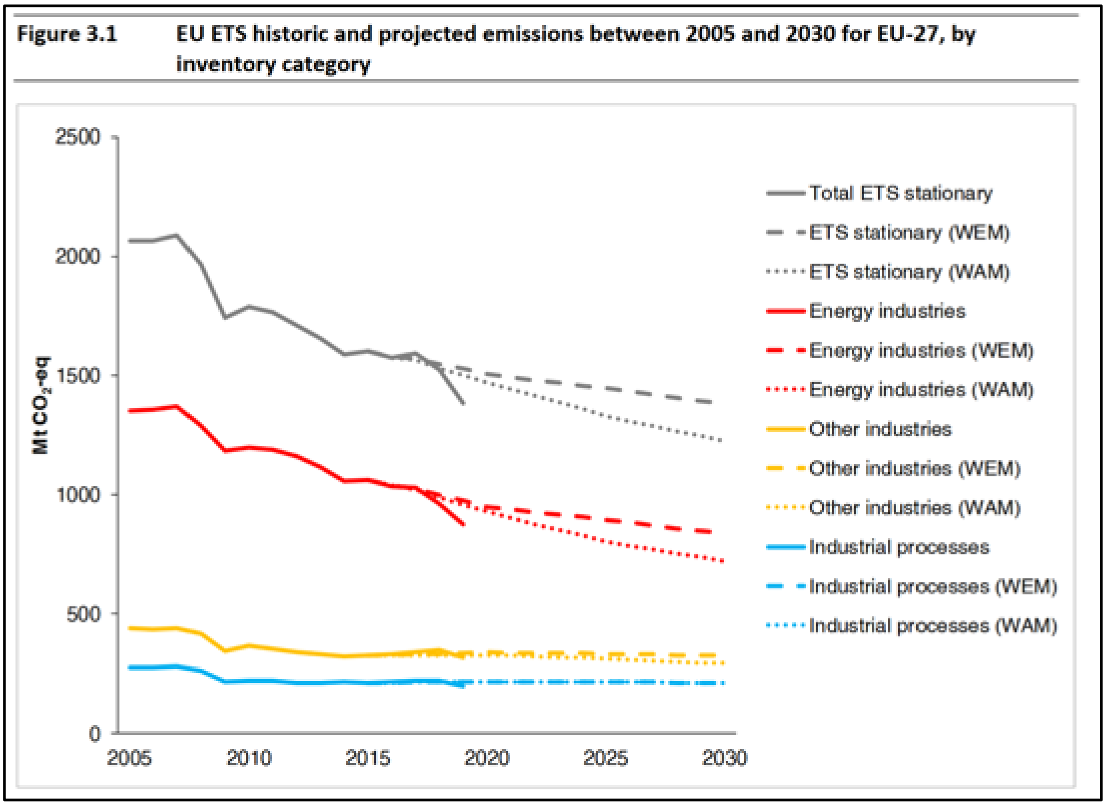


Figure 18.2 Historical ETS Verified Emissions & Project Emissions 2005 – 2030 (WEM = with existing measures, WAM = with additional measures)

18.2.1.2 National Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the 2015 Act). The purpose of the Act was to enable Ireland 'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050' (3.(1) of No. 46 of 2015). This is referred to in the Act as the 'national transition objective'.

The 2019 *Climate Action Plan* (CAP) (Government of Ireland, 2019), published in June 2019, outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The 2019 CAP set a built environment sector reduction target of 40 - 45% relative to 2030 pre-NDP (National Development Plan) projections.

In June 2020, the Government published the Programme for Government – Our Shared Future (Government of Ireland 2020). In relation to climate, there is a commitment to an average 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 (51% reduction over the decade) with an ultimate aim to achieve net zero emissions by 2050. Policy changes include the acceleration of the electrification of the transport system, including electric bikes, electric vehicles and electric public transport, alongside a ban on new registrations of petrol and diesel cars from 2030. In addition, there is a policy to ensure an unprecedented model shift in all areas by a reorientation of investment to walking, cycling and public transport.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) was published in July 2021. The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and* *climate neutral economy by no later than the end of the year 2050*'. The 2021 Climate Act will also '*provide for carbon budgets and a sectoral emissions ceiling to apply to different sectors of the economy*'. The 2021 Climate Act removed any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority. The 2021 Climate Act set a target of a 51% reduction in the total amount of greenhouse gases over the course of the first two carbon periods ending 31 December 2030 relative to 2018 annual emissions. The 2021 Climate Act defined the carbon budget as 'the total amount of greenhouse gas emissions that are permitted during the budget period'

The Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) outlines a series of specific actions including:

- To make a strategy to be known as the 'National Long Term Climate Strategy' not less than once in every five-year period with the first to be published for the period 2021 to 2035 and with each subsequent Strategy covering the next three five-year carbon budgets and also include a longer term perspective of at least 30 years;
- To adopt a system of carbon budgets which will be determined as part of a grouping of three five-year periods calculated on an economy-wide basis, starting with the periods 2021 to 2025, 2026 to 2030, and 2031 to 2035;
- To introduce a requirement for Government to adopt "sectoral emission ceilings" for each relevant sector within the limits of each carbon budget;
- To request all local authorities to prepare climate action plans for the purpose of contributing to the national climate objective. These plans should contain mitigation and adaptation measures that the local authority intends to adopt;
- Increasing the power of the Advisory Council to recommend the appropriate climate budget and policies;
- Requiring the Minister to set out a roadmap of actions to include sector specific actions that are required to comply with the carbon budget and sectoral emissions ceiling for the period to which the plan relates; and
- Reporting progress with the CAP on an annual basis with progress including policies, mitigation measures and adaptation measures that have been adopted.

In terms of wider energy policy, as outlined in the EPA publication "*Ireland's Greenhouse Gas Projections 2021-2040*" (EPA, 2022b) under the *With Additional Measures* scenario, emissions from the energy industries sector are projected to decrease by 415.9% to 4.5 Mt CO_{2eq} over the period 2020 to 2030 including the proposed increase in renewable energy generation to approximately 80% of electricity consumption:

- In this scenario it is estimated that renewable energy generation increases to approximately 80% of electricity consumption. This is mainly a result of further expansion in wind energy (comprising 5.0 GW offshore). Expansion of other renewables (e.g. solar photovoltaics) also occurs under this scenario.
- Under the With Additional Measures, one power station operates to the end of 2023 with 30% co-firing.
- In this scenario the Moneypoint power station is assumed to operate in the market up to end 2025 at which point it no longer generates electricity from coal.
- In terms of inter-connection, it is assumed that the Greenlink 500MW interconnector to the UK to come on stream in 2025 and the Celtic 700MW interconnector to France to come on stream in 2027 (EPA, 2022b).

The 2023 *Climate Action Plan* (CAP) (Government of Ireland, 2022) provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting us on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021. The plan outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. CAP 2023 also detailed the required governance arrangements for implementation including carbon-proofing of policies and establishment of sectoral emission ceilings and carbon budgets. In relation to data centres, the *CAP 2021* provides that emissions from industry sectors covered by the ETS are subject to EU-wide rather than national targets set out under EU Effort Sharing Regulation. Box 2.1 states:

> *"emissions from electricity generation and large industry in the ETS are subject to EU-wide targets which require that emissions from these sectors be reduced by 43% by 2030, relative to 2005 levels".*

In relation to the 2023 Climate Action Plan, under Section 13.3.5 EU Emission Trading System, the 2023 CAP states:

> *"The EU ETS is an important measure for reducing industry GHG emissions. The Fit for 55 proposals for the reformed EU ETS will increase emissions reductions in this sector from the current 43% to 61%, in the period 2005 to 2030. Changes include a steeper annual reduction in the emissions ceiling and reductions in free allowances, alongside the corresponding introduction of a carbon border adjustment mechanism." (2023 CAP, page 155).*

As part of the preparation of a 'local authority climate action plan', each local authority shall consult and co-operate with an adjoining local authority in making a local authority climate action plan and co-ordinate the mitigation measures and adaptation measures to be adopted, where appropriate. Each local authority is also required to consider any significant effects the implementation of the local authority climate action plan may have on the adjoining local authority.

The Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy (2022) states that the Government has a preference for data centres developments that can demonstrate a clear pathway to decarbonise and ultimately provide net zero data services. The current facility is in line with this strategy through the use of CPPAs and the minimisation of energy use including the use of PV roof panels. A heat recovery building is also provided in the event future connection can be made to a district heating system in the area.

Individual county councils in Ireland have also published their own Climate Change Strategies which outline the specific climate objectives for that local authority and associated actions to achieve the objectives. The South Dublin Climate Action Plan (SDCC and Codema, 2019) outlines a number of goals and plans to prepare for and adapt to climate change. There are five key action areas within the SDCC Climate Action Plan: energy and buildings, transport, flood resilience, nature-based solutions and resource management.

The Long-term Climate Action Strategy has not yet been published although the government issued the "*Long-term Strategy on Greenhouse Gas Emissions Reduction*" in November 2019 (Government of Ireland, 2019). In relation to electricity the Government commits to the full decarbonisation of the electricity system by 2050. In addition, the Gas Networks Ireland (GNI) report *Vision 2050 – A Net Zero Carbon Gas Network For Ireland*" (Ervia, 2019) highlights that by 2050 natural gas will be replaced by biomethane, abated natural gas (with Carbon Capture & Storage (CCS)) and hydrogen. By 2030 it is envisaged that 20% of current demand will be biomethane gas and increasing to 37% by 2050 with hydrogen accounting for 13% by 2050. The report states that CCS technologies will increasingly capture and store CO_2 emissions from natural gas used for power generation and large industry and will deliver net zero carbon by 2050. Thus, Gas Networks Ireland has stated that the impact of using gas supplied by Ervia by 2050 will not be significant and will have an overall net zero impact on climate.

The carbon budget programme was published in November 2021 and comprises three successive 5-year carbon budgets. In relation to carbon budgets, the Climate Action and Low Carbon Development (Amendment) Act 2021 states '*A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years* *commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'*. The carbon budget is to be produced for 3 sequential budget periods with the third carbon budget in draft format. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. The total emissions allowed under each budget is set out below in Table 18.1, as well as the average annual reduction for each 5-year period.

Period	Mt CO2eq	Emission Reduction Target
2021-2025	295 Mt CO2eq	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO2eq	Reduction in emissions of 15.3% per annum for the second budget period.
2031-2035	151 Mt CO2eq	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 18.1 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

The CAP 2023 provides that the economy-wide carbon budgets will be supplemented by sectoral emissions ceilings, setting the maximum amount of GHG emissions that are permitted in a given sector of the economy during each five-year carbon budget. The recently agreed Sectoral Emission Ceilings for each Sector are shown in Table 18.2. It should be noted that 5.25 $MtCO_{2eq}$ of annual emissions reductions are currently unallocated on an economy-wide basis for the second carbon budget period (2026-2030). These will be allocated following a mid-term review and identification of additional abatement measures. The electricity sector emitted approximately 10.5 $MtCO_{2eq}$ in 2018 and has a ceiling of 3 $MtCO_{2eq}$ in 2030 which is a 71% reduction over this period.

Sector	Reduction Required	2018 Emissions ($MtCO_{2eq}$)	2030 Emission Ceiling ($MtCO_{2eq}$)
Electricity	75%	10.5	3
Transport	50%	12	6
Buildings (Commercial and Public)	45%	2	1
Buildings (Residential)	40%	7	4
Industry	35%	7	4
Agriculture	25%	23	17.25
Other**	50%	2	1

Table 18.2 Sectoral Emission Ceiling 2030

The 2023 CAP has outlined the path towards the electricity target by 2030. The core measures are:

- Increasing the share of renewable electricity to 80%,
- Indicative Onshore Wind Capacity of up to 9GW,
- Indicative Offshore Wind Capacity of at least 5GW,
- Indicative Solar PV Capacity of 8GW.

A research report by Baringa / Wind Energy Ireland (Baringa, 2021) has indicated that a carbon intensity of between 38 – 84 gCO_2/kWh was achievable for the national grid. At a keynote speech for the EPA's Climate Change conference in June 2022 the ESB Chief Executive stated that the projected carbon intensity figure for 2030 is likely to be 66 gCO_2/kWh (ESB 2022) as shown in Figure 18.3 which is in line with the Baringa report. The ESB has also committed to net zero by 2040 as outlined in recent publications (ESB,2021, 2022). Thus, the current assessment has been conducted on the basis of 100 gCO_2/kWh in 2030 which is a conservative assumption given that the ESB has predicted a level of 66 gCO_2/kWh by 2030.

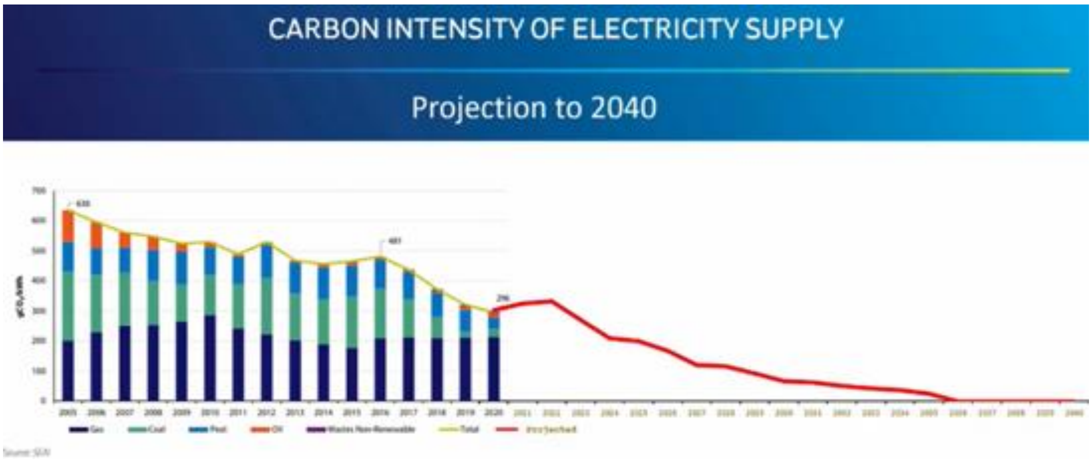


Figure 18.3 ***ESB Presentation At EPA Climate Change Conference 2022***

In relation to the decarbonisation of natural gas and the availability of biomethane, the publication "*Sustainability of Biomethane Production in Ireland*" (KPMG/GNI, 2021) has assessed the environmental sustainability of a proposed national biomethane industry in Ireland based on farm-scale anaerobic digestion (AD) plants. The report found that the industry is technically feasible with the current government target of 1.6 TWh by 2030 achievable and more ambitious targets set out in the Government's Renewable Heat Obligation consultation of 5.5TWh also feasible.

The report envisages a roll-out of 125 x 20 GWh farm-scale biomethane AD plants by 2030 leading to 2.5TWh of biomethane production which will require 125,000 acres (1.1% of Ireland's agricultural land). The level of production would be sufficient to displace 15% of current commercial and industrial natural gas consumption. As outlined in *EU Directive 2018/2001 on the promotion of the use of energy from renewable sources (RED II Directive)*, the use of biomethane to produce electricity based on wet manure in a closed digestate system is at least carbon neutral and thus replacing natural gas by biomethane will lead to direct GHG emission savings.

These measures in total have the potential for an additional abatement impact of between 6 – 8 $MtCO_{2eq}$ which can be compared to the target of 7.5 $MtCO_{2eq}$ reduction required by 2030. In addition, there is a target of between 1-3TWh of zero-emission gas generation (including green hydrogen).

18.2.2 Climate Criteria For The Rating Of Impacts

The Institute of Environmental Management and Assessment (IEMA) guidance note on "*Assessing Greenhouse Gas Emissions and Evaluating their Significance*" (IEMA, 2022) states that "*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*". Mitigation has taken a leading role within the Guidance compared to the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings.

The assessment aims to quantify the difference in GHG emissions between the proposed project and the baseline scenario (the permitted development). This is done by calculating the difference in whole life net GHG emissions between the two options. The IEMA EIA guidance (IEMA, 2022) does not recommend a particular approach for this due to variations of situations but instead it sets out advice for the key common components necessary for undertaking a GHG emissions assessment.

During the assessment IEMA recommend the use of a reasonable worst-case scenario rather than an absolute worst-case scenario. The IEMA Guidance (IEMA, 2022) states that a GHG emissions assessment should incorporate the following steps into any climate assessment:

1. Set the scope and boundaries of the GHG assessment;
2. Develop the baseline;
3. Decide upon the emissions calculation methodologies;
4. Data collection;
5. Calculate/determine the GHG emissions inventory; and
6. Consider mitigation opportunities and repeat steps 4 & 5.

Activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions, and where all such exclusions should be clearly stated and total a maximum of 5% of total emissions.

When considering the cumulative assessment, all global cumulative GHG sources are relevant to the effect on climate change as outlined in the IEMA Guidance (IEMA, 2022). As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other. The following section details the specific appraisal methods utilised in order to complete the assessment in accordance with the IEMA Guidance (IEMA, 2022).

18.2.3 Construction Phase

For the purpose of the qualitative climate assessment of the construction phase, the combined impact of concurrent construction of all buildings at any one time at the site has been assumed to occur together.

The impact of the construction phase of the Permitted Development (data centre), the Proposed Development (OSPG) and the Overall Project – data centre and OSPG on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities.

18.2.4 Operational Phase

The assessment for the Permitted Development (data centre) is based on the use of electricity to power the facility. For the Proposed Development (OSPG) and the Overall Project – data centre and OSPG gas engines in the energy centre will be the primary source of power, from the opening year, which is likely to be Year 2025 or 2026, until the facility connects to the National Grid which is likely to be approximately Year 2032. Power will be derived from the energy centre gas engine emission points operating for the full year on gas in addition to the emergency operation of 7 of the 8 generators in the data centre for 72 hours per year (the remaining generator serving as a "catcher" generator). The back-up diesel generators are only used in the event of a power failure at the site. In reality and based on recent experience over the past number of years of the electricity network (Eirgrid, 2022), backup generators are rarely used other than during testing and maintenance. When the primary source of power is the National Grid, which is likely from Year 2032 onwards, the facility will use electricity from the National Grid.

When assessing significance, the *2010 IEMA Principles Series on Climate Change Mitigation & EIA* (IEMA, 2010) defines three overarching principles:

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect;
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g. human health, biodiversity, water, land use, air quality); and

- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit; as such any GHG emissions or reductions from a project might be considered to be significant. The environmental limit is the global GHG emission budget that defines a level of dangerous climate change, and any GHG emission that contributes to exceedance of that budget or threatens efforts to stay within it can be considered as significant.

The 2020 Guidance (IEMA, 2022) document builds on those principles with three points:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. In relation to climate, there is no project specific assessment criteria, but the project will be assessed against the recommended IEMA (IEMA, 2022) significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

- Major or moderate adverse impact (significant): A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the net zero[4] trajectory by 2050 or sectoral based transition to net zero targets, results in a significant adverse effect. It is down to the consultant completing the assessment to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects. A project's impact can shift from significant adverse to nonsignificant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero. Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect. This is particularly true where policy lags behind the necessary levels of GHG emission reductions for a science based 1.5°C compatible trajectory towards net zero.
- Minor adverse impact (not significant): A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral[5] (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.
- Negligible Impact (not significant): A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.

[4] Net Zero: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.*" Net zero is achieved where emissions are first reduced in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

[5] Carbon Neutral: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required.*"

- Beneficial Impact (significant): A project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is significant. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.

The impact of the operational phase of the proposed development on climate was determined by an assessment of the of the existing permitted scenario and the direct (due to onsite gas and diesel usage) and indirect CO_2 emissions associated where the electricity is supplied from the national grid. There is uncertainty in relation to a grid connection for the permitted Data Centre on site. The Applicant intends to use the proposed OSPG until such time as connection can be made to the national electricity grid. The medium and long-term options for the OSPG are assessed in this chapter. The details and results of the assessment are provided in Section 18.7.2.2. The change in both the renewable fraction of electricity from the national grid and biomethane fraction of natural gas with time have also been considered.

18.2.5 Significance Criteria – Vulnerability of the Proposed Scheme to Climate Change

Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EC, 2013) and IEMA EIA Guide to Climate Change Resilience and Adaptation (IEMA, 2020) outlines an approach for undertaking a risk assessment where there is a potentially significant impact on the project receptors due to climate change. The approach to the assessment is based on the following steps:

- Identify potential climate change risk to a project;
- Assess these risks (potentially prioritising to identify the most severe); and
- Formulating mitigation actions to reduce the impact of the identified risks.

The risk assessment assesses the likelihood and consequence of the impact occurring, leading to the evaluation of the significance of the impact. The assessment of likelihood should include consideration of available climate projections data for the project (IPCC, 2015). The Operational Phase assessment, after identifying the hazards and benefits of the climate change impacts, has assessed the likelihood and consequences using the framework outlined in recent risk assessment publications (Raydugin Y. (2014), EPA (2010)) as outlined in Tables 18.3, 18.4 and 18.5.

Likelihood Category (Score)	Description (Probability and Frequency of Occurrence)
Very high (5)	The event may occur with a > 90% probability
High (4)	The event may occur with a 50% - 90% probability
Medium (3)	The event may occur with a 10% - 50% probability
Low (2)	The event may occur with a 0.1% - 10% probability
Very Low (1)	The event may occur with a <0.1% probability

Note 1 **Based on "Consistent Application of Risk Management for Selection of Engineering Design Options in Mega-Projects", Int. Journal of Risk & Contingency Management (Oct 2014)**

Table 18.3 **Likelihood Categories**

Consequence of Impact (Score)	Description Note 1
Very large adverse (5)	Very heavy contamination, widespread effects of extended duration
Large adverse (4)	Heavy contamination, localised effects of extended duration
Moderately adverse (3)	Simple contamination, widespread effects of short duration
Minor adverse (2)	Simple contamination, localised effects of short duration
Negligible (1)	No contamination, localised effects

Note 1 Based on "Guidance to Licensees/COA holders on the Notification, Management and Communication of Environmental Incidents" (EPA, 2010)

Table 18.4 Measure of Consequence

		Measure of Likelihood				
		Very Low	**Low**	**Medium**	**High**	**Very High**
Measure of Consequence	**Very Large**	5	10	15	20	25
	Large	4	8	12	16	20
	Moderate	3	6	9	12	15
	Minor	2	4	6	8	10
	Negligible	1	2	3	4	5

Note 1 Based on "Consistent Application of Risk Management for Selection of Engineering Design Options in Mega-Projects", Int. Journal of Risk & Contingency Management (Oct 2014) (Red = high risk, Yellow = medium risk, Green = low risk)

Table 18.5 Significance Matrix

18.3 RECEIVING ENVIRONMENT

Climate is defined by the IPCC (IPCC, 2015) as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in the industrial age human activities, through the release of GHGs, have impacted on the climate (EPA, 2017). The release of anthropogenic GHGs is altering the Earth's atmosphere resulting in a 'Greenhouse Effect'. This effect is causing an increase in the atmosphere's heat trapping abilities resulting in increased average global temperatures over the past number of decades. The release of CO_2 as a result of burning fossil fuels, has been one of the leading factors in the increase of the 'Greenhouse Effect'. The most significant GHGs are CO_2, methane (CH_4) and nitrous oxide (N_2O).

For the purposes of this assessment, the definition outlined in Council Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (hereafter referred to as the Renewable Energy Directive) for GHGs has been used. In Annex V, C. Methodology Point 5 of the Renewable Energy Directive the relevant GHGs are defined as CO_2, CH_4 and N_2O. CO_2 accounted for 63.7% of total GHG emissions in Ireland in 2018 while CH_4 and N_2O combined accounted for 34.4%. The main source of CH_4 and N_2O is from the agricultural sector. Perfluorocarbons are not relevant in the context of the Renewable Energy Directive as they are not emitted in significant quantities by energy sources.

GHGs have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The IPCC AR5 Synthesis Report: Climate Change 2014 of the Fifth Assessment Report (AR5) (IPCC 2015) sets out the global warming potential for a 100-year time period (GWP100) for CO_2 as the basic unit (GWP = 1) whereas CH_4 has a global warming potential equivalent to 28 units of CO_2 and N_2O has a GWP100 of 265. This approach is also maintained in the IPCC AR6 Technical Summary (IPCC 2021).

18.3.1 Climate Baseline

LA 114 Climate (UKHA, 2021) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the project for both the current and future baseline (i.e. Do Minimum scenarios).

Given the circumstances of Ireland's declaration of a climate and biodiversity emergency in May 2019 and the November 2019 European Parliament approval of a resolution declaring a climate and environment emergency in Europe, in conjunction with Ireland's current failure to meet its EU binding targets under the GHG Regulation, changes in GHG emissions either beneficially or adversely are of more significance than previously viewed prior to these declarations. Thus, the baseline climatic environment should be considered a highly sensitive environment for the assessment of impacts.

Anthropogenic emissions of greenhouse gases (GHGs) in Ireland included in the European Union's Effort Sharing Regulation (ESR) (EU 2018/842) are outlined in the most recent review by the EPA which details provisional emissions up to 2021 (EPA, 2022b). The greenhouse gas emission inventory for 2021 is the first of ten years over which compliance with targets set in the ESR will be assessed. This Regulation sets 2030 targets for emissions outside of the Emissions Trading System (known as ESR emissions) and annual binding national limits for the period 2021-2030. Ireland's target is to reduce ESR emissions by 30% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this. Ireland's ESR emissions annual limit for 2021 is 43.48 Mt CO_2eq. Ireland's provisional 2021 GHG ESR emissions are 46.19 Mt CO_2eq, this is 2.71 Mt CO_2eq more than the annual limit for 2021 (EPA, 2022b). Agriculture continues to be the largest contributor to overall emissions at 37.5% of the total. Transport, energy industries and the residential sector are the next largest contributors, at 17.7%, 16.7% and 11.4%, respectively. GHG emissions for 2021 are estimated to be 4.7% higher than emissions in 2020, this is due to a gradual lifting of covid restrictions and an increase in the use of coal and less renewables within electricity generation. Ireland's GHG emissions have increased by 11.4% from 1990 – 2021.

Provisional National total emissions (including LULUCF) for 2021 are 69.29 Mt CO_2eq, these have used 23.5% of the 295 Mt CO_2eq Carbon Budget for the five-year period 2021-2025. This leaves 76.5% of the budget available for the succeeding four years, requiring an 18.4% average annual emissions reduction from 2022-2025 to stay within budget.

The EPA 2022 GHG Emissions Projections Report for 2021 – 2040 (EPA, 2022b) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the 2021 Climate Action Plan published in 2021. Implementation of these are classed as a "*With Additional Measures*" scenario for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2021 to 2030 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Regulations (Regulation (EU) 2018/842) 2030 targets by approximately 52.3MtCO_{2eq} under the "*With Existing Measures*" scenario. However, the projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full implementation of the Climate Action Plan and the use of the flexibilities available (EPA, 2022b).

18.3.2 Vulnerability of the Project to Climate Change

The Proposed Development study area for assessing a project's vulnerability to climate change should be based on the construction footprint / project boundary as this is the region where the direct impact from climate change will occur. Impacts as a result of climate change involve increases in global temperatures and increases in the number of rainfall days per year. Ireland has seen increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east (EPA, 2015). The EPA have compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the Proposed Development:

- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality; and
- Changes in distribution of plant and animal species.

The historical regional weather data for Casement Aerodrome which is representative of the current climate in the region of the Proposed Development is shown in Table 18.6 (Met Eireann, 2022). The region of the Proposed Development has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Casement Aerodrome, is the nearest weather and climate monitoring station to the Proposed Development that has meteorological data recorded for the 30-year period from 1981 to 2010. Casement Aerodrome meteorological station is located approximately 2 km west of the Proposed Development at the closest point. Meteorological data recorded at Casement Aerodrome over the 30-year period from 1981 to 2010 indicates that the wettest months were October and December, and the driest month on average was February. July was the warmest month with a mean temperature of 15.7°C.

The recent weather patterns and extreme weather events recorded by Met Éireann have been reviewed. A noticeable feature of the recent weather has been an increase in the frequency and severity of storms with notable events including Storm Darwin in February 2014, Storm Emma in March 2018, and Storm Ophelia in October 2018. The maximum wind gust for Casement Aerodrome for Storm Ophelia peaked at 117 km/hr with a 10-minute speed of 85 km/hr.

Heavier historical rainfall events have also been recorded in recent years including heavy rainfall and flooding in the summer of 2008, severe flooding in November 2009, and heavy rainfall in the Greater Dublin Area (GDA) on the 24 October 2011. The rainfall recorded on 24 October 2011 totalled 76.5mm over a nine-hour period at Casement Aerodrome, which has an annual probability of 1 in 60 years.

Future climate predictions undertaken by Met Éireann have been published in 'Ireland's Climate: the road ahead (Met Eireann, 2013) based on four scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5) which is named with reference to a range of radiative forcing values for the year 2100 (i.e. 2.6, 4.5, 6.0 and 8.5 W/m^2 (watts per square metre)) respectively with focus on RCP4.5 (medium-low) and RCP8.5 (high) scenarios. In terms of mean temperatures, it is predicted that increases of between 1°C to 3°C will occur under RCP4.5 rising to 2°C to 4°C under RCP8.5. Warm extremes are expected to rise by 2°C to 3°C (RCP4.5) but by up to 5°C under RCP8.5.

The EPA sponsored Report No.159 '*Ensemble of regional climate model projections for Ireland*' (EPA, 2015) which has projected significant decreases in mean annual, spring and summer precipitation amounts with extended dry periods. The decreases are largest for summer, with reductions ranging from 0% to 13% and from 3% to 20% for the medium-to-low and high emission scenarios, respectively. Conversely increases of heavy precipitation of up to 20% are projected to occur during the winter and autumn months. The number of extended dry periods is projected to increase substantially by mid-century during autumn and summer.

In relation to storms, '*Report No.159 – Ensemble of regional climate model projections for Ireland*' (EPA, 2015) indicates that the overall number of North Atlantic cyclones is projected to decrease by 10% coinciding with a decrease in average mean sea-level pressure of 1.5 hectopascals (hPa) for all seasons by mid-century. Wind energy is also predicted to decrease for spring, summer and autumn with a projected increase in winter.

EPA's State of the Irish Environment Report (Chapter 2: Climate Change) (EPA 2020a) notes that projections show that full implementation of additional policies and measures, outlined in the 2019 Climate Action Plan, will result in a reduction in Ireland's total GHG emissions by up to 25 per cent by 2030 compared with 2020 levels. Climate change is not only a future issue in Ireland, as a warming of approximately 0.8°C since 1900 has already occurred. The report (EPA 2020a) underlines that the next decade needs to be one of major developments and advances in relation to Ireland's response to climate change in order to achieve these targets and that Ireland must accelerate the rate at which it implements GHG emission reductions. The report states that mid-century mean annual temperatures in Ireland are projected to increase by between 1.0°C and 1.6°C (subject to the emissions trajectory). In addition, heat events are expected to increase by mid-century (EPA 2020a). While individual storms are predicted to have more severe winds, the average wind speed has the potential to decrease (EPA 2020a).

Future climate predictions undertaken by the EPA have been published in 'Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach (EPA 2020b). The future climate was simulated under both Representative Concentration Pathway 4.5 (RCP4.5) (medium-low) and RCP8.5 (high) scenarios. This study indicates that by the middle of this century (2041–2060). Mid-century mean annual temperatures are projected to increase by 1 to 1.2°C and 1.3 to 1.6°C for the RCP4.5 and RCP8.5 scenarios, respectively, with the largest increases in the east. Warming will be enhanced at the extremes (i.e. hot days and cold nights), with summer daytime and winter night-time temperatures projected to increase by 1 to 2.4°C. There will be a substantial decrease of approximately 50% which is projected for the number of frost and ice days. Summer heatwave events are expected to occur more frequently, with the largest increases in the south. In addition, precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events. Climate change also has the potential to impact future energy supply which will rely on renewables such as wind and hydroelectric. Wind turbines need a specific range of wind speeds to operate within and droughts or low ground water levels may impact hydroelectric energy generating sites. More frequent storms have the potential to damage the communication networks requiring additional investment to create resilience within the network.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (°C)													
Mean Daily Max	8.0	8.2	10.2	12.4	15.2	17.9	18.8	18.5	17.1	13.6	10.2	8.3	13.4
Mean Daily Min	2.1	2.0	3.3	4.1	6.6	9.4	11.5	11.3	9.5	7.0	4.2	2.4	6.1
Mean Temperature	5.1	5.1	6.8	8.2	10.9	13.6	15.7	15.4	13.3	10.3	7.2	5.4	9.7
Absolute Max.	15.2	15.9	17.3	22.7	24.9	27.6	31.0	29.5	25.4	21.3	17.7	14.8	31.0
Min. Maximum	-3.0	-0.7	2.3	4.5	7.1	10.2	10.6	11.7	10.8	5.2	-3.1	-4.7	-4.7
Max. Minimum	11.3	13.0	11.5	12.6	13.8	17.2	18.1	18.3	17.8	16.4	13.8	12.7	18.3
Absolute Min.	-12.4	-8.0	-9.0	-5.5	-2.4	0.4	4.6	2.2	0.2	-4.1	-9.1	-15.7	-15.7
Mean Num. of Days with Air Frost	7.5	7.7	4.6	3.4	0.8	0.0	0.0	0.0	0.0	1.3	4.3	7.6	37.2
Mean Num. of Days with Ground Frost	14.0	14.0	11.0	11.0	4.0	0.0	0.0	0.0	1.0	4.0	9.0	14.0	82.0
Mean 5cm Soil	3.7	3.6	5.3	8.4	12.6	15.7	17.1	16.0	12.8	9.2	6.0	4.2	9.6
Mean 10cm Soil	3.9	3.8	5.2	7.6	11.4	14.6	16.2	15.3	12.6	9.2	6.2	4.4	9.2
Mean 20cm Soil	4.6	4.5	5.9	8.1	11.5	14.5	16.3	15.8	13.4	10.1	7.1	5.1	9.7
Relative Humidity (%)													
Mean at 0900UTC	87.2	86.7	84.5	80.1	77.4	77.7	79.7	82.2	84.5	86.3	88.9	88.4	83.6
Mean at 1500UTC	82.2	76.7	71.8	67.7	67.3	67.9	68.9	69.0	71.8	76.6	81.6	84.1	73.8
Sunshine (hours)													
Mean Daily Duration	1.7	2.5	3.3	5.1	6.0	5.3	4.9	4.8	4.1	3.3	2.2	1.5	3.7
Greatest Daily Duration	8.1	9.2	10.9	13.2	15.4	16.0	15.5	14.4	12.3	10.1	8.5	6.9	16.0
Mean Num. of Days with No Sun	8.9	5.8	4.4	2.5	1.8	2.1	1.6	1.1	2.4	4.5	7.0	9.9	52.0
Rainfall (mm)													
Mean Monthly Total	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.2
Greatest Daily Total	30.0	32.2	31.1	38.7	29.8	97.5	33.7	89.3	51.1	50.1	82.0	46.8	97.5
Mean Num. of Days with >= 0.2mm	17	14	16	14	15	14	15	16	14	16	16	16	183
Mean Num. of Days with >= 1.0mm	12	10	11	10	11	10	10	11	10	12	11	12	130
Mean Num. of Days with >= 5.0mm	4	3	3	3	3	3	3	4	4	4	4	5	43
Wind (knots)													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Monthly Speed	13.6	12.9	12.4	9.8	9.1	8.6	8.8	9.0	9.6	11.1	11.6	12.3	10.7
Max. Gust	80	78	71	59	63	51	58	55	59	65	66	82	82
Max. Mean 10-Minute Speed	57	54	47	43	43	36	39	36	38	44	46	57	57
Mean Num. of Days with Gales	4.5	3.2	2.1	0.6	0.4	0.1	0.1	0.2	0.3	1.2	1.9	3.5	18.1
Weather (Mean No. of Days with.)													
Snow or Sleet	4.1	3.9	2.5	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.5	2.3	14.6
Snow Lying at 0900UTC	1.8	1.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	4.1
Hail	1.0	1.5	2.7	2.4	1.5	0.2	0.2	0.1	0.2	0.2	0.7	0.6	11.3

Table 18.6 **Casement Aerodrome 1981-2010**

18.3.3 Existing GHG Emissions Baseline

For 2021, baseline GHG emissions in Ireland are estimated to be 61.528 Mt CO_{2eq} as shown in Table 18.7. The sector with the highest emissions is agriculture at 37.5% of the total, followed by transport at 17.7% and energy industries at 16.7%. In relation to energy, the total emissions amount to 10,272 kiltonnes of CO_{2eq} in 2021.

Category	Kilotonnes (kt) CO_{2eq}	% of Total GHG Emissions
Waste	937	1.5%
Energy Industries	10,272	16.7%
Residential	7,040	11.4%
Manufacturing Combustion	4,593	7.5%
Commercial Services	817	1.3%
Public Services	663	1.1%
Transport	10,912	17.7%
Industrial Processes	2,460	4.0%
F-gases	738	1.2%
Agriculture	23,097	37.5%
Total	61,528	100%

Table* 18.7 *GHG Emissions In Ireland 20121

18.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

18.4.1 Construction Phase

The proposed development will comprise construction of an energy centre and associated ancillary development. The key civil engineering works which will have a potential impact on climate during construction are summarised below:

(i) During construction, an amount of soil will be generated as part of the site preparation works and during excavation for installation of foundations, drainage services and ancillary infrastructure;

(ii) Embodied carbon associated with the raw materials used in the construction of the energy centre including cement and steel will lead to indirect GHG emissions at the point of manufacture;

(iii) Following completion of the building shell, commissioning of the mechanical and electrical equipment is undertaken;

(iv) Infilling and landscaping will be undertaken. Spoil generated during site preparation will be re-used where possible;

(v) Temporary storage of construction materials and fuels; and

(vi) Construction traffic accessing the site will emit air pollutants and greenhouse gases during transport.

As outlined in Section 18.6, a construction management plan has been formulated for the construction phase of the proposed development as outlined in the *Construction Environmental Management Plan – Proposed Development (Equinix DB8)* which will help to minimise the release of GHG emissions.

18.4.2 Operational Phase

The key works which will have a potential impact on climate during operation of the proposed development are summarised below. Other works such as low levels of site traffic will have an insignificant impact on climate:

(i) The operation of the gas generators and the scheduled testing of the back-up diesel generators in the data centre facilities will release GHG emissions;

(ii) The infrequent emergency operation of the back-up diesel generators for the data centre facilities in the event of a power outage would release GHG emissions. An outage may occur due to scheduled maintenance or an interruption to gas supply. A review of operational data from similar operational data centre facilities in Ireland indicates that it is highly unlikely that the back-up generators would be used for emergency operations for more than 24 - 48 hours per year. This is an over-estimation of the actual usage;

(iii) Road traffic accessing the site will emit greenhouse gases. However, the operational phase of the proposed development is not expected to contribute a significant volume of additional traffic on the local road network (see Chapter 13). Therefore, no local GHG assessment of the traffic impact is required for this development; and

(iv) The direct GHG emissions, based on operation of the gas generators and indirect impact of GHG emissions from electricity to operate the data centre will have an impact on climate. These emissions have been assessed in detail in Section 18.7.2.2.

18.5 LIKELY IMPACTS OF THE PROPOSED DEVELOPMENT

18.5.1 Construction Phase

Construction traffic would be expected to be the dominant source of direct greenhouse gas emissions as a result of the Proposed Development and the Overall Project. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development. The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Indirect emissions of GHGs will also occur due to the embodied carbon associated with the raw materials used in the construction of the data centre including cement and steel with GHG emissions occurring at the point of manufacture.

It is important to note that the likely impacts associated with the construction phase of the Proposed Development and the Overall Project are short-term in nature. When the mitigation measures detailed in the mitigation section (see Section 18.6.1) of this chapter are implemented, direct GHG emissions from the site will not be significant whilst the embodied carbon emissions associated with the manufacture of the facility will not be significant. Due to the duration and nature of the construction activities, CO_2 and N_2O emissions from construction vehicles and machinery will have a ***short-term*** and ***imperceptibly negative*** impact on climate and thus have a ***not significant*** impact.

18.5.1.1 Impact of Climate Change on the Construction Phase

Appropriate flood risk measures and extreme weather events have been considered as part of the construction planning. As outlined in the DB8 Flood Risk Assessment Report, any fluvial flooding adjacent to the environs of the site is considered to be of an extreme nature, i.e. 1:1000 year storm event and would not jeopardise the proposed development of the site, particularly as the site will be positively drained and surface water will be contained within the overall sites drainage network and managed in a sustainable manner in accordance with all relevant guidelines and specifications. Thus, the potential for changes to long-term seasonal averages as a result of climate change are not considered to be as significant. Thus, in line with the methodology outlined in Table 18.3, Table 18.4 and Table 18.5, the likelihood of extreme weather and flooding is assessed to be of either very low or low likelihood and with a moderate adverse effect leading to a finding of low risk and thus a non-significant impact.

No major accident scenarios of concern have been identified during the construction phase as a result of climate change. As such there is no risk of a major accident.

18.5.2 Operational Phase

The Proposed Development and the Overall Project has the potential, in the absence of mitigation, to release significant quantities of GHG emissions during the operational phase of the project. However, as the Proposed Development and the Overall Project is over 20 MW thermal input, a greenhouse gas emission permit will be required for the facility which will be regulated under the EU-wide Emission Trading System (ETS) which necessitates operating under a “cap and trade” scheme. Thus, the proposed development will operate under a system where carbon emissions will become increasingly costly and will encourage the least-cost pathway to GHG emission reductions.

In addition, as outlined in the *Regulation (EU) 2018/842*, any new electricity provider (including the Proposed Development and the Overall Project) will be treated as a “new entrant” under Phase IV of the ETS (i.e. an electricity generator or site obtaining a GHG emissions permit for the first time after 30th June 2018). The new electricity provider will be required to purchase allocations in the same manner as existing players in the market using the European Energy Exchange. EU leaders have also decided that during Phase IV (2021-2030) 90% of the revenue from the auctions will be allocated to the Member States on the basis of their share of verified emissions with 10% allocated to the least wealthy EU member states. The revised EU ETS Directive has enshrined in law the requirement that at least 50% of the auctioning revenues or the equivalent in financial value should be used for climate and energy related purposes.

18.5.2.1 Impact of Climate Change on the Operational Phase

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. Changes in climate will lead to a variety of associates GHG impacts including:

- Increased average temperatures will lead to a greater requirement for cooling of the data centre leading to greater energy use and associated GHG emissions;
- Increase rainfall will lead to a greater risk of flooding;
- Periods of drought may lead to reduction in water availability.

As a result of this there is the potential for flooding related impacts on site in future years. Chapter 8 (Hydrology) has investigated the likelihood of flooding and has found that there is no current or predicted flood risk (either fluvial, pluvial or coastal) for the site. Any fluvial flooding is considered to be of an extreme nature, i.e. 1:100 year storm event and would not endanger the proposed development of the site. In addition, the site is located within Flood Zone C "Low Probability". Thus, in line with the methodology outlined in Table 18.3, Table 18.4 and Table 18.5, the likelihood of extreme weather and flooding was assessed to be of low likelihood and with a moderate adverse effect leading to a finding of low risk and thus a non-significant impact.

RCP 8.5 scenario predicts warming of the extreme temperatures could be up to 5°C. This could result in maximum temperatures of 36°C (Table 19.6). The diesel in the back-up generators has a flash point >55°C (the lowest temperature a liquid will form a vapour and ignite). Therefore, the temperature increase due to climate change does not increase the risk of a major accident at the proposed development; thus, a non-significant impact.

Under the 2023 Climate Action Plan, the National Adaptation Framework, which aims to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts, remains in place as does the Carbon Action Plan, which will reduce GHG emissions in future years, with a number of other strategies currently being proposed.

The Electricity & Gas Networks Sector Climate Change Adaptation Plan prepared under the National Adaptation Framework has been prepared by the Department of Communications, Climate Action and Environment (DCCAE 2019) and considers future climate change impacts on energy infrastructure and aims to reduce vulnerability by building resilience in the energy sector. The plan proposes to avoid or minimise future adverse impacts within the sector and to exploit opportunities. Steps include diversification of energy sources, improved communication between relevant bodies/stakeholders, a requirement for energy network companies to continue to ensure climate change is taken into account in planning and design standards and engineering management practices and identification of vulnerable areas and measures to take with respect to climate impacts.

18.5.3 Do Nothing Scenario – Construction Phase

Under the Do Nothing Scenario no construction works will take place and the previously identified impacts of GHG emissions from equipment and machinery will not occur. The proposed site will remain as a greenfield site and will not lead to any GHG emissions. Therefore, this scenario can be considered ***neutral*** in terms of climate.

18.5.4 Do Nothing Scenario – Operational Phase

Under the Do Nothing Scenario GHG emissions will take place from the permitted development. The main emissions will be associated with electricity associated with the operation of the data centre and infrequent operation of the backup generators.

The indirect (due to electricity) and direct (due to diesel usage) CO_2 emissions to operate the permitted facility has been assessed below in the context of Ireland's national annual

CO_2 emissions. The Sustainable Energy Authority of Ireland (SEAI, 2020) states on its website that the average CO_2 emission factor for electricity generated in Ireland was 348 gCO_2/kWh in 2021 whilst for diesel the average CO_2 emission factor in Ireland was 263.9 gCO_2/kWh in 2021.

Thus, for Year 2026 (expected full year of operation), the GHG emissions from electricity will be based on the expected GHG emission rate in 2026 taking into the account the ESB projections out to 2032 (ESB, 2022). The expected values for each year from 2026 to 2040 is shown below in Table 18.8.

Year	Electricity[Note 1] (g CO_2 / kWh)
2025	0.237
2026	0.209
2027	0.182
2028	0.155
2029	0.127
2030	0.100
2031	0.095
2032	0.090
2033	0.085
2034	0.080
2035	0.075
2036	0.070
2037	0.065
2038	0.060
2039	0.055
2040	0.050

Note 1 Based on a carbon intensity of 348 g CO_2 / kWh in 2021 and assuming linear interpolation to 100 CO_2 / kWh by 2030 and zero CO_2 / kWh by 2050.

Table 18.8 *Carbon Intensity of Electricity From 2026 - 2040*

For the existing permitted development, the facility will use electricity from the National Grid. Thus, based on electricity from the National Grid for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 6.03MW of power this equates to 52.5 GWh annually. This translates to approximately 10,967 tonnes of CO_2eq per year (including generator testing) based on the likely 2026 electricity mix and approximately 5,239 tonnes of CO_2eq per year (including generator testing) based on the likely 2030 electricity mix as outlined in Table 18.9.

By 2032, the load for the existing permitted development will increase to 9.25MW. Based on electricity from the National Grid for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 9.25MW of power this equates to 80.8 GWh annually. This translates to approximately 7,233 tonnes of CO_2eq per year (including generator testing) based on the likely 2032 electricity mix as outlined in Table 18.9.

For existing permitted development, the electricity provided through the national grid will fully operate under the ETS which will gradually increase the carbon price in future years in order to ensure all EU-wide GHG emission targets are met under the scheme.

Year	Existing Permitted Development (6.03 MW)	Existing Permitted Development (9.25 MW)
2025	12,399	
2026	10,967	
2027	9,535	
2028	8,103	
2029	6,671	
2030	5,239	
2031	4,977	
2032		7,233

Table 18.9 **GHG Emissions (CO2eq) For Existing Permitted Scenario (Tonnes CO2eq)**

18.6 REMEDIAL AND MITIGATION MEASURES

18.6.1 Construction Phase

The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimized wherever possible during the construction phase of the proposed development and the Overall Project. The measures will include:

- All vehicles will be required to switch off engines when stationary (no idling);
- All vehicles will be serviced and maintained to ensure emissions are minimised;
- Embodied Carbon will be investigated at detailed design stage;
- Where practicable, materials will be reused within the extent of the Proposed Development; and
- Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport.

19.6.2 Operational Phase

The gas engines and diesel generators will be regularly serviced to ensure that they operate to their maximum efficiency. In addition, the data centre is designed to minimize energy use including the use of PV roof panels. A heat recovery building is also provided in the event future connection can be made to a district heating system in the area. In addition, an IT cooling system will cool water via free cooling air cooled chillers. From the chillers, water is circulated into data hall fan arrays which distribute cooled recirculated air back into the data hall.

The delivery of sustainable gas is presented in Gas Networks Ireland 2050 vision. This presents a clear strategy to transition to a zero carbon grid through the use of renewable gas, carbon capture and hydrogen to ensure sustainable gas delivery. In addition, the Climate Action Plan 2023 includes KPI for 20 AD plants producing 1TWh of biomethane per year by 2025 and 5.7TWh by 2030 from up to 200 AD plants which the plant has been future proofed to utilise.

18.7 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

18.7.1 Construction Phase: Proposed Development – OSPG

18.7.1.1 *Impact of Construction* Phase: Proposed Development - OSPG

The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the likely impact on climate change from the Proposed Development - OSPG is deemed to be ***short-term, imperceptibly negative*** and ***not significant*** in relation to Ireland's obligations under the EU 2030 target.

18.7.1.2 *Impact of Construction* Phase: Overall Project – OSPG & Data Centre

The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the likely impact on climate change from the Overall Project – Data Centre & OSPG is deemed to be ***short-term, imperceptibly negative*** and ***not significant*** in relation to Ireland's obligations under the EU 2030 target.

18.7.2 Operational Phase: Proposed Development - OSPG

18.7.2.1 *Impact of Climate Change on the Operational* Phase: Proposed Development - OSPG

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. A detailed flood risk assessment has been undertaken as part of this planning application and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the impact of climate change on the Proposed Development - OSPG will be ***imperceptible***.

18.7.2.2 *Impact of the Operational Phase on Climate*: Proposed Development - OSPG

Under the Proposed Development - OSPG Scenario, the main GHG emissions will be associated with gas engines associated with the operation of the data centre and infrequent operation of the backup generators. The associated GHG emissions will be mainly dictated by the carbon intensity of gas which is likely to change over time in line with Ervia predictions (Ervia, 2019). The expected GHG emissions from gas / biomethane is shown in Table 18.10 based on the 2021 carbon intensity of natural gas (203 gCO_2/kWh) which is assumed to remain constant to 2032, a gas engine efficiency of 45% and assuming an increase in biomethane in the network from a level of 8% in 2025 increasing to 20% in 2032 as outlined in GNI report entitled "*Vison 2050 – A Net Zero Carbon Gas Network For Ireland*" (GNI, 2021). In order to be conservative, the predicted penetration of hydrogen and natural gas with carbon capture has been ignored in these calculations (i.e. it has been assumed that neither of these sources will be available).

The direct (due to natural gas and diesel usage) CO_2 emissions to operate the Proposed Development - OSPG facility has been assessed below in the context of Ireland's national annual CO_2 emissions. Thus, for Year 2026 (expected full year of operation), the GHG emissions from natural gas will be based on the expected GHG emission rate in 2026 taking into the account the GNI projections out to 2032 (Ervia, 2019). The expected values for each year from 2026 to 2032 is shown below in Table 18.10.

Year	Natural Gas[Note 1] ($g\ CO_2$ / kWh)
2025	0.187
2026	0.183
2027	0.178
2028	0.173
2029	0.170
2030	0.166
2031	0.164
2032	0.162

Note 1 Based on a carbon intensity of 203 g CO_2 / kWh in 2020 and based on the penetration of biomethane as outlined in GNI publication "*Vison 2050 – A Net Zero Carbon Gas Network For Ireland*". It has been assumed that there is no hydrogen in the network and that there is no carbon capture of natural gas as a worst-case assumption.

Table 18.10 ***Carbon Intensity of Natural Gas/Biomethane From 2026 - 2032***

For the Proposed Development - OSPG Scenario, it is assumed that the facility will use natural gas from opening year until 2031 approximately. Thus, based on natural gas for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 0.2MW of power this equates to 1.7 GWh annually. This translates to approximately 705 tonnes of CO_2eq per year (including generator testing) based on the likely 2026 electricity mix and approximately 643 tonnes of CO_2eq per year (including generator testing) based on the likely 2030 electricity mix as outlined in Table 18.11.

By 2032, the load for the Proposed Development - OSPG Scenario will remain at 0.2MW and it is assumed the facility will operate using electricity from the national grid. Based on electricity for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 0.2MW of power this equates to 1.7 GWh annually. This translates to approximately 156 tonnes of CO_2eq per year (including generator testing) based on the likely 2032 electricity mix as outlined in Table 18.11.

For the Proposed Development - OSPG Scenario, the electricity provided through the national grid will fully operate under the ETS which will gradually increase the carbon price in future years in order to ensure all EU-wide GHG emission targets are met under the scheme.

Year	Proposed Development - OSPG Scenario (0.2 MW)
2025	721
2026	705
2027	686
2028	666
2029	655
2030	643
2031	635
2032	156

Table 18.11 **GHG Emissions (CO2eq) For Proposed Development - OSPG Scenario (Tonnes CO2eq)**

18.7.2.3 Impact of the Operational Phase on Climate: Overall Scenario – Data Centre and OSPG

Under the Overall Scenario – Data Centre and OSPG, the main GHG emissions will be associated with gas engines associated with the operation of the data centre and infrequent operation of the backup generators.

The direct (due to natural gas and diesel usage) CO_2 emissions to operate the Overall Scenario – Data Centre and OSPG has been assessed below in the context of Ireland's national annual CO_2 emissions. Thus, for Year 2026 (expected full year of operation), the GHG emissions from natural gas will be based on the expected GHG emission rate in 2026 taking into the account the GNI projections out to 2032 (Ervia, 2019). The expected values for each year from 2026 to 2032 is shown below in Table 18.12.

Year	Natural Gas Note 1 (g CO_2 / kWh)
2025	0.187
2026	0.183
2027	0.178
2028	0.173
2029	0.170
2030	0.166
2031	0.164
2032	0.162

Note 1 Based on a carbon intensity of 203 g CO_2 / kWh in 2020 and based on the penetration of biomethane as outlined in GNI publication "*Vison 2050 – A Net Zero Carbon Gas Network For Ireland*". It has been assumed that there is no hydrogen in the network and that there is no carbon capture of natural gas as a worst-case assumption.

Table 18.12 Carbon Intensity of Natural Gas/Biomethane From 2026 - 2032

For the Overall Scenario – Data Centre and OSPG, it is assumed that the facility will use natural gas from opening year until 2031 approximately. Thus, based on natural gas for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 6.23MW of power this equates to 54.6 GWh annually. This translates to approximately 21,975 tonnes of CO_2eq per year (including generator testing) based on the likely 2026 natural gas / biomethane fraction and approximately 20,022 tonnes of CO_2eq per year (including generator testing) based on the likely 2030 natural gas / biomethane fraction as outlined in Table 18.13.

By 2032, the load for the Overall Scenario – Data Centre and OSPG will increase to 9.45MW and it is assumed the facility will operate using electricity from the national grid. Based on electricity for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 9.45MW of power this equates to 82.8 GWh annually. This translates to approximately 7,389 tonnes of CO_2eq per year (including generator testing) based on the likely 2032 electricity mix as outlined in Table 18.13.

For Overall Scenario – Data Centre and OSPG, the electricity provided through the national grid will fully operate under the ETS which will gradually increase the carbon price in future years in order to ensure all EU-wide GHG emission targets are met under the scheme.

Year	Overall Project - OSPG & Data Centre Scenario (6.23 MW)	Overall Project - OSPG & Data Centre Scenario (9.45 MW)
2025	22,464	
2026	21,975	
2027	21,365	
2028	20,754	
2029	20,388	
2030	20,022	
2031	19,778	

2032		7,389

Table 18.13 **GHG Emissions (CO2eq) For Proposed Development - OSPG Scenario (Tonnes CO2eq)**

18.7.2.4 *Impact of the Operational Phase on Climate*: Medium Term Option Scenario – Retain The OSPG With A Grid Connection.

Under the Medium Term Option Scenario – Retain The OSPG With A Grid Connection, the facility will operate using electricity from the national grid by 2032 and infrequent operation of the OSPG for up to 500 hours per year.

Based on electricity for 8,188 hours per year, the OSPG for 500 hours per year and diesel generators usage for 72 hours per year, will consume 9.45MW of power this equates to 82.9 GWh annually. The GHG emissions is based on the likely electricity mix as outlined in Table 18.8.

The Medium Term Option Scenario – Retain The OSPG With A Grid Connection, based on the use of electricity for 8,188 hours per year, the OSPG for 500 hours per year and diesel generators usage for 72 hours per year which will consume 9.45MW of power equating to 82.9 GWh annually. This translates to approximately 8,878 tonnes of CO_2eq per year (including generator testing) based on the likely 2032 emission rates and approximately 5,548 tonnes of CO_2eq per year (including generator testing) based on the likely 2040 electricity emission rate as outlined in Table 18.14.

For Medium Term Option Scenario – Retain The OSPG With A Grid Connection, the power provided through the OSPG will fully operate under the ETS which will gradually increase the carbon price in future years in order to ensure all EU-wide GHG emission targets are met under the scheme.

Year	Medium Term Option Scenario – Retain The OSPG With A Grid Connection Scenario (9.45 MW)
2032	8,878
2033	8,459
2034	8,040
2035	7,621
2036	7,202
2037	6,794
2038	6,386
2039	5,967
2040	5,548

Table 18.14 **GHG Emissions (CO2eq) For Medium Term Option Scenario – Retain The OSPG With A Grid Connection (Tonnes CO2eq)**

18.7.2.5 *Impact of the Operational Phase on Climate*: Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG.

Under the Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG, the main GHG emissions will be associated with gas engines associated with the operation of the data centre which is assumed to remain in operation for at least 15 years and infrequent operation of the backup generators.

The direct (due to natural gas and diesel usage) CO_2 emissions to operate the Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG has been assessed below in the context of Ireland's national annual CO_2 emissions. Thus, for Year 2033, the GHG emissions from natural gas will be based on the expected GHG emission rate in 2033 taking into the account the GNI projections out to 2042 (Ervia, 2019). The expected values for each year from 2033 to 2042 is shown below in Table 18.15.

Year	Natural Gas[Note 1] (g CO_2 / kWh)
2033	0.354
2034	0.347
2035	0.341
2036	0.334
2037	0.329
2038	0.325
2039	0.318
2040	0.311
2041	0.309
2042	0.307

Note 1 Based on a carbon intensity of 203 g CO_2 / kWh in 2020 and based on the penetration of biomethane as outlined in GNI publication "*Vison 2050 – A Net Zero Carbon Gas Network For Ireland*". It has been assumed that there is no hydrogen in the network and that there is no carbon capture of natural gas as a worst-case assumption.

Table 18.15 Carbon Intensity of Natural Gas/Biomethane From 2033 - 2042

For the Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG, it is assumed that the facility will use natural gas from opening year until at least 2040. Thus, based on natural gas for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 9.45MW of power this equates to 82.9 GWh annually. This translates to approximately 29,838 tonnes of CO_2eq per year (including generator testing) based on the likely 2032 natural gas / biomethane fraction and approximately 25,764 tonnes of CO_2eq per year (including generator testing) based on the likely 2040 natural gas / biomethane fraction as outlined in Table 18.16.

For Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG, the power provided through the OSPG will fully operate under the ETS which will gradually increase the carbon price in future years in order to ensure all EU-wide GHG emission targets are met under the scheme.

Year	Overall Project - OSPG & Data Centre Scenario (6.23 MW)	Overall Project - OSPG & Data Centre Scenario (9.45 MW)
2031	19,915	
2032		29,838
2033		29,283
2034		28,727
2035		28,172
2036		27,616
2037		27,246
2038		26,875
2039		26,320
2040		25,764
2041		25,579
2042		25,394

Table 18.16 **GHG Emissions (CO2eq) For Overall Project - OSPG & Data Centre Scenario Based On The Long-Term Operation of the OSPG (Tonnes CO2eq)**

18.7.2.6 *Impact of the Operational Phase on Climate*: Overall Scenario – Assessment Criteria

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors as set out in Section 18.2.4. In relation to climate, as there is no project specific assessment criteria, the proposed development has been assessed against the recommended IEMA (IEMA, 2022) significance determination (see Section 18.2.4).

In reference to Principle 1 of IEMA Guidance (IEMA, 2022), the Overall Scenario – Data Centre and OSPG and Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG, the will replace activities which have a higher GHG profile. Data centre facilities represent a more efficient means of data storage when compared to a distributed model of enterprise data storage by individuals and companies (or 'enterprise sites'). Data centres are more energy efficient than enterprise sites due to comprehensive efficiency central to the design of the proposed development. In a June 2020 report, the International Energy Agency noted: *"Hyperscale data centres are very efficient large-scale cloud data centres that run at high capacity, owing in part to virtualisation software that enables data centre operators to deliver greater work output with fewer servers. The shift away from small, inefficient data centres towards much larger cloud and hyperscale data centres is evident in the shrinking share of data centre infrastructure in total energy demand…"*[6]. A study published in 2020 by Science[7] Magazine, found that while cloud computing productivity has grown globally by 550% between 2010 and 2018, energy consumption rose in tandem during the same period by just 6%, demonstrating the energy efficiency improvements of the industry, most notably by hyperscale data centres, as per the current project (hyperscale data centres are very large business-critical facilities designed to support robust scalable applications). A report from IEA entitled "Data Centres & Data Transmission Networks (IEA, 2021) found that while global internet traffic surged by more than 40% in 2020, this strong growth in demand for data centre services continues to

[6] IEA Data Centres and Data Transmission Networks – June 2020

[7] Masanet, Eric; Shehabi; Arman, Lei; Nuoa, Smith, Sarah; Koomey, Jonathan; "Recalibrating global data center energy-use estimates", Sciencemag.org, February 28, 2020, Vol. 367, Issue 6481; ("Expressed as energy use per compute instance, the energy intensity of global datacenters has decreased by 20% annually since 2010….").

be mostly offset by ongoing efficiency improvements for data centre infrastructure as shown in Figure 18.4.

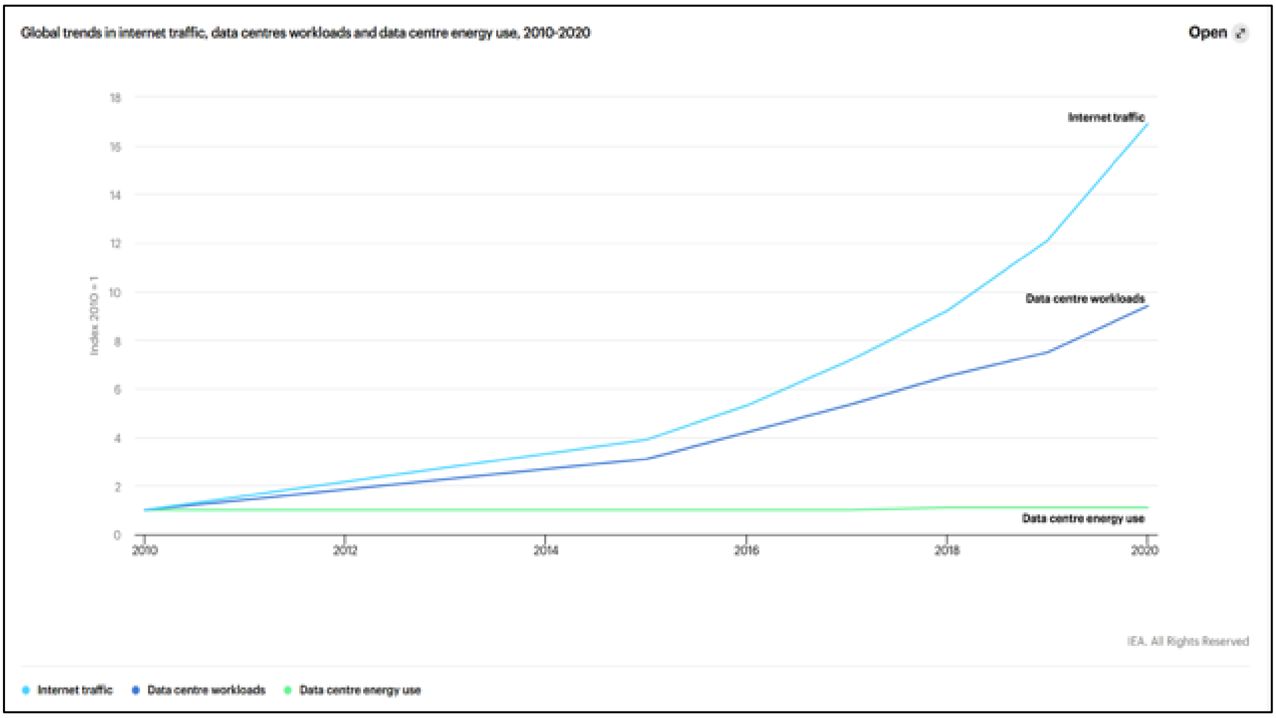


Figure 18.4 ***Global Trends In Internet Traffic, Data Centres Workloads & Data Centre Energy Use, 2010 – 2020 (IEA, 2021)***

In the wider context, data centres are at least 84% more efficient than on-premises servers and the associated GHG savings associated have not been accounted for in the current analysis[8]. In addition, the carbon intensity of electricity is predicted to decrease from 348 gCO_2/kWh in 2021 to less than 100 gCO_2/kWh in 2030 as a result of the increase in renewables to near 80% of the electricity market by 2030. Overall, all data centres in Ireland are estimated to account for 1.85% of Ireland's total carbon emissions in 2020 and it is predicted that data centres in Ireland will peak at 2.2% of total GHG emissions in 2025 and will fall or level off after this date (Host In Ireland, 2020).

In reference to Principle 2 of IEMA Guidance (IEMA, 2022), a range of measures will be employed which is in line with "best practice" as outlined in the IEMA guidance (IEMA, 2022) including the installation of PV panels and the investigation in the feasibility of a connection to a local future district heating scheme.

In reference to Principle 3 of IEMA Guidance (IEMA, 2022), it is the intention of the applicant that measures will be implemented in line with "best practice" as outlined in the IEMA guidance (IEMA, 2022). DB8 data centre is committed to Ireland's 2023 Climate Action Plan to meet 80% of electricity demand from renewable sources by 2030. The overall energy demand for this project, in terms of energy use will be offset from a CPPA. The renewable energy plant CPPA can be based on electricity production from renewables and/or e-fuel production to allow the CPPA to align with the building ramp energy use.

As the Overall Scenario – Data Centre and OSPG and Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG are both over 20 MW thermal input, a greenhouse gas emission permit will be required for the facility which will be regulated under the EU-wide Emission Trading System (ETS). Electricity providers form

[8] https://blog.aboutamazon.eu/aws/amazon-announces-new-project-in-ireland-as-part-of-commitment-to-be-100-powered-by-renewable-energy-by-2025

part of the ETS and thus greenhouse gas emissions from these electricity generators are not included when determining compliance with the targeted 42% reduction in the non-ETS sector i.e. electricity associated greenhouse gas emissions will not count towards the Effort Sharing Regulation (because the Effort Sharing Regulation relates to non-ETS emissions and any fossil-fuel related GHG emissions related, directly or indirectly, to energy generation for the proposed development will be continue to be controlled, increasingly stringently, by the ETS which is the subject of Directive 2003/87/EC as amended). On an EU-wide basis, where the ETS market in 2021 was approximately 1,307 million tonnes CO_2eq, the impact of the emissions associated with the Overall Scenario – Data Centre and OSPG and Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG will be no more than 0.004% of the total EU-wide ETS market which is imperceptible.

The Overall Scenario – Data Centre and OSPG and Overall Scenario – Data Centre and OSPG Based On The Long-Term Operation of the OSPG will both account for approximately 82.8 GWh when fully completed. However as outlined below, the facility will operate in compliance with the policies and objectives of the 2021 Climate Act. The phasing of the development and the period taken to reach full capacity within each planned phase will result in the 'ramping up' of demand associated with the project over a number of years during the lifetime of the 10-year permission to reach 9.45MW.

Table 18.17 shows the significance of the project when compared to the Electricity 2030 Sectoral Emission Ceiling based on the approach set out in IEMA guidance (IEMA, 2022). The assessment is presented both prior to and post mitigation. As shown in Table 18.17, the impact of the project prior to mitigation would be deemed to be a moderate, adverse impact. Although the project prior to mitigation is better than the "do-nothing" scenario of enterprise computers, the impact would still be significant in the absence of appropriate mitigation.

Also presented in Table 18.17 is the impact post mitigation. As outlined above the project will use "best practice" adaptive design measures (PV panels, facilitating district heating) and by using long term corporate power purchase agreements. With the implementation of these measures the impact of the proposed project, in line with the IEMA methodology (IEMA, 2022), is reduced to a minor adverse, non-significant impact. As noted previously, it has been assumed, in order to provide a conservative assessment, that hydrogen and carbon capture for natural gas are not provided for up to 2042.

Scenarios	% Of 2030 ETS Total Note 1	% Of Electricity Emission 2030 Ceiling Note 2	Significance (Prior to mitigation)	Significance (After mitigation)
Proposed Development - OSPG	0.00006%	0.0099%	Minor Adverse	Minor Adverse
Overall Project – OSPG & Data Centre	0.003%	0.71%	Moderate Adverse	Minor Adverse
Overall Project – OSPG & Data Centre Based On Long-Term Operation of the OSPG	0.004%	0.97% Note 3	Moderate Adverse	Minor Adverse

Note 1 ETS 2030 Total = 690.91 Million Tonnes CO_{2eq}

Note 2 Based on 5-year average 2026 – 2030

Note 3 Based on 5-year average 2031 – 2035

Table 18.17 *GHG Emissions Associated With Each Scenario Compared To Sectoral Emission Ceiling & ETS*

The 2023 CAP states, in relation to data centres and electricity demand, that:

" 12.3.3 ***Electricity Demand Management***

Improved electricity demand management will require more flexible demand, improved infrastructure, and supportive policies. As electrification and decarbonisation of the other sectors continues, there will be an increase in *electricity demand and a transferring of emissions from those sectors to the electricity sector. Limiting peak demand when renewable resources are unavailable, through improved flexibility and demand management, will be vital. In the short- and medium-term, new demand growth from large energy users, such as data centres, will have to be moderated to protect security of supply and ensure consistency with the carbon budget programme""*

Through a series of measures including project replacement, a reduction in residual emissions through best practice and the implementation of a series of adaptive design measures, the net impact of the proposed development is not significant. The Applicant will implement a CPPA with a renewable energy plant that is in the development stage which will add to the renewable energy capacity in Ireland. The agreement will offset the energy that is consumed by the Data Centre with the production of renewable energy. Given that the use of gas and electricity to power the facility will achieve net zero by 2050 and that the energy centre is investigating other decarbonization measure for the development, including CPPAs, the predicted impact to climate, after mitigation, is deemed to be ***long-term, negative*** and ***minor adverse***.

18.8 RESIDUAL IMPACTS

Once the mitigation measures outlined in Section 18.6 are implemented, the residual impacts on climate from the construction of the proposed development will be ***short-term*** and ***imperceptibly negative*** and for the operational phase of the proposed development will be ***long-term, negative*** and ***minor adverse.*** Thus, in terms of climate, both the construction phase and operational phase will be ***not significant***.

Interactions are addressed in Chapter 21 of this EIA Report.

18.9 CUMULATIVE EFFECTS

In relation to climate, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other (IEMA, 2022).

18.10 DECOMMISSIONING

In terms of climate, if decommissioning of the OSPG is required the direct GHG emissions from the gas engines will not occur after 6-8 years and GHG emissions will occur indirectly from electricity generation from the National Grid.

18.11 COMPLIANCE WITH SECTION 15 OF THE CLIMATE ACTION & LOW CARBON DEVELOPMENT ACT (AMENDED) 2021

Section 15 of the Climate Action & Low Carbon Development Act (Amended) 2021 states that:

(1) "A relevant body shall, in so far as practicable, perform its functions in a manner consistent with:

(a) the most recent approved climate action plan,

(b) the most recent approved national long term climate action strategy,

(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

(d) the furtherance of the national climate objective, and

(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

The GHG emissions associated with the proposed project are in compliance with the above mentioned plans, strategies and objectives. In relation to (a) 2023 Climate Action Plan, under Section12.3.1 Emission Trading System, the 2023 CAP states:

> *"The EU ETS is an important measure for reducing industry GHG emissions. The Fit for 55 proposals for the reformed EU ETS will increase emissions reductions in this sector from the current 43% to 61%, in the period 2005 to 2030. Changes include a steeper annual reduction in the emissions ceiling and reductions in free allowances, alongside the corresponding introduction of a carbon border adjustment mechanism." (2023 CAP, page 155).*

Thus, the indirect electricity emissions and the direct emissions from gas engines will both require greenhouse gas permits under the ETS in order to operate and thus the GHG emissions associated with the proposed development will be in line with the 2023 CAP.

The Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy (2022) states that the Government has a preference for data centres developments that can demonstrate a clear pathway to decarbonise and ultimately provide net zero data services. The current facility is in line with this strategy through the use of CPPAs and the minimisation of energy use including the use of PV roof panels. A heat recovery building is also provided in the event future connection can be made to a district heating system in the area.

In relation to (B), the Long-term Climate Action Strategy has not yet been published although government issued the "Long-term Strategy on Greenhouse Gas Emissions Reduction" in November 2019 (Government of Ireland, 2019). In relation to electricity the Government commits to the full decarbonisation of the electricity system by 2050.

The current project is in line with this strategy as the electricity associated with the project will reduce in line with national policy to obtain net zero by 2050. In addition, the GNI report Vision 2050 – A Net Zero Carbon Gas Network For Ireland" (Ervia, 2019) highlights that by 2050 natural gas will be replaced by biomethane, abated natural gas (with Carbon Capture & Storage (CCS)) and hydrogen. By 2032 it is envisaged that 20% of current demand will be renewable gas and increasing to over 50% by 2050. The report states that CCS technologies will increasingly capture and store CO_2 emissions from natural gas used for power generation and large industry and will deliver net zero carbon by 2050. Thus, Gas Networks Ireland has stated that the impact of using gas supplied by Ervia by 2050 will not be significant and will have an overall net zero impact on climate.

In relation to (C) national and sectoral adaptation plans and (E) "adapting to the effects of climate change on the state", the project has completed a detailed flood risk assessment for the project and adequate attenuation and drainage have been provided to account for increased rainfall in future years.

In relation to (D) the national climate objective, the 2023 CAP has stated that:

"Under the Climate Action and Low Carbon Development (Amendment) Act 2021, Ireland's national climate objective requires the State to pursue and achieve, by no later than the end of the year 2050, the transition to a climate-resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy. The Act also provides for a reduction of 51% in GHG emissions by 2030, compared to 2018 levels.

Our statutory national climate objective and 2030 targets are aligned with Ireland's obligations under the Paris Agreement and with the European Union's objective to reduce GHG emissions by at least 55% by 2030, compared to 1990 levels and to achieve climate neutrality in the European Union by 2050." (2023 CAP, page 30)

Thus, the proposed project aligns with the national climate objective as the project will be within the EU ETS which is the cornerstone of the EU's objective to reduce GHG emissions by at least 55% by 2030 (compared to 1990) and to achieve climate neutrality by 2050.

In regards to (E) the objectives of mitigating greenhouse gases, the proposed project has the following benefits which will all help to mitigate greenhouse gas emissions:

I. The project will replace activities which have a higher GHG profile. Data centre facilities represent a significantly more efficient means of data storage when compared to a distributed model of enterprise data storage by individuals and companies (or 'enterprise sites'). A study published in 2020 by Science Magazine, found that while cloud computing productivity has grown globally by 550% between 2010 and 2018, energy consumption rose in tandem during the same period by just 6%, demonstrating the energy efficiency improvements of the industry, most notably by hyperscale data centres.

II. A range of measures will be employed which is in line with "best practice" as outlined in IEMA (IEMA, 2022) including the installation of PV panels, and the installation of flow and return pipes from the Energy Centre which will allow an onward connection to a local user for heat or a future heat network.

III. Measures will be implemented in line with "best practice" as outlined in IEMA (IEMA, 2022). The applicant will implement a CPPA with a renewable energy plant that is in the development stage which will add to the renewable energy capacity in Ireland. The agreement will offset the energy that is consumed by the Data Centre with the production of renewable energy.

In summary, the facility will operate under the ETS and will thus be required to operate within the limits of the system which includes carbon pricing and a linear reduction in GHG emissions going forward. Economy-wide reductions that Ireland achieves towards its own national periodic targets, 2030 to 2050 (and intermediate quantitative targets), will be contributed to by the reductions achieved by those Irish installations that are part of the EU ETS. The 2050 target as outlined under the EU Climate Law is one of achieving climate neutrality ('Net Zero') by 2050, and thus aligns with the commitment Ireland has undertaken under the Climate Action and Low Carbon Development Act 2015 (as amended in 2021) and all reductions achieved by Irish EU ETS-participating installations will contribute towards that.

18.11 REFERENCES

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19 Cumulative Effects

19.1 Introduction

This chapter considers the likely cumulative effects of the following developments:

1. **<u>The Proposed Development</u>** for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 and the construction of an Onsite Power Generation Plant OSPG and associated site works. We refer to section 2.3.1 of this EIAR for a full description of the proposed development. (Note: the Proposed Development (no. 1) is a subset of the Overall Project (no. 2))

2. **<u>The Overall Project</u>** which includes the granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to it as per application SDCC Ref. SD22A/0156 - described in section 2.3.2 of this EIAR.

These developments are described in Chapter 2 sections 2.3.1 and 2.3.2 of this EIAR.

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, as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, ("the EIA Directive") provides that an EIAR shall include a description of the likely significant effects of the proposed project on the environment resulting from, inter alia:

> *"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".*

Cumulative effects are defined in the European Commission 'Guidance on Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (2017) as:

> *"Changes to the environment that are caused by activities/projects in combination with other activities/projects."*

19.2 Methodology

We refer to Section 1.4.1 of this EIAR for details on the competent persons who prepared and assesses the cumulative effects of each environmental topic that is included in this chapter of the EIAR.

Cumulative Effects that are relevant to the subject proposal have been assessed regarding the following relevant guidance:

- EIA Directive (2011/92EU) as amended by EIA Directive (2014/52EU)
- Planning and Development Regulations 2001 (as amended)
- Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018)
- Guidelines on the Information to be included in Environmental Impact Assessment Reports (EPA 2022)
- Guidance on the Preparation of Environmental Impact Assessment Report (European Union 2017).
- Guidelines for the Assessment of Indirect and Cumulative Effects as well as Impact Interactions, European Commission, 1999

The EPA Guidelines (2022) define cumulative effects as *"The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects."* The guidance clearly outlines that this assessment is required as while a single activity may have a minor impact, the impact may be more significant when combined with effects from other projects, current or future. It could also be relevant to consider the likely environmental loadings that may arise from the development of lands surrounding the subject project, the study area is defined for each environmental topic below.

European Union guidance (2017) states that *"It is important to consider effects not in isolation, but together, that is cumulatively."* Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from:

- The interaction between all of the different projects in the same area and,
- The interaction between the various effects within a single project.

This chapter provides a description of the likely significant effects of the Overall Project on the environment resulting from the cumulative effects with other existing or approved projects in the locality of the site as stated from the EIAR Directive 2014/52/EU resulting from, inter alia:

> *"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 likely cumulative effects are considered and assessed for each environmental aspect in Section 19.6 of this EIAR. In addition, each relevant chapter in this EIAR also addresses the cumulative effects and has been cross-referenced where applicable.

19.3 Proposed Development - Modifications to the permitted data centre and development of On Site Power Generation - Ref. SDA22/0156

The proposed development consists of the development of On Site Power Generation to power the permitted data centre in addition to modifications to the permitted data centre granted under Ref. SDA21/0186. We refer to Chapter 2 Section 2.3.1 for a full description of the proposed development.

In summary, the proposal consists of an On-site gas power generation compound (c.2,604sqm in area), which consists of 7 no. modular plant rooms (totalling c.180sqm in area), 10 no. gas fired generators and associated flues c.14.7m high, gas skid, associated modular plant and boundary treatment surrounding the compound c.6.5m high. The overall GFA of the development is reduced by c.44sqm to c.9795sqm from the previously permitted development under Ref. SD21A/0186. We refer to section 2.3.1 for a description of the modifications to the permitted data centre development under Ref. SD21A/0186.

19.3.1 Cumulative Effects - Construction Phase

Subject to a construction programme and planning approval for the proposed OSPG, it is likely that the construction works for the permitted data centre development would coincide with the construction of the proposed OSPG development and would last up to 16-18 months. The proposed OSPG development is seeking permission for 10 years. There are numerous reasons why construction might not start due to challenges to acquiring labour directly after permission is granted hence a likely range of when construction could start is presented below.

Overall Project - Construction timeline:

- Construction Start - Q3 2023
- Full Operation – Q2 2025

Overall Project - Construction timeline:

- Construction Start - Q3 2024
- Full Operation – Q2 2026

Cumulative effects that are likely to arise during the construction phase will be short-term effects relating to dust, noise, as well as pollution of groundwater to the existing drainage ditches associated with demolition, excavations and construction.

A working draft of a Construction Environmental Management Plan (CEMP has been prepared and will be used by the appointed contractor to prepare an updated and comprehensive CEMP for the permitted data centre and the proposed OSPG. This report has been included in Appendix 11.8 as part of this EIAR. All mitigation measures outlined therein will be implemented, as well as any additional measures required pursuant to planning conditions which may be imposed.

The preliminary CEMP mentioned above will set out the overarching vision of how the construction of the Data Centre and OSPG will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works if the Planning Authority requests other mitigation measures. The CEMP sets out requirements and standards which must be met during the construction stage and includes the relevant mitigation measures outlined in the EIA Report.

The likely cumulative effects are considered and assessed for each environmental aspect in Section 19.6 of this EIAR. The cumulative effects are also addressed within the relevant Chapters of this EIAR.

19.3.2 Cumulative Effects – Operational Phase

The cumulative effect to air quality for the operational phase of the Overall Project – Data Centre & OSPG Scenario assessed the combined impact of the facility as outlined in Section 9.7.3 as well as scheduled testing emissions associated with standby diesel generators in the neighbouring (defined as within 1km of the facility) proposed and operational data storage facilities obtained from relevant planning permission applications.

The results indicate that the ambient ground level concentrations at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario are within the relevant air quality standards for NO_2 as outlined in Section 19.6.6.2.

The cumulative operational phase impact of the Overall Project – Data Centre & OSPG Scenario in terms of Air Quality is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

The likely impact to noise during the operational phase was assessed which is presented in Section 8.9.2 of this EIAR. Once the mitigation measures outlined in Section 8.6 are implemented there will be no significant cumulative effects as a result of the permitted development and the Proposed Development operating together. The proposed development, i.e. the modified data centre and the OSPG, satisfy the planning condition which currently applies to the permitted data centre development.

We refer the Planning Authority to Chapter 8 and 9 of this EIAR for more details relating to the air and noise created during the operational and construction phase of the development.

19.3.2 Cumulative Effects – Decommissioning Phase

If the grid is upgraded in 6-8years and the decommissioning of the OSPG is required, the mitigation measures outlined throughout this EIAR for the Construction Phase of Each Environmental Topic for the Proposed Development will be employed for the decommissioning phase we refer to each environmental topic that assess the effect of the decommissioning phase.

19.4 Overall Project - granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to this application as per application SDCC Ref. SDA22/0156

In summary, the Overall Project consists of an On-site gas power generation compound (c.2,604sqm in area), which consists of 7 no. modular plant rooms (totalling c.180sqm in area), 10 no. gas fired generators and associated flues c.14.7m high, gas skid, associated modular plant and boundary treatment surrounding the compound c.6.5m high. The overall GFA of the development is reduced by c.44sqm to c.9795sqm from the previously permitted development under Ref. SD21A/0186.

The Data Centre development is the parent permission for the subject site permitted under Ref. SDA21/0186. We refer to Section 2.3.2 of this EIAR for a full description of the Overall Project.

19.4.1 Cumulative Effects - Construction Phase

Subject to a construction programme and planning approval for the proposed OSPG, it is likely that the construction works for the permitted data centre development would coincide with the construction of the proposed OSPG development and would last up to 16-18 months. The proposed OSPG development is seeking permission for 10 years. There are numerous reasons why construction might not start due to challenges to acquiring labour directly after permission is granted hence a likely range of when construction could start is presented below.

Overall Project - Construction timeline:

- Construction Start - Q3 2023
- Full Operation – Q2 2025

Overall Project - Construction timeline:

- Construction Start - Q3 2024
- Full Operation – Q2 2026

Cumulative effects that are likely to arise during the construction phase will be short-term effects relating to dust, noise, as well as pollution of groundwater to the existing drainage ditches associated with demolition, excavations and construction.

A working draft of a Construction Environmental Management Plan (CEMP has been prepared and will be used by the appointed contractor to prepare an updated and comprehensive CEMP for the permitted data centre and the proposed OSPG. This report has been included in Appendix 11.8 as part of this EIAR. All mitigation measures outlined therein will be implemented, as well as any additional measures required pursuant to planning conditions which may be imposed.

The preliminary CEMP mentioned above will set out the overarching vision of how the construction of the Data Centre and OSPG will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works if the Planning Authority requests other mitigation measures. The CEMP sets out requirements and standards which must be met during the construction stage and includes the relevant mitigation measures outlined in the EIA Report.

The likely cumulative effects are considered and assessed for each environmental aspect in Section 19.6 of this EIAR. The cumulative effects are also addressed within the relevant Chapters of this EIAR.

19.4.2 Cumulative Effects - Operational Phase

The cumulative effect to air quality for the operational phase of the Overall Project – Data Centre & OSPG Scenario assessed the combined impact of the facility as outlined in Section 9.7.3 as well as scheduled testing emissions associated with standby diesel generators in the neighbouring (defined as within 1km of the facility) proposed and operational data storage facilities obtained from relevant planning permission applications.

The results indicate that the ambient ground level concentrations at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site and nearby facilities lead to an ambient NO_2 concentration (including background) which is 86% of the maximum ambient 1-hour limit value (measured as a 99.8^{th} percentile) and 75% of the annual limit value at the maximum off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8^{th} percentile) and annual mean NO_2 ground level concentrations for the Cumulative Scenario are illustrated as concentration contours in Figures 9.8 and 9.9.

The cumulative operational phase impact of the Overall Project – Data Centre & OSPG Scenario is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

The likely impact to noise during the operational phase was assessed which is presented in Section 8.9.2 of this EIAR. Once the mitigation measures outlined in Section 8.6 are implemented there will be no significant cumulative effects as a result of the permitted development and the Proposed Development operating together. The proposed development, i.e. the modified data centre and the OSPG, satisfy the planning condition which currently applies to the permitted data centre development.

We refer the Planning Authority to Chapter 8 and 9 of this EIAR for more details relating to the air and noise created during the operational and construction phase of the development.

The likely cumulative effects are considered and assessed for each environmental aspect in Section 19.6 of this EIAR. Where the cumulative effects are also addressed within the relevant Chapters, this has been crossed referenced where applicable.

19.5 Receiving Environment

19.5.1 Existing and Local Land Uses

The Overall Project is located within Profile Park approximately 10km south west of Dublin City centre. Profile Park largely comprises of commercial and industrial development with numerous data centres located within the vicinity. The sites surrounding context consist of Profile Park and industrial development to the north, Grange Castle Golf Club borders the southern and eastern boundary of the site, a residential development is located further east beyond the golf course located on the eastern side of the R136 and a permitted data centre development to the west of the site.

The existing and approved land use in the area is an industrial park that is managed by the IDA with a specific core business for data centres.

The Overall Project is in keeping with the designation of Profile Park and the Land use zoning of the site as objective "EE – To provide for enterprise and employment related uses" to which the entire of profile park is zoned. The southern and eastern border of the site is zoned Objective "OS – To preserve and provide for open space and recreational amenities" which is occupied by Grange Castle Golf Club as mentioned above.

19.5.2 Cumulative developments

This assessment of the cumulative effects from the Overall Project and other developments has taken into account any relevant developments within 2km of the subject site are either currently permitted, under construction, or any substantial projects for which plans have been submitted for the consideration of the Planning Authority and are live in the planning system and not yet decided.

These relevant developments that met the criteria are located approximately 2km from the subject site and are considered to be significant i.e. could have a likely effect on the environmental. Each environmental topic has identified relevant cumulative developments that are likely to create a cumulative effect which is included in this chapter.

Any applications that are deemed small i.e. residential extensions, retention and minor alterations were not considered to be relevant for the assessment of cumulative effects.

The review of the receiving environment including existing developments and permitted developments within the surrounding area comprises of large industrial developments of a similar nature to the Overall Project (proposed development and permitted development) subject of this EIAR. These relevant developments are listed in Appendix 19.1.

We note that the developments that are identified as having a likely cumulative effect with the Overall Project on the environment were submitted with an EIAR and/or included planning conditions that include appropriate mitigation measures to minimise the developments impact on the environment. These developments have been taken into account for the assessment of cumulative effects with the Overall Project.

The criteria for identifying cumulative developments that are likely to overlap with the construction and operational phase of the Overall Project are as follows:

- Applications that have been submitted within the last 5 years (2018 onwards), and any developments that have been granted over 5 year permission prior to 2018,
- are within 2km from the subject site, in order to include all of the Data Centre developments in Profile Park,
- Significant developments (i.e. that are likely to cause effects on the environment) which would include the following type of developments:
    - Data Centres,
    - Infrastructure projects including roads or utilities,
    - Power Plants,
    - Commercial Developments over 2000sqm GFA,
    - Residential Developments over 50 units.
- Developments that are permitted and are likely to overlap with the construction and operational phase of the Overall Project,
- Developments currently under construction and are likely to overlap with the construction and operational phases of the Overall Project,
- Substantial development in the planning system (in order to capture developments that could potentially be granted before the proposed development that are likely to have an effect on the environment).

The figure below illustrates the 2km radius from the boundary of the subject site which captures the whole of profile park.

Figure 77 - Subject site with 2km Raduis

19.6 Assessment of Likely Cumulative Effects

19.6.1 Population and Human Health

19.6.1.1 Construction Phase

The Overall Project has been designed to ensure there are no significant effects on human health during construction and operation, when taking into account the surrounding land uses and population, once appropriate mitigation measures as outlined in each chapter of this EIA Report are implemented.

The Overall Project and Proposed Development in addition to the developments outlined in Appendix that may be constructed at the same time as the Overall Project 19.1 will create additional short term employment during the construction phase. We note that any future development listed in appendix 19.1 of this EIAR will be required to incorporate appropriate mitigation measures including managing noise, dust, traffic, water quality, visual impact and waste management during the construction phase as such any cumulative development will not have a significant effect on human health as appropriate these mitigation measures will be implemented for the developments identified in appendix 19.1.

It is envisaged that the Overall Project including the proposed and permitted development will be constructed at the same time. During construction it is estimated to employ c. 100 – 120 no. construction workers during the construction phase which is estimated to last up to 16-18 months.

The following cumulative developments that are likely to overlap during the construction phase of the overall project have been considered, SDCC Ref. SD22A/0420, SD21A/0167, SDA/01211, ABP Ref. 312793.

The effects associated with the introduction of the construction workers for the Overall Project with the development listed above would be **short term, slight, not significant and neutral** in terms of the cumulative effects on human health and population.

Air Quality

The main outward temporary risks from the Overall Project that could be capable of resulting in cumulative effects for the construction phase on human health and populations are in relation to air quality. The conclusion of the cumulative assessment is summarised below and is outlined in detail in Section 9.8.

The mitigation measures outlined in section 9.6 of this EIAR will be implemented for the construction phase of the Overall Project which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. These mitigation measures will ensure that the effect of the cumulative fugitive emissions of dust and particulate matter from the Overall Project – Data Centre & OSPG Scenario and nearby facilities undergoing construction will be ***negligible***, ***short-term*** and ***not significant*** in nature with respect to human health and posing no nuisance at nearby receptors.

Noise

During the construction phase of the Proposed Development and permitted developments, there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. During permitting of all developments that are relevant for the noise cumulative assessment the planning authority will apply noise and vibration limits and hours of operation to limit noise and vibration to the levels proposed in Section 8.2.4 of the EIAR. Management of noise and vibration in accordance with planning conditions will ensure that the cumulative impact is slight, negative, and short term in nature.

The cumulative effect of the construction stage from the Overall Project and neighbouring schemes has been considered by each specialist consultant when preparing the relevant technical topic assessments of the EIAR.

19.6.1.2 Operational Phase

The Overall Project has been designed to ensure there are no significant effects on human health during construction and operation, when taking into account the surrounding land uses and population, appropriate mitigation measures are outlined in each chapter of this EIA Report and summarised in Chapter 21 of this EIAR will be implemented.

The following cumulative developments that are likely to overlap during the operational phase of the overall project have been considered, SDCC Ref. SD22A/0420, SD21A/0167, SD20A/01211, ABP Ref. 312793.

The effects associated with the employees for the Overall Project once operational with the development listed above would be **permanent, slight, not significant and neutral** in terms of the cumulative effects on human health and population.

The main outward emissions from the Overall Project that could be capable of resulting in cumulative effects, and effects on human health and populations during the operational phase are in relation to Air Quality, Noise, Climate and Visual Impact during the operational phase. The conclusions of these cumulative assessments are summarised below.

Air Quality

We refer to section 9.8.2 of the Air Quality Chapter cumulative impact scenario for the operational phase of the Overall Project – Data Centre & OSPG Scenario which assessed the combined impact of the facility as well as scheduled testing emissions associated with standby diesel generators in the neighbouring (defined as within 1km of the facility) proposed and operational data storage facilities obtained from relevant planning permission applications (ADSIL, Cyrus One, Google Ireland, Interxion, Edgeconnex, Echelon, Microsoft, Digital Reality Trust and Vantage Data Centres Dub 11 Ltd) as well as proposed energy centres (Greener Ideas Limited and Vantage Data Centres Dub 11 Ltd). Emissions from nearby IED licensed sites including Pfizer, Takeda and Grange Backup Power were also included in the cumulative modelling. These emission points emit air pollutants on an essentially continuous basis over the course of a year. Nearby data storage facilities have emission points (standby diesel generators) which are classified as likely emission points as these will only operate under exceptional circumstances and thus will not be in operation on a day-to-day basis. The data storage facilities do not have licenced main emission points and do not have a licence issued by the EPA in contrast to the IED Licenced facilities. Thus, the emergency operations emission points associated with other nearby data storage facilities were not considered for the purpose of this assessment. This approach is in line with the methodology of AG4 (EPA, 2020). Testing of the standby diesel generators from these facilities has been included in the cumulative impact scenario.

The cumulative assessment for the operational phase of the Overall Project – Data Centre and OSPG concludes that the cumulative operational phase of the Overall Project – Data Centre & OSPG Scenario is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

The NO_2 cumulative modelling results at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario at and beyond the site boundary are detailed in Table 9.9 based on the operation of the gas engines running on gas for the full year in addition to the operation of the backup generators operating for 72 hours per year in addition to the scheduled weekly testing and annual load-banking of all back-up generators from the Overall Project – Data Centre & OSPG Scenario and including the nearby facilities.

The results indicate that the ambient ground level concentrations at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario are within the relevant air quality standards for NO_2. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Cumulative Scenario are illustrated as concentration contours in Figures 9.8 and 9.9

We refer to table 9.9, figure 9.8 and 9.9 for more details on the cumulative scenario.

<u>Noise</u>

We refer to section 8.9 of the Noise and Vibration Chapter for the Cumulative assessment the Overall Project may have with other developments during the operational phase.

<u>Climate</u>

In relation to climate, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other (IEMA, 2022).

We refer to Chapter 18 of this EIAR for more information on the impact the Overall Porject will have on the Climate.

19.6.1.3 Decommissioning Phase

The Overall Project has been designed to ensure that there are no significant effects on human health during construction and decommissioning phase if required. When taking into account surrounding land uses and population, once appropriate mitigation measures as outlines in each chapter of this EIAR are implemented.

The effects associated with the introduction of the construction workers to decommission the OSPG if required with the developments listed in appendix 19.1 would be **short term, slight, not significant and neutral** in terms of the cumulative effects on human health and population.

<u>Summary</u>

The Overall Project, developments identified in appendix 19.1 and existing developments within the vicinity of the site are considered to have a negligible effect on the local population. There are no significant cumulative effects anticipated in relation to human health and population, the predicted cumulative effects on Air Quality and Noise are deemed short term and not significant during the construction phase of the Overall Project.

As these developments identified include mitigation measures to minimise environmental impacts beyond the site, therefore, there is limited likely for cumulative effects on human health the Overall Project may have in combination with the identified developments in appendix 19.1 during the operational phase of the Overall Project.

19.6.2 Biodiversity

The Proposed Development is an extension and amendment of planning application (SD21A/0186) which proposed to construct a 3-4No. storey data centre, plant room, ESB substation, parking facilities and all other auxiliary works within the Site. The original application, which included an NIS and EcIA, was granted planning on the 24th of March 2022. The reports submitted in support of the Permitted Development (Planning Reference: SD21A/0186) concluded that following the implementation of mitigation measures outlined in the reports submitted, there would be no significant direct or indirect effects on biodiversity onsite or in the wider surrounding area.

As the Proposed Development is located within the boundary of this granted development, cumulative or in-combination impacts on biodiversity have been considered throughout this assessment with both the Proposed and Permitted Developments onsite being viewed as the Overall Project. Therefore, the original construction works, and operational phases of the data centres have been re-assessed to account for any modifications as a result of the Proposed Development. The mitigation included as part of this report also includes for the potential in-combination effects between the Proposed Development and the Permitted Development onsite, therefore, it can be stated that no cumulative effects on biodiversity will occur as a result of the Overall Project.

A review of the South Dublin County Council Planning Portal identified the following projects within Profile Park which were considered relevant to the Overall Project in terms of likely cumulative effects.

Vantage Data Centers DUB11 Ltd. have submitted a planning application for the demolition of a two-storey residential dwelling and outbuildings to be replaced by the construction of a two-storey data centre and its associated infrastructure, ca.20m west of the Site (Planning Application No. SD22A/0420). This planning application is currently awaiting a decision from SDCC. A Request for Further Information (RFI) was issued on the 12th of January 2023. This development was subject to an Appropriate Assessment and an EIAR. Chapter 11 of the EIAR submitted in support of this development assessed the likely significant ecological effects arising from the development. This chapter states, '*no significant effects are predicted on ecology as a result of the proposed development alone in either the demolition and construction or the operation stage so there is no potential for cumulative effects*.' Therefore, should this development receive planning permission, it is considered highly unlikely that the Overall Project will result in any in-combination effects on biodiversity with this development.

Moffash Ltd. received planning consent for the construction of a Distribution Warehouse Building and associated works in Profile Park, ca.40m west of the Site in 2020 (Planning reference: SD20A/0124). This development was subject to an Ecological Impact Assessment (EcIA) prepared by Scott Cawley as part of a Request for Further Information (RFI) from the Council. This EcIA assessed a number of potential receptors and concluded that following the implementation of mitigation measures outlined in the EcIA, the potential effects on these receptors were '*not considered to be significant at any geographic scale.*' Therefore, taking the above into account and given the low ecological value of the Site, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this granted development. This site was subject to an additional planning application in 2022 by Vantage Data Centers Dub 11 Ltd. (Planning Application No. SD21A/0241). This application included for the demolition of the single storey dwelling onsite and the construction of two (2No.) data centres, a gas-powered generation plant and all associated site works. This project was subject to an Appropriate Assessment and a full Environmental Impact Assessment Report (EIAR). This application was granted by SDCC on 16th May 2022. An appeal was lodged with An Bord Pleanála (ABP) but was withdrawn. The EIAR prepared by Ramboll UK Ltd. for this development concluded that '*no significant effects are predicted on ecology as a result of the proposed* *development alone in either the demolition and construction or the operation stage so there is no potential for cumulative effects.'* Therefore, it can be concluded that the Overall Project will not result in any in-combination effects on biodiversity with this granted development.

Greener Ideas Limited have submitted a planning application for the construction of a gas fired power plant with associated plant, equipment and buildings ca.130m southwest of the Site (Planning Application No. SD21A/0167). This planning application was granted on 19th of July 2022. An EIAR was submitted as part of planning for this development. This EIAR concluded that there was no potential for in-combination effects on biodiversity with other developments at the time. Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this granted development.

Digital Netherlands VIII B.V. have submitted a planning application for the removal of an existing unused wastewater treatment facility onsite and the erection of two data buildings and all associated siteworks ca.68m southof the Site (Planning Application No. SD21A/0217). This planning application also proposed to reroute and widen the Baldonnell Stream. This planning application was granted by SDCC on 2nd of August 2022. However, it is currently awaiting a decision from an ABP appeal due in April 2023 (ABP Reference: 314461-22). This development was subject to a Appropriate Assessment and an EcIA. This EcIA concluded that the development in question would 'not result in any significant impacts on ecological receptors identified both onsite and in the surrounding area following the implementation of appropriate mitigation measures.' Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this development.

Microsoft received planning consent for the demolition of an existing single storey vacant hose, garage and outhouse followed by the construction of a 1-4 storey Central Administrations Building and two 2-storey data centres in 2021 (Planning Reference: SD20A/0283). Microsoft then issued a renewed application for modifications and minor additions to the granted development under SD21A/0203. This development was granted on the 10th of November 2021. Both planning submissions included an EIAR. As part of Chapter 5 of the EIAR submitted in support of SD21A/0203 and SD20A/283, an assessment of in-combination effects with other plans or projects on biodiversity was conducted and no developments were identified that could lead to cumulative effects with the development in question. Chapter 5 of the EIAR included a number of mitigation measures to ecological receptors and as such, the predicted impacts on biodiversity were predicted to be, '*neutral and imperceptible*.' Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this development. The likelihood for in-combination effects is further diminished by the distance between the Site and this development which is ca.900m from the Site.

CyrusOne Irish Data Centre Holdings Ltd. submitted a Strategic Infrastructure Development (SID) planning application to An Bord Pleanála (ABP) for the provision of a new 110kV Gas Insulated Swithgear (GIS) Substation under ABP Planning Reference: 309146. This development was granted in 2021 and altered in 2023. The location of this development is ca.700m west of the Site. An Appropriate Assessment Screening Report and an EIAR were submitted in support of this development. Chapter 6 of the EIAR states, '*The assessment presented in the AA Screening Report concluded that the Proposed Development poses no risk of likely significant effects on any European sites, either alone or in combination with any other plans or projects. The Proposed Development also will not result in any significant effects on any nationally designated sites for nature conservation (i.e. pNHA or NHA sites).'* Chapter 6 of this EIAR also states that there is potential for cumulative effects to arise on water quality or through disturbance to birds and bats should construction take place in tandem with other plans or projects. However, the report goes on to state that '*these potential cumulative impacts would be temporary and could occur at a local geographical scale, in the absence of mitigation*.' It is important to note that mitigation measures have been included as part of the EIAR for this development which result in a prediction of no significant impacts. Therefore, it is considered highly unlikely that any in-combination effects could result from the Overall Project with this development.

CyrusOne received planning permission for modifications to the permitted data centre development (granted under Planning Reference SD18A/0134 and ABP Reference: 302813-18). This development was submitted under Planning Reference SD20A/0295 and is located ca.700m west of the Site. An Ecological Impact Assessment (EcIA) was submitted as part of the application which states that, '*with the mitigation measures outlined above in section 6 above, it is considered that there are no residual significant ecological effects, therefore there is no potential for cumulative effects to arise.*' Therefore, it can be concluded that the Overall Project will not result in any in-combination effects on biodiversity with this granted development.

UBC Properties received planning permission for the development of three 2-storey data centres ca.700m south of the Site under Planning Reference SD20A/0121. An EIAR was submitted as part of the planning application for this development. This development is currently undergoing construction and therefore, it is considered unlikely that the construction phase of this development will overlap with the construction phase of the Overall Project. In addition, the EIAR submitted in support of this application included a number of mitigation measures for identified ecological receptors. The implementation of mitigation measures as part of the granted development coupled with the intervening distance between the Site and this development make it highly unlikely that any in-combination effects will occur.

It should be noted that any likely cumulative effects will be minimised as all works will be completed in line with relevant best practice guidelines as outlined in Section 5.2.1 and legislation alongside the mitigation measures detailed within this EIAR. Likely effects associated with the deterioration in water quality, noise, air and climate have been addressed within Chapters 7, 8, 9 and 18.

Taking into account that the Overall Project will have an imperceptible residual impact on biodiversity provided the mitigation measures within this EIAR are implemented as outlined in Section 5.5 and 5.7, it is considered unlikely that any significant cumulative and in-combination impacts will arise as a result of the Overall Project. Subsequently, the cumulative effects on ecology arising from the Overall Project in-combination with other developments is considered to be imperceptible.

19.6.3 Land & Soil, Geology & Hydrogeology

In relation to the likely cumulative impact on the geological or hydrogeological environment during the construction phases, those key engineering works which could result in cumulative impact if not adequately mitigated include:

- The removal of topsoil and subsoil cover during construction, which will further increase the vulnerability of the underlying bedrock, and;
- Accidental spillages and leakage from construction traffic and construction materials may occur, which could result in localised contamination of soils and groundwater underlying the site.

19.6.3.1 Construction Phase

As discussed in Chapter 6, enabling works and construction effects of the Proposed Development and Overall Project is considered likely to have an overall permanent minor beneficial effect on controlled waters (the underlying locally important A Aquifer and Baldonnel Stream). It is possible that construction of cumulative schemes would result in the likely for contamination of controlled waters, resulting in a cumulative **minor adverse effect**, which is **not significant**.

Likely cumulative effects to adjacent land users during demolition and construction have been discounted on the basis that contamination has not been identified at the Site based upon the findings of the 2021 ground investigation and a range of mitigation measures (including the minimisation of areas of bare ground as far as reasonably practicable and the use of dust suppression measures) will be implemented during enabling works that will address previously unidentified/unencountered sources of contamination.

19.6.3.2 Operational Phase

In relation to the likely cumulative impacts from the operational stages of the Proposed Development and Overall Project, the following could result in a cumulative:

- Overall increase in hardstanding: Cumulatively these developments will result in a localised reduced surface infiltration to ground, reducing the likely for contaminant mobilisation (in the event of previously unidentified contaminant sources on the Site).
- Accidental releases from fuel storage/unloading could contaminate groundwater or soil environments by entering damaged drains. To prevent contaminants entering soil or water courses, harmful substances should be stored within double skin tanks or located within a bund or on a sump pallet with 110% capacity of the stored volume. Adequate provision of spill kits and their use should be provided to all workers at the Proposed Development. Incorporation of petrol/oil interceptors into the surface water drainage system will mitigate impact to surface watercourses receiving run-off from hard surfacing.

The volumes and nature of substances at the Proposed Development and Overall Project are anticipated to be small and low to medium magnitude. With appropriate measures, the Cumulative Impact from the Permitted Development is considered **minor adverse effect**, which is **not significant**.

Summary of Cumulative Effects

The operation of the Proposed Development and Overall Project is concluded to have a **long-term, imperceptible** significance with a **neutral** impact on soil and water quality.

19.6.4 Water

During the construction phase and operational phase of the Overall Project the likely for cumulative effects due to contaminated runoff effects on local surface water quality is low as there is only a weak indirect hydrological connection through the local drainage network and due to the mitigation measures outlined in Chapter 7 of this EIAR.

19.6.4.1 Construction Phase

During the construction phase of the overall project the potential for cumulative impacts due to contaminated run-off impacts on local surface water quality is low as there is only a weak indirect hydrological connection through the local drainage network, to the Baldonnel Stream.

The respective CEMP's incorporate measures, oil / petrol interceptors etc., to protect water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives(Surface Water) Regulations (S.I. 272 OF 2009 & S.I. 77 Oof 2019). Thus the potential for downstream in-combination effects impacts is considered highly unlikely.

19.6.4.2 Operational Phase

During operation there is no potential for increase in flooding, as each permitted development which receives permission from the Local Authority, is required to comply with the Greater Dublin Strategic Drainage Study (GDSDS) and specific local authority requirements by providing suitable attenuation on-site, in order to ensure that Greenfield runoff rates are adhered to and that there is no increase in run-off in comparison to existing, which in turn ensures that there is no off site flooding as a result of the proposed development.

A pre connection enquiry (PCE) was submitted to Irish Water in respective of the water supply requirements pertaining to the development. The Ref. No. for the PCE is CDS20004468, with a Confirmation of Feasibility (COF) being received from Irish Water on the 13th January 2021 in respect of same Appendix 7.2 of the EIAR. This COF confirms available capacity in the water infrastructure.

19.6.5 Noise and Vibration

19.6.5.1 Construction Phase

During the construction phase of the Proposed Development and permitted developments, there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. During permitting of all developments the planning authority will apply noise and vibration limits and hours of operation to limit noise and vibration to the levels proposed in Section 8.2.4 of the EIAR. Management of noise and vibration in accordance with planning conditions will ensure that the cumulative impact is slight, negative, and short term in nature.

19.6.5.2 Operation

An assessment of the cumulative effects of the operation of the permitted development and Proposed Development has been presented in the Noise Chapter. The assessment shows that the noise emissions from operation of the data centre and OPSG compound will not exceed the adopted criterion at the façade of any nearby noise sensitive locations, as stated in Section 8.2.5 of the EIAR, under the subheading Recommended Criteria.

Once the mitigation measures outlined in Section 8.6 are implemented there will be no significant cumulative effects as a result of the permitted development and the Proposed Development operating together.

In order to address any further possible cumulative effects, a review of other developments in the area that are likely to have a cumulative effect with the Overall Project on NSL07 were identified and the noise conditions of known developments in the wider area, (shown in Figure 8.11) has been undertaken and is summarised below. These developments are considered the most relevant because of their proximity to the site and the residential noise-sensitive location.

Figure 8.2 Other development with likely for cumulative impacts

SD21A/0167 Profile Park

This development consists of a of a gas fired power plant with an electrical output of up to 125MW.

The planning condition for outward operational noise associated with this development is as follows, from Condition 16:

Environmental Health 1. Noise due to the normal operation of the proposed development, expressed as L_{Aeq} over 15 minutes at the façade of a noise sensitive location, shall not exceed the daytime background level by more than 10 dB(A) and shall not exceed the background level for evening and night time. Clearly audible and impulsive tones at noise sensitive locations during evening and night shall be avoided irrespective of the noise level.

SD22A/0420

This development consists of two-storey data centre with plant at roof level and associated ancillary development including emergency generators. A decision has not yet been issued by SDCC on this planning application.

Noise Cumulative Assessment

NSL07 is the nearest residential noise-sensitive location to the proposed development, thus it is the focus of this cumulative assessment. Each of the planning applications above contains a noise assessment which includes a receiver corresponding to NSL07. The predicted noise levels for each development are presented in Table 8.22 below, along with predicted noise levels for the Proposed Developments, these predicted noise levels have been taken from their respective EIARs:

Location	*Predicted Noise Level, dB $L_{Aeq,T}$*			
	Proposed OSPG, and Permitted DC with modifications as in the Proposed Development.	*SD21A/0167*	*SD22A/0420*	*Cumulative*
NSL07	*37*	*38*	*37*	*42*

Table 8.1 Cumulative Noise Levels at NSL07

The predicted cumulative noise level is 42 dB $L_{Aeq,T}$. In respect of the existing background noise level of 37 dB L_{A90}, a +5dB change, if realised, would correspond to a 'moderate' effect in terms of the scale in Table 8.11. However, the cumulative noise level of 42 dB $L_{Aeq,T}$ is within the typical EPA NG4 night-time noise criterion of 45 dB $L_{Aeq,T}$. which is commonly applied to sites of this nature. Finally, it is re-iterated at the proposed development, i.e. the modified data centre and the OSPG, satisfy the planning condition which currently applies to the permitted data centre development.

19.6.6 Air Quality

19.6.6.1 Construction Phase

When the dust mitigation measures detailed in the mitigation Section 9.6 of this report are implemented, cumulative fugitive emissions of dust and particulate matter from the Overall Project – Data Centre & OSPG Scenario and nearby facilities undergoing construction will be ***negligible***, ***short-term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

19.6.6.2 Operational Phase

The cumulative impact scenario for the operational phase of the Overall Project – Data Centre & OSPG Scenario assessed the combined impact of the facility as outlined above (Section 9.7.2) as well as scheduled testing emissions associated with standby diesel generators in the neighbouring (defined as within 1km of the facility) proposed and operational data storage facilities obtained from relevant planning permission applications (ADSIL, Cyrus One, Google Ireland, Interxion, Edgeconnex, Echelon, Microsoft, Digital Reality Trust and Vantage Data Centres Dub 11 Ltd) as well as proposed energy centres (Greener Ideas Limited and Vantage Data Centres Dub 11 Ltd). 1km is an appropriate distance for the cumulative assessment as air emissions are dispersed to background levels within 1km of the point of release. Emissions from nearby IED licensed sites including Pfizer, Takeda and Grange Backup Power were also included in the cumulative modelling. These emission points emit air pollutants on an essentially continuous basis over the course of a year. Nearby data storage facilities have emission points (standby diesel generators) which are classified as likely emission points as these will only operate under exceptional circumstances and thus will not be in operation on a day-to-day basis. The data storage facilities do not have licenced main emission points and do not have a licence issued by the EPA in contrast to the IED Licenced facilities. Thus, the emergency operations emission points associated with other nearby data storage facilities were not considered for the purpose of this assessment. This approach is in line with the methodology of AG4 (EPA, 2020). Testing of the standby diesel generators from these facilities has been included in the cumulative impact scenario.

<u>USEPA Methodology</u>

The NO_2 cumulative modelling results at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario at and beyond the site boundary are detailed in Table 9.9 based on the operation of the gas engines running on gas for the full year in addition to the operation of the backup generators operating for 72 hours per year in addition to the scheduled weekly testing and annual load-banking of all back-up generators from the Overall Project – Data Centre & OSPG Scenario and including the nearby facilities within 1km of the facility as outlined in Section 19.6.1.2.

The results indicate that the ambient ground level concentrations at the location of the maximum impact from the Overall Project – Data Centre & OSPG Scenario are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site and nearby facilities lead to an ambient NO_2 concentration (including background) which is 86% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 75% of the annual limit value at the maximum off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Cumulative Scenario are illustrated as concentration contours in Figures 9.8 and 9.9.

The cumulative operational phase impact of the Overall Project – Data Centre & OSPG Scenario is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Pollutant / Year	Background Concentration (μg/m^3)	Averaging Period	Process Contribution NO_2 (μg/m^3)	Predicted Environmental Concentration NO_2 (μg/m^3)	Limit Value (μg/m^3)
NO_2 / 2017	30	99.8th%ile of 1-hr means	141.8	171.8	200
	15	Annual Mean	14.9	29.9	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	123.5	153.5	200
	15	Annual Mean	11.8	26.8	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	128.1	158.1	200
	15	Annual Mean	13.8	28.8	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	139.1	169.1	200
	15	Annual Mean	13.5	28.5	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	124.3	154.3	200
	15	Annual Mean	12.5	27.5	40

Table 9.9 ***NO_2 Dispersion Model Results – Cumulative Scenario***

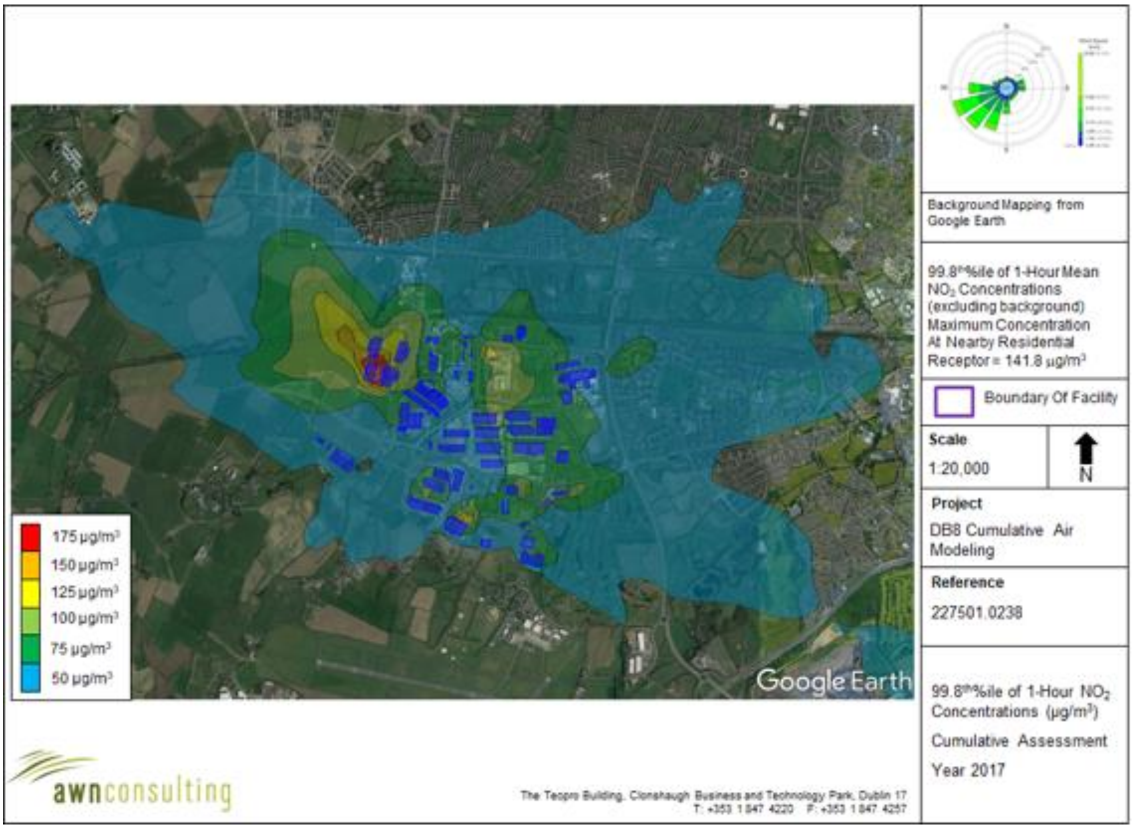

Figure 9.8 Cumulative Scenario – Predicted NO_2 99.8th Percentile 1-Hour Concentrations

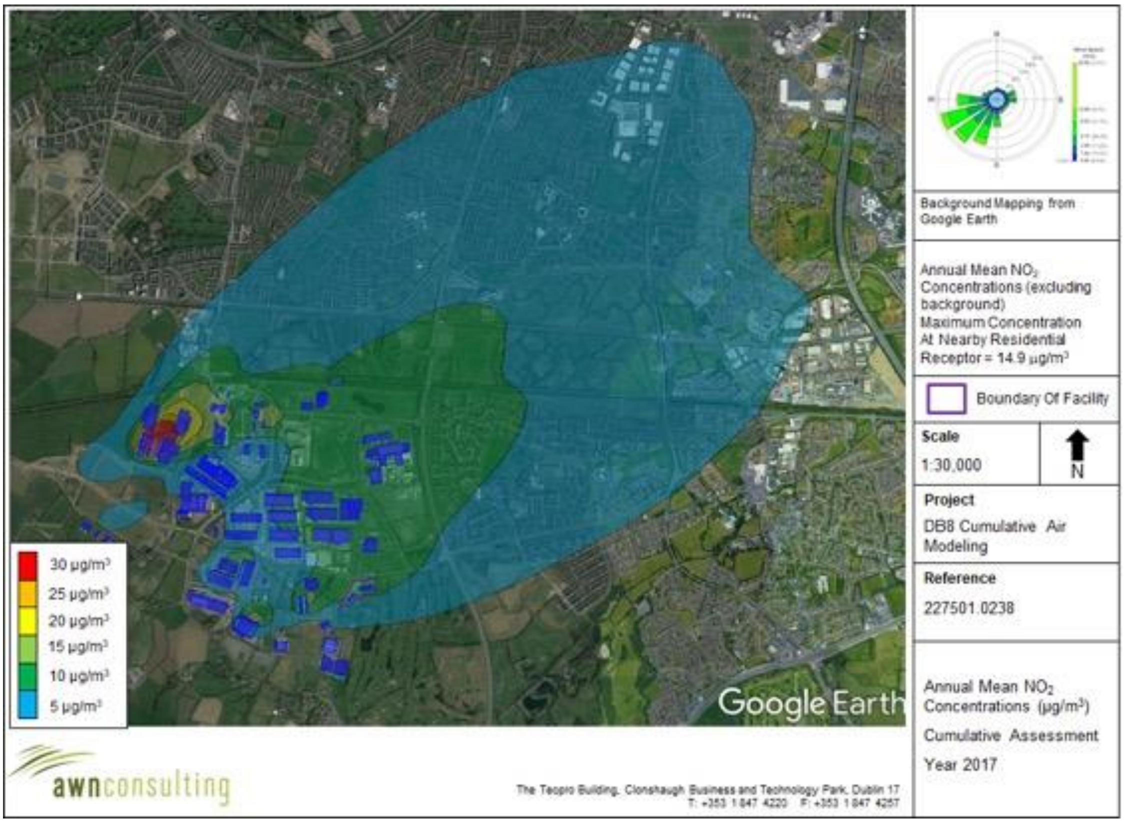

Figure 9.9 *Cumulative Scenario – Predicted NO_2 Annual Mean Concentrations*

Summary of Cumulative Air Quality Modelling Assessment

The cumulative modelling assessment has found that ambient NO_2 concentrations as a result of the Overall Project – Data Centre & OSPG Scenario and nearby facilities within 1km of the facility as outlined in Section 19.6.1.2 are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. The impacts to air quality from the cumulative operation of the Overall Project – Data Centre & OSPG Scenario and other nearby facilities are therefore deemed ***long-term*** and ***slight*** in terms of significance and ***negative*** in terms of quality.

19.6.7 Wind and Microclimate

This section assesses the impact of the proposed development on the existing environment and considers projects that have been:

- (a) granted planning permission but that are not built yet and,
- (b) projects that have been submitted for consent but not yet consented.

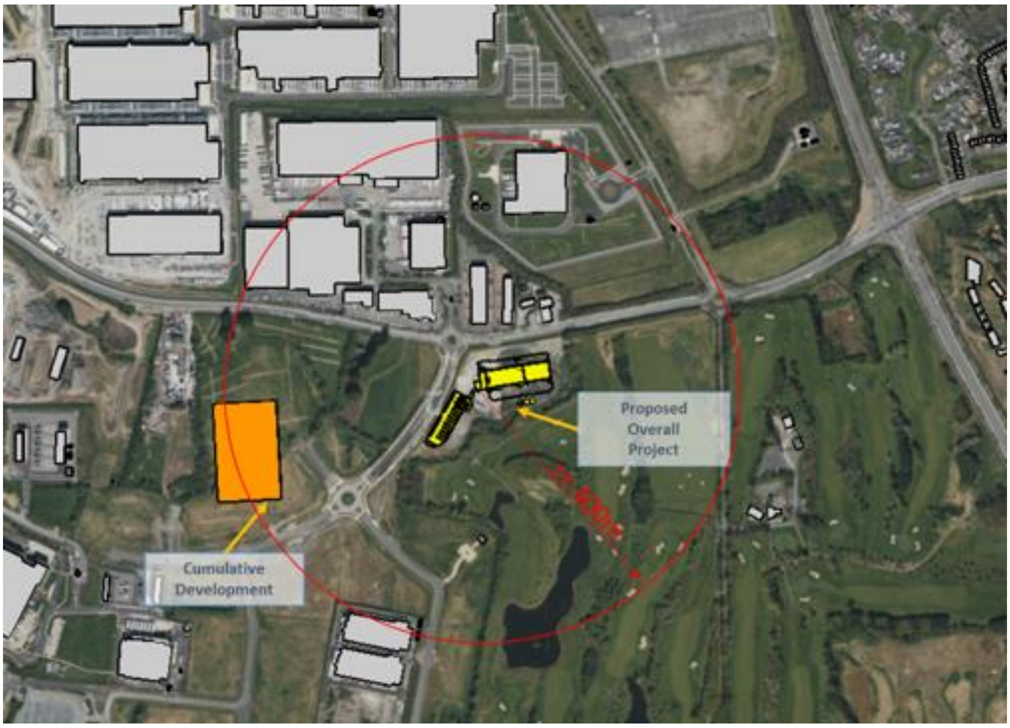

Figure 10.3- ***Cumulative schemes within the vicinity of the Proposed Overall Project Area***

In accordance with the guideline cited in section 12.2, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the centre of the site. Other taller buildings outside of this zone that could have an influence on wind conditions within the project site should be included for wind directions where they are upwind of the project site.

The potential and permitted schemes within the vicinity of the proposed Overall Project are listed below. The criteria to select the relevance of these schemes for the wind microclimate is based on their distance from the centre of the proposed site.

In particular, the following applications are considered:

- SD21A/0186, Applicant Equinix, granted: The development is located on the Subject Site and forms part of the Overall Project.
- SD23A/0035, Applicant: Vantage, under evaluation: The development is at 20m west from the site of the Overall project.
- SD22A/0420 Applicant: Vantage, under evaluation: The development is at 20m west from the site of the Overall project.
- SD21A/0241 Applicant: Vantage, granted: The development is at 20m west from the site of the Overall project.

19.6.7.1 Impact on Pedestrian Comfort and Distress

The wind flow results obtained simulating the different directions and wind speeds are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows and the impact of the proposed development is classified on the potential receptors in line with the significance criteria cited in **Section 10.2.3** and detailed in the summary tables provided at the end of this section. The comfort/distress conditions are presented using a colour-coded diagram below formulated following the Lawson Criteria.

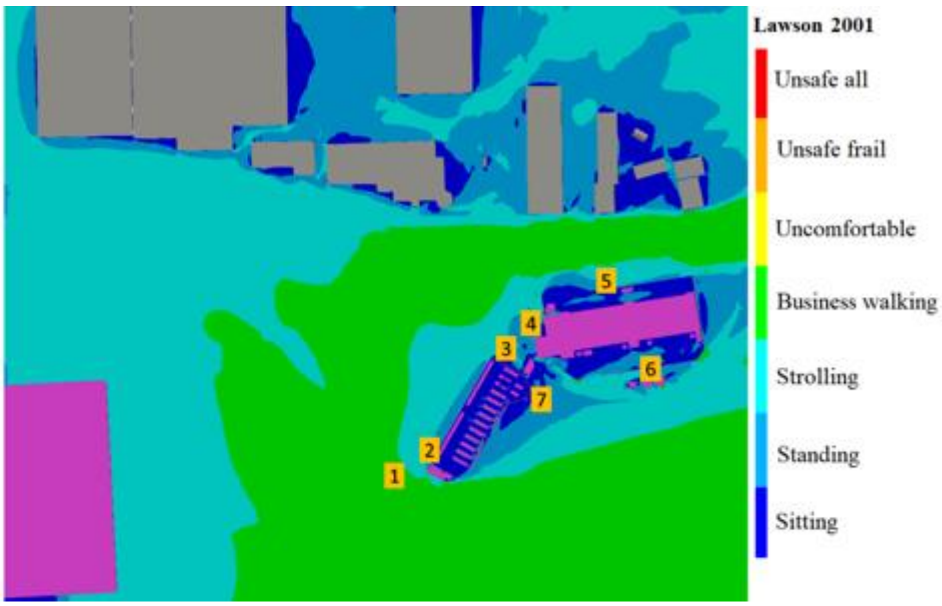

Figure 10.4- ***Lawson Map of Wind Comfort Level/Activity with labelled potential receptor Areas***

In summary, the following conclusions can be made by observing the results of the wind microclimate analysis and comparing the results obtained, under the same wind conditions for the proposed development scenario versus the cumulative scenario:

- The assessment of the cumulative scenario has shown that no area is unsafe, and no conditions of distress are created by the proposed development.

- The area is already impacted by similar wind conditions to the ones obtained after the construction of the proposed development and the proposed development does not pose any increased risk related to wind comfort and distress.

- The wind microclimate of the proposed development is suitable for the type of activities expected on the type of structure (walking).

- The proposed development does not enhance any critical wind conditions on the off-site areas compared to the actual existing wind conditions on the same place.

As a result of the proposed development construction, in conjunction with the permitted development considered in the Cumulative Scenario, the wind in the surrounding urban context remains basically the same when compared with the baseline situation and proposed scenario in the existing context. The wind comfort distress map showing the proposed and cumulative scenarios are illustrated as shown for comparison in **Figure 10.53 and 10.54**.

A summary of the impact and significance of the proposed development in a Cumulative Scenario on the on-site receptors (pedestrian areas, roads, entrances) and on the off-site receptors (roads/ pedestrian areas off-site on the north, south, west and east directions) following the significance criteria of **Section 10.2.3** is detailed in **Table 10.8.**

The proposed development therefore has a beneficial effect on the surrounding wind microclimate and can create comfortable pedestrian areas and public spaces.

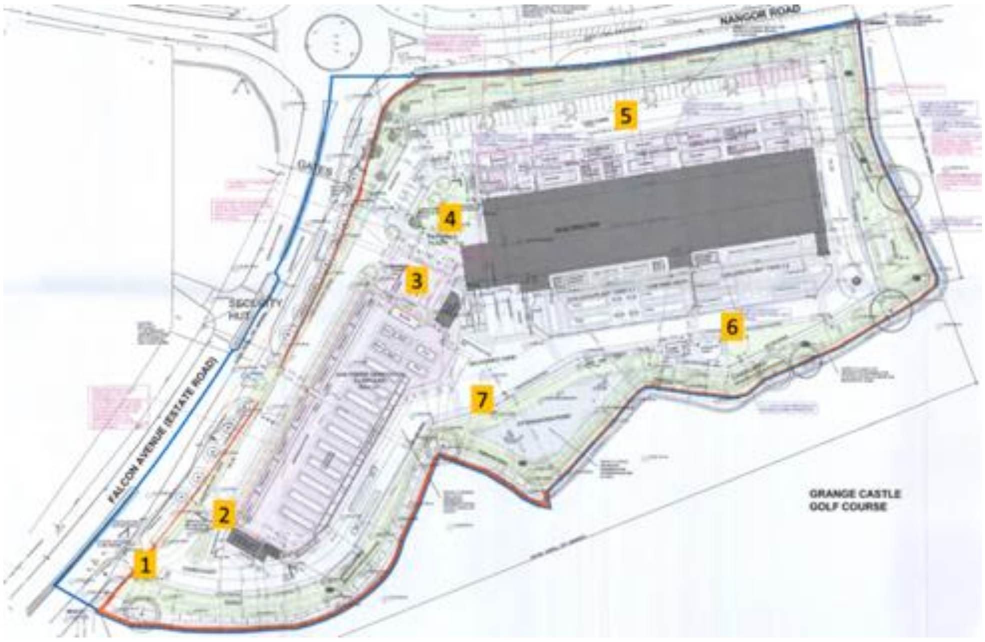

Figure 10.5- ***Site Location in Red; Receptors: Main Entrance (1), Car and Motorbikes(2), Gas Generation Compound Access/Motorbike park(3), Building Entrance(4), Car Park(5), Pedestrian Walkway east(6), Pedestrian Walkway West(7).***

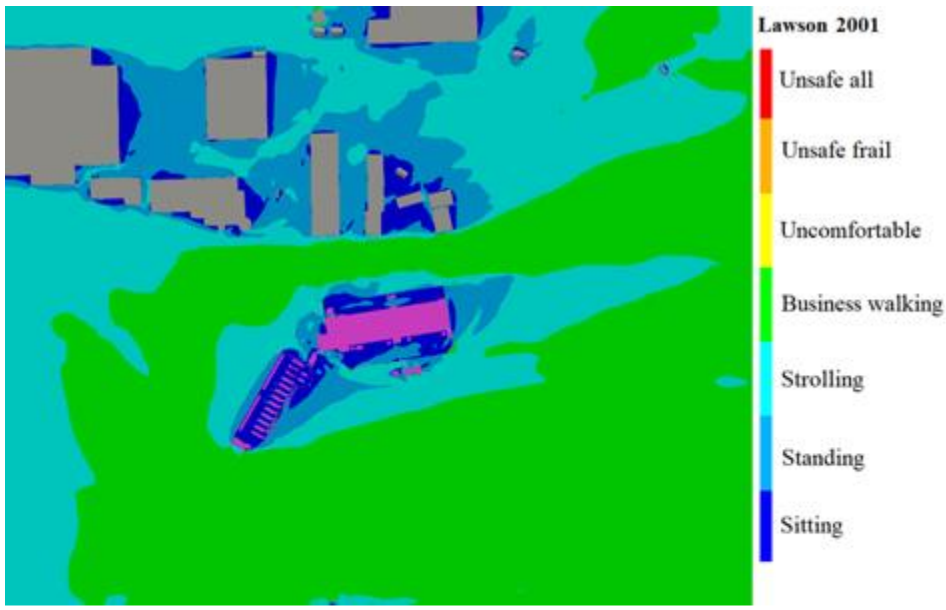

Figure 10.6- ***Lawson Map of Wind Comfort Level/Activity – Plan view -Proposed***

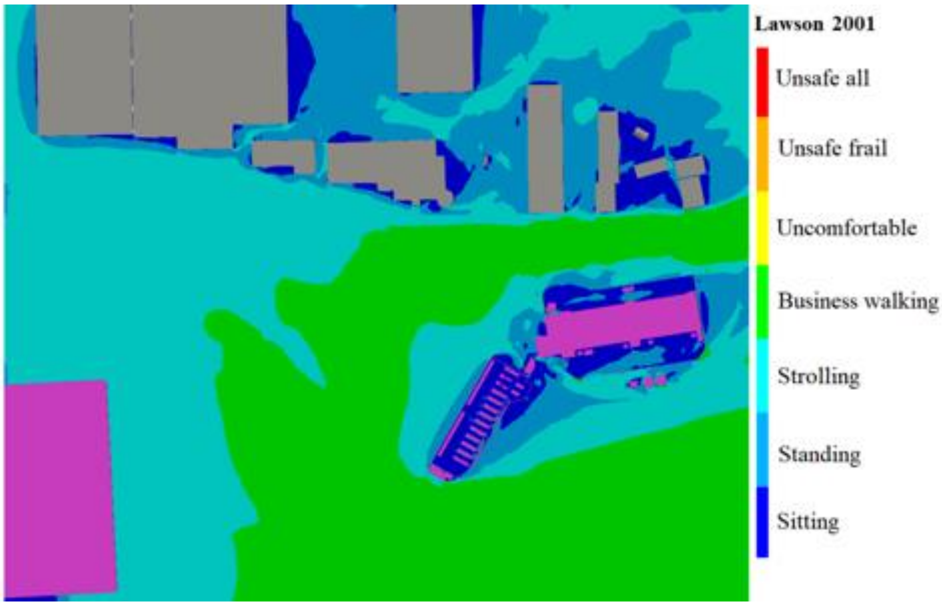

Figure 10.7- ***Lawson Map of Wind Comfort Level/Activity – Plan view -Cumulative***

Table 10.8: Impact Significance of Proposed Development In Relation To Cumulative Conditions

Potential Receptors *(on-site)*	Proposed Development Conditions	Cumulative Conditions	Impact Significance
Main Entrance (1)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Car and lotorbikes Entrance 2)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Gas Power ieneration ompound ccess/Motorbike ark (3)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Building Entrance 4)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*

Car Park (5)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Pedestrian ralkway East (6)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Pedestrian ralkway West (7)	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
Potential Receptors (*Off-Site*)	**Proposed Development Conditions**	**Cumulative Conditions**	**Impact**
***Off-Site* Area-North**	Conditions are "suitable" for the intended pedestrian use.	Conditions remain the same as in the Proposed development scenario	*Negligible*
***Off-Site* Area-South**	Conditions remain the same as in the baseline scenario.	Conditions remain the same as in the Proposed development scenario	*Negligible*
***Off-Site* Area-East**	Conditions remain the same as in the baseline scenario.	Conditions remain the same as in the Proposed development scenario	*Negligible*
***Off-Site* Area-West**	Conditions remain the same as in the baseline scenario.	Conditions remain the same as in the Proposed development scenario	*Negligible*

19.6.7.2 Residual Impact

Wind cannot be eliminated or mitigated as it depends on weather conditions which could vary. The data of the historical wind conditions collected and reported in the previous sections show that the wind speeds likely to occur on the site are below critical values and that a pleasant and comfortable microclimate can be maintained for most of the time and under the most frequent wind scenarios.

Gusts and storms can still occur, however, and they can create unpleasant and sometimes unsafe conditions. The pedestrian activities concerning the Lawson Comfort and Distress Criteria are not in general carried out during those weather conditions.

Having considered the above, no further changes to the development design and further increase of the landscaping are suggested, as safety and pedestrian comfort are maintained under Lawson Comfort and Distress Criteria.

19.6.8 Landscape and Visual effect

Landscape Cumulative effects

Due to the development plan zoning the wider area comprising Profile Business Park, Grange Castle Business Park, Grange Castle South Business Park and Kilcarberry Business Park is a popular location for large-scale industrial developments.

Taking into account other developments in the area - recently completed, being under construction and still in the planning phase - the cumulative impact of all on the landscape would be noticeable. The intensification of the use of the sites in this area is an ongoing process. The new developments are large-scale buildings which may result in changing the landscape ridgelines. However, thanks to the mitigation measures that are being implemented, like screening using berms and native plants or woodlands, the developments integrate well into the existing landscape and increase biodiversity.

The proposed development is rather a small scale in comparison with the other developments in the area, does not affect the existing ridgelines and will be well integrated into the landscape thanks to the green living wall solution.

The cumulative impact can therefore be described as **slight in magnitude, neutral in quality, and long term / permanent in duration.**

The overall project is comparable in scale to other developments in the area and in line with the current emerging trends. It impacts the landscape by changing the ridgeline, however, the landscape scheme will partially mitigate that impact.

Cumulatively the impact can be rated as negative as it is definitely changing the existing character of the landscape, although the landscape has been described as an 'edge of city' type with increasing urban influences that impact the rural landscape character, resulting in a mixture of commercially developed land and agricultural land (refer to section 11.5.5 for more details).

The cumulative impact can therefore be described as **moderate in magnitude** (the development is in keeping with the existing trends)**, negative in quality, and long term / permanent in duration.**

Visual Environment Cumulative effect

Taking into account other developments in the area - recently completed, being under construction and still in the planning phase, the cumulative impact of all on the visual amenity would be noticeable. The new developments are large-scale buildings which may result in affecting the visual receptors. Due to various design mitigation measures that are being implemented, like high standards of architectural design, use of a wide range of materials and colours, and avoiding heavy massing of the buildings, the developments attempt to mitigate the impact on visual amenity.

The proposed development is rather small in scale and is well hidden from view, which have been demonstrated on the photomontages described and assessed in sections 12.7.5-12.7.17 of this EIAR.

The cumulative impact can therefore be described as **not significant to imperceptible in magnitude, positive to neutral in quality, and long term / permanent in duration.**

The overall project on the other hand is a development comparable to other industrial developments in the wider area. The cumulative visual effect of all may be described as significant, however, the trend has already been established and the land zoning is being followed. Various mitigation measures are applied to the projects. High quality of architecture and attention to the massing of the building as well as various screening measures are looked at and implemented.

The cumulative impact can therefore be described as **negative in quality, but moderate in magnitude** (the development is in keeping with the existing trends)**, and long term / permanent in duration.**

19.6.9 Traffic and Transport

We refer to section 12.21 of the Traffic and Transport Chapter, Chapter 12 for the assessment of potential cumulative effects.

19.6.10 Waste Management

As has been identified in the receiving environment section all cumulative developments that are already built and in operation contribute to our characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational cumulative developments has been assessed in the preceding sections of this chapter.

Construction Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place in the area. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase. This would require sufficient servicing capabilities of permitted waste collection contractors and availability in suitability permitted or licensed waste facilities to receive the waste material.

Developments that potentially could overlap during the construction phase can be found in chapter 19 Cumulative Effects appendix 19.1.

Due to the high number of waste contractors in the South Dublin region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will mitigate against any likely cumulative effects associated with waste generation and waste management. As such the likely effect will be **short-term, not significant and neutral in quality**.

Operational Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place. All of the current and likely developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any likely cumulative impacts associated with waste generation and waste management. As such the likely effect will be a **long-term, imperceptible** and **neutral**.

19.6.11 Material Assets Utilities

The review of the existing and permitted projects set out in Appendix 19.1 of this EIAR has not identified any simultaneous construction projects capable of having a significant cumulative impact anticipated on material assets.

During construction, the General Contractor will require power for onsite accommodation, and construction equipment and plant. The power requirements will be relatively minor and there will be a requirement for a temporary connection to be located in the north west of the site. A connection to the grid will be made subject to relevant applications and approvals.

The General Contractor will install a temporary low voltage distribution system to supply welfare cabins and site staff accommodation which will be removed on completion of the works.

The cumulative impact on other developments would be assessed by the Utility companies themselves. The Overall Project consist of power to be sourced from gas from GNI therefore the Utilities within the site boundary has no impact on other developments.

19.6.12 Cultural Heritage - Archaeological and Architectural

19.6.12.1 Construction Phase

The Overall Project will require removal of the soil within the site. Should any archaeological features exist under the surface of the ground the construction phase would have a significant impact upon archaeological features. We note there are no upstanding architectural features on the site.

Remedial and mitigation measures are set out in Chapter 15 and 16 of this EIAR include on site monitoring by a licensed archaeologist during the construction phase.

The review of the existing and permitted projects set out in Appendix 19 of this EIAR has not identified any simultaneous construction projects capable of having a significant cumulative impact anticipated on the Cultural Heritage associated with the site.

19.6.12.2 Operational Phase

There are no likely effects on archaeological, architectural and cultural heritage expected as a result of the operational phase of the Overall Project provided that the mitigation measure outlined in Chapter 15 and 16 including a buffer zone of 10m is put in place. Therefore, there are no cumulative effects expected with other existing and permitted developments set out in Appendix 19.

19.6.13 Sunlight and Daylight

There are no known proposed developments that meet the criteria of the BRE guidelines which are within c.500m (3 times the height of the Overall Project) which would create a cumulative effect on the daylight, sunlight or overshadowing of the adjacent properties.

19.6.14 Climate

In relation to climate, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other (IEMA, 2022).

We refer to Chapter 18 of this EIAR for more information on the impact the Overall Project will have on the Climate.

19.6.15 Summary

This chapter has been prepared to consider the potential for cumulative effects that may arise as a result of the proposed development and Overall Project in combination with any future development, as far as is practically possible, on the site and the cumulative impacts with both planned and permitted developments in the immediate surrounding area.

In summary, the cumulative effects from the developments surrounding the subject proposal for the environmental factors discussed in this EIA Report have been assessed and the majority of the cumulative effects are ***not significant or neutral***

There are no significant negative effects predicted from the cumulative developments of the constituent elements of the permitted Data Centre development and proposed On Site Power Generation and modifications to the permitted Data Centre development when viewed in the light of their associated mitigation measures.

20 Interactions

20.1 Introduction

The purpose of this chapter is to identify and draw attention to significant interactions and interdependencies in the existing environment between all environmental factors.

This chapter has been prepared under the guidance within the EIA Directive, the Planning and Development Act 2000 (as amended), the Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017), European Commission guidelines for the assessment of indirect and cumulative impacts as well as impact interactions (1999) and the EPA Guidance on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022).

We refer to section 1.5 of this EIAR for information on the competent persons who prepared this Chapter.

The EPA Guidelines define interactions as "Interactions – careful consideration of pathways – direct and indirect – that can magnify effects through the interaction or accumulation of effects – for instance the potential for cumulative significant effects to arise from multiple non-significant effects."

Where relevant the majority of the EIA report chapters have already included and described assessments of potential interactions between aspects, considered by the various specialists contributing to this impact assessment. This chapter presents a summary and assessment of the identified interactions.

Section 171A of the Planning and Development Act requires that the interactions between the following be assessed:

- Population and Human Health
- Land, Soil, Water, Air and Climate
- Biodiversity, with particular attention to species and habitats protected under the habitats Directive and the Birds Directive,
- Material assets, cultural heritage and the landscape

This EIAR has described and assesses the 2no. following developments impact on the environment:

1. Proposed Development - Modifications to the permitted data centre and development of On Site Power Generation - Ref. SDA22/0156

And

2. The Overall Project - Data Centre DB8 Ref. SDA21/0186 and Proposed Development Ref. SDA22/0156

For the purpose of this chapter these 2no. developments are assessed as the Overall Project as the purpose of the proposed OSPG is to power the associated Data Centre development, therefore the proposed OSPG will have a direct effect on whether the Data Centre will come to fruition. As mentioned throughout this EIAR the permitted Data Centre development and the proposed OSPG development will be constructed at the same time.

As Described in section 2.11 of the EIAR there are 3no. options or scenarios are considered for the period of operation of the OSPG. If decommissioning of the OSPG is required the mitigation measures outlined for the Construction Phase of the Proposed Development throughout this EIAR will also be employed for the decommissioning phase.

20.2 Planning and Alternatives and its interaction with:

Population and Human Health

The permitted Data Centre development is reliant on the proposed OSPG development which has been designed and proposed to power the associated permitted Data Centre development, therefore the proposed OSPG will have a direct effect on whether the Data Centre will come to fruition and therefore create employment at this site.

The proposed OSPG and permitted Data Centre development is envisioned to create 100-120 no. temporary jobs during the construction phase which will have a ***short-term positive*** effect on employment and 14 no. permanent full-time jobs during the operational phase, which will have a ***long term positive effect*** on employment in the local area respectively.

20.3 Population and Human Health and its interaction with:

Land, Soils, Geology and Hydrogeology

Construction and ground workers and users of adjacent land are considered to represent high sensitivity receptors to sources of contamination. Based upon the Site history, and the findings of the 2021 Delta-Simons investigation, there is a low risk from soil/groundwater contaminant sources. The potential for localised, previously unidentified sources contaminants (such as metals and organics) and potential for unforeseen contamination exposure is considered greatest for construction and ground workers, who would be exposed to contaminated dust, soils and shallow groundwater encountered during excavation works. Owing to the ground excavations required, residual contaminants within the soils and dust may become mobilised via wind entrainment, during dry and windy conditions, temporarily resulting in potential exposure to residents adjacent to the site, construction and ground workers through inhalation or ingestion of dusts.

Adoption of safe working procedures, high standards of personal hygiene and appropriate PPE is such that the works are considered to have a likely **negligible short-term temporary effect** on construction workers, which is **not significant**.

As part of the CEMP, measures to mitigate fugitive dust emissions, including the use of water bowsers to dampen down any areas of exposed soils, will be applied during earthworks to reduce the risk to construction and ground workers, residents adjacent to the site. Furthermore, with the adoption of safe working practices, observance of good personal hygiene and provision and utilisation of appropriate PPE (also implemented as part of the CEMP), the risk to construction and groundworkers, residents adjacent to, and within the proposed Development and Overall Project, is considered likely to result in a **negligible short-term temporary effect**, which is **not significant**.

Water

The permitted Data Centre development and proposed OSPG development represents an increase in hardstanding areas which may potentially interact with the risk of flooding and therefore on populations. However, the proposed sustainable urban drainage measures and flood risk assessment undertaken demonstrates that the Overall Project will not result in offsite flooding or impact on surface water flows in the local area Therefore, there is no residual negative interaction between these aspects.

There are no other interactions. The effect is considered to be ***long-term, imperceptible*** and ***neutral***.

Waste Management

During the construction phase risks to human health are primarily associated with waste material that is not managed and stored correctly, it is likely to lead to litter or pollution issues at the Development Site and in adjacent areas. The indirect effect of litter issues is the presence of vermin in areas affected, mismanagement of demolition and soil material can potentially lead to air / dust impacts. There are all also potential risks to human health associated with accidents when handling and transporting earthworks and wastes However, control measures undertaken during the site development will be implemented to ensure that handling and transportation occurs in accordance with a managed and planned manner controlled by a Project Supervisor at Construction Stage in conjunction with the development RWMP.

Similar risks associated with improper waste management during the operational phase could lead to litter and associated vermin. There is the potential risks when untrained staff and waste contractors use waste equipment or move waste receptacles improperly.

A carefully planned approach to waste management and adherence to the project specific RWMP (Appendices 13.1), and the mitigation measures in Chapter 13, will ensure appropriate management of waste and avoid any negative impacts on the local population. The effects should be ***long-term, imperceptible and neutral.***

Air Quality

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction 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. Therefore, the impact of construction of the proposed development is likely to be ***neutral, short-term*** and ***imperceptible*** with respect to human health.

Once the mitigation measures outlined in Section 9.6 are implemented, the residual impacts on air quality from the construction of the Overall Project will be ***short-term*** and ***imperceptibly negative*** and for the operational phase of the proposed development will be ***long-term, negative*** and ***slight.*** Thus, in terms of air quality, both the construction phase and operational phase will be ***not significant***. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

Climate

Once the mitigation measures outlined in Section 18.6 are implemented, the residual impacts on climate from the construction of the proposed development will be ***short-term*** and ***imperceptibly negative*** and for the operational phase of the proposed development will be ***long-term, negative*** and ***slight*** in terms of population and human health.

Noise and Vibration

It should be noted that the proposed development will not give rise to any significant levels of vibration off site and therefore the associated impact is not significant.

During the construction phase of the Overall Project, there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. During permitting of all developments the planning authority will apply noise and vibration limits and hours of operation to limit noise and vibration to the levels proposed in Section 8.2.4 of this EIAR. The management of noise and vibration will be in accordance with planning conditions that are applied to the overall project. It is envisioned that the

Overall Project and the cumulative impacts will be ***slight, negative, and short term in nature***.

The projected increase in vehicle traffic during the operational stage may lead to a slight increase in noise levels during peak trip generation periods, however, implementation of the mitigation measures described in the Noise and Air Quality Section of this Environmental Impact Assessment Report will prevent and minimize the potential impacts of this interaction.

Any change in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is expected to be ***imperceptible***. The resultant noise effect is ***neutral, imperceptible*** and ***long term.***

During the operational phase proprietary noise and vibration control measures have been employed including plant selection and acoustic screening, in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions will be broadband in nature and will not contain any tonal or impulsive elements. The resultant noise effect is ***negative, not significant*** *to* ***slight*** and ***long-term***.

Landscape and Visual Impact

The extent of potential visual impact of the Overall Project on the surrounding environment from the 12no. viewpoints have been assessed. While the Overall Project is in an area that is in keeping with the existing trends in the area and has incorporated mitigation measures outlined in section 11.6 of this EIAR.

During the construction phase the impact would be **negative**, but **moderate** in significance and **short to medium-term** in its duration.

During the operational phase the impact on the landscape may be perceived as **negative,** but **moderate** to **slight** in significance and **long-term** in duration.

Traffic and Transport

During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. Measures will be put in place to reduce the risk of road traffic accidents during the construction phase through the implantation of a Construction Traffic Management Plan. Furthermore, it is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used and no unusual substance or underground tunnelling works required or predicted.

Construction Stage

A number of temporary risks to human health may occur during construction phase related to noise, dust, air quality and visual impacts which are addressed in other sections of this EIAR. Traffic impacts are considered to be negligible due to the implementation of mitigation measures identified.

Operational Stage

There will be a slight increase in traffic on the local road network.

20.4. Waste Management and its interaction with:

Land, Soils, Geology and Hydrogeology

During the construction phase, excavated soil and stone c. 10,314.24m^3 will be generated from the excavations required to facilitate site levelling, construction of new foundations and installations of site services. It is estimated that c.973.11m^3 of the excavated material will need to be removed off-site with the remaining balance being reused on site. Where material cannot be reused onsite it will be taken off-site, it will be taken for reuse or recovery, where practical, with disposal as a last resort. Adherence to the mitigation measures in Chapter 13 and the requirements of the RWMP (Appendix 13.1), will ensure the effect is ***long-term, imperceptible and neutral.***

Traffic & Transportation

Local traffic and transportation will be impacted by the additional vehicle movements generated by removal of waste from the Site during the construction and operational phases of the proposed Development. The increase in vehicle movements as a result of waste generated during the construction phase will be temporary in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the operational phase but these movement will be imperceptible in the context of the overall traffic and transportation increase. Traffic-related impacts during the construction and operational phases are addressed in Chapter 12 Traffic and Transport. Provided the mitigation measures detailed in Chapter 12 and Chapter 13 are adhered to, the predicted effects are ***short to long-term, imperceptible and neutral.***

20.5 Biodiversity and its interaction with:

The Environmental Attributes with which flora and fauna interact include:

Water

The drainage ditches onsite are hydrologically connected to Grifeen River and subsequently the River Liffey. As a result, the Site is hydrologically connected to the downstream. Water quality deterioration has the potential to impact aquatic and riparian species as discussed in Section 5.5 of this EIAR. However, appropriate mitigation measures are presented in Chapter 7 to combat this issue. Therefore, the effect will be ***long-term, imperceptible and neutral.***

Noise and Vibration

Species within the locality have the potential to be affected by noise disturbance as discussed in Section 5.5. of the Biodiversity Chapter However, appropriate mitigation measures are presented in Chapter 8 to combat potential noise issues. Therefore the effect will ***long-term, imperceptible and neutral.***

Landscape and Visual

Taking into account the mitigation measures and proposed enhancement measures for the Site, it is considered that the construction onsite will have a ***short -term, imperceptible and neutral*** effect on Biodiversity.

The Site contains limited vegetation cover at present. However, considering the Overall Project which incorporates a sensitive design, enhancement and mitigation measures outlined in Chapter 5 Biodiversity which are listed below.

- the hedgerow / treeline bordering the Site will be retained and protected from unnecessary damage,
- The Overall Project has been designed to include an 8m landscape buffer from the drainage ditches to protect this feature; and,
- A landscape plan and ecological enhancement measures for the Overall Project will be implemented as part of the works. This landscape plan includes wildflower and wetland habitats designed with pollinators in mind, tree and hedgerow planting and green roofs and trellises. Hibernacula and habitat piles will also be installed onsite.

Considering the above, it is envisioned that the operational phase of the Overall Project will have a neutral interaction on Biodiversity.

Overall, the operational phase of the development and the implementation of the Landscape Plan would have a positive impact on biodiversity benefits in comparison to the sites current state which currently comprises of grey brown clayey sandy fineto coarse gravel as identified in Chapter 6. Due to the ecological enhancement measures outlined in section 5.5.3 of this EIAR and above the operational phase of the Overall Project will result in a ***Long Term***, ***imperceptible*** and ***neutral*** interaction with Biodiversity overall.

Air Quality

Air quality and climate change has the potential to impact ecosystems. Therefore, an assessment was carried out on the emissions to air from the Proposed Development and the projected GHG emissions.

Once the mitigation measures outlined in Section 9.6 are implemented, the residual impacts on air quality from the construction of the proposed development will be ***short-term*** and ***imperceptibly negative*** and for the operational phase of the proposed development will be ***long-term, negative*** and ***slight*** in relation to biodiversity.

Climate

Once the mitigation measures outlined in Section 19.6 are implemented, the residual impacts on climate from the construction of the proposed development will be ***short-term*** and ***imperceptibly negative*** and for the operational phase of the proposed development will be ***long-term, negative*** and ***slight*** in terms of biodiversity.

20.6. Traffic and Transport and its interaction with:

The projected increase in vehicle traffic during the operational stage may lead to a slight increase in noise levels during peak trip generation periods, however, implementation of the mitigation measures described in the Noise and Air Quality Section of this Environmental Impact Assessment Report will prevent and minimize the potential impacts of this interaction.

Air Quality

The Air Quality and Climate Chapter of this EIAR states that the impact of the proposed development on air quality and climate is considered Long-term and imperceptible for the Operational Stage of the proposed development.

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development.

There is the interaction between Land and Soils Chapter where the import and export of construction materials is considered. It is noted that the designs have been developed to achieve a near balance of the cut and fill materials on site, which minimise construction related traffic. The associated construction traffic has been considered in the construction stage impacts and Construction Management Plan included with the application.

Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified.

Risks to Human Health

During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. Measures will be put in place to reduce the risk of road traffic accidents during the construction phase through the implantation of a Construction Traffic Management Plan. Furthermore, it is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used and no unusual substance or underground tunnelling works required or predicted.

Construction Stage

A number of temporary risks to human health may occur during construction phase related to noise, dust, air quality and visual impacts which are addressed in other sections of this EIAR. Traffic impacts are considered to be negligible due to the implementation of mitigation measures identified.

Operational Stage

There will be a slight increase in traffic on the local road network.

20.7 Summary and Conclusion

In summary, the interactions between the environmental factors and impacts discussed in this EIA Report have been assessed and the majority of interactions are ***weak*** or ***neutral***.

There are no significant negative impacts predicted from the interactions of the constituent elements of the permitted Data Centre development and proposed On Site Power Generation and modifications to the permitted Data Centre development when viewed in the light of their associated mitigation measures.

Table 20.1 Summary of Interactions and Interrelationships between the Aspects of the Environment

No Interaction	Strong Interaction	Some Interaction	Weak interaction	Con. Construction
x	+	-	o	Op. Operation

Interaction	Planning and Alternatives		Population & Human Health		Biodiversity		Land, Soils & Geology		Water		Air Quality		Climate		Noise & Vibration		Landscape		Material Assets		Roads, Traffic & Transportation		Waste Management		Cultural Heritage Archaeology and Architectural Heritage	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
Planning and Alternatives			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Population & Human Health					x	x	o	o	o	o	o	-	-	-	x	x	-	-	x	x	o	-	o	o	x	x
Biodiversity							o	o	o	o	-	-	-	-	o	o	o	o	x	x	x	x	x	x	x	x
Land, Soils & Geology									o	o	x	x	x	x	x	x	x	x	x	x	x	x	o	o	x	x
Water											x	x	x	x	x	x	x	x	x	x	x	x	o	o	x	x
Air Quality & Climate															x	x	x	x	x	x	x	x	x	x	x	x
Noise & Vibration																	x	x	x	x	o	o	x	x	x	x
Landscape and Visual Impact																			x	x	x	x	x	x	x	x
Material Assets																					x	x	x	x	x	x
Roads, Traffic & transportation																							o	x	x	x
Waste Management																									x	x

Cultural Heritage Archaeology and Architectural Heritage																										

21. Summary of mitigation measures

Given the complexity of this EIAR, this chapter will comprise a summary of the mitigation measures for the proposed development and overall project that are outlined in Chapters 4 to 18.

The EPA Guidelines 2022 state the following in relation to the Clarity of Mitigation and Monitoring Measures in an EIAR.

"The commitment to all mitigation and monitoring measures need to be made clear in the EIAR. Terms such as ...is recommended or ...should be considered need to be avoided. All commitments need to be clear and specific."

"For ease of reference and clarity, and to facilitate enforcement, all such measures contained in an EIAR can be included in a compendium of mitigation and monitoring commitments (only). This may be a separate section or appendix to the EIAR. Such a compendium should comprise a list of relevant measures but should not elaborate on the reasoning or expected effectiveness of those measures, as the elaboration will take place within the main body of the EIAR."

In accordance with the EIAR 2022 Guidelines this section will not elaborate on the reasoning or expected effectiveness of those measures, as the elaboration will have taken place within the main body of the EIAR.

This section provides a summary of the mitigation measures for the Proposed Development Modifications to the permitted data centre and development of On Site Power Generation - Ref. SDA22/0156 and the Overall Project - granted development under SDCC Ref. SD21A/0186 comprising of a Data Centre Development and associated site works and the proposed amendments to this application as per application SDCC Ref. SDA22/0156 for each relevant topic.

21.1 Population and Human Health

Construction Phase

In accordance with the Safety, Health, and Welfare at Work (Construction) Regulations, a safety management system will be put in place on-site to minimise any risks to both construction personnel and site visitors. The site will not be accessible to the public and will have strict procedures in place for allowing entrance to visitors and contractors.

Traffic mitigation measures proposed to reduce the impact of additional traffic to and from the development are outlined in Chapter 12.

Similarly mitigation measures to reduce impact on human health as a result of construction noise, vibration and dust emissions are outlined in Chapters 8 and 9. Measures will reflect best construction practice including pro-active control of dust and other air pollutants to minimise generation of emissions at source. The measures will ensure compliance with all EU ambient air quality legislative limit values. A comprehensive suite of mitigation measures are outlined in table 5-4 of the the Construction and Environment Management Plan which is included in appendix 11 with the planning authority prior to commencement of development.

Operation Phase

The Overall Project and Proposed Development will be entirely beneficial in employment terms as it will power the permitted data centre which forms part of the Overall Project, no remedial or reductive measures are considered necessary for the Overall Project.

Mitigation measures proposed to minimise the likely effects on human health in terms of air quality, climate, noise and vibration during the operational phase of the development are discussed in the relevant sections of this EIA report.

21.2 Biodiversity

We refer to section 5.5 for the full details on the remedial mitigation measures that will be incorporated during the construction and operation phases of the Overall Project. For the purpose of this chapter these remedial and mitigation measures are summarised below.

Construction Phase

During the construction phase, all works will comply with all relevant legislation and best practice guidance listed in section 5.5.1 to reduce any potential environmental impacts.

A working draft of a Construction Environmental Management Plan (CEMP) [39] was prepared by MOR and will be used by the appointed contractor to prepare an updated and comprehensive CEMP prior to the commencement of any onsite works. If required by the conditions of the grant of planning permission, the updated plan will be approved by the Planning Authority in advance of any works commencing onsite. The approved CEMP will be implemented for the duration of the construction works to protect the receiving environment from potential impacts arising during the construction works. The updated CEMP will include all mitigation measures outlined in this EIAR and the accompanying NIS.

An EcoW will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works, to ensure that all works will be completed in line with the CEMP and all wildlife legislation

During construction, all boundary hedgerows / treelines will be retained and protected in line with policies NCBH2, NCBH11 and GI2 of the South Dublin County Development Plan. During construction, care will be required to protect trees from both direct and indirect disturbance. We refer to section 5.5.1.1 for more details on the mitigation measures for the protection for hedgerows and treelines.

In order to ensure that the proposed works do not have adverse effects on amphibians, the following construction procedures and mitigation measures will be implemented:

- Vegetation clearance and ground stripping adjacent to the drainage ditch will be supervised by the ECoW to ensure no adverse effects occur to any amphibians in the area; and,
- Should amphibians be encountered during the construction works, the EcoW will be consulted for advice.

In addition, hibernacula and habitat piles will be installed in the landscaped area around the drainage ditch network and along the attenuation pond to support any potential amphibians in the area we refer to Section 5.5.3 for more details.

To ensure that the works in relation to the Overall Project do not have significant impacts on mammals (including badgers and foxes), construction works will be in line with the NRA (now TT) guidance for Badgers [19] and policy NCBH5 of the SDCDP [33]. The following mitigation measures will be implemented onsite:

- Should construction works be required outside of daylight hours, the appointed project EcoW will be consulted as required;
- Where deep excavations are required onsite, appropriate measures (such as covers, or fencing) to protect mammals from ingress will be installed as required; and,
- If unidentified burrows are identified within the works area during construction, works will cease within that area and the project EcoW will be contacted for advice.

There is potential that terrestrial mammals utilising the Site and surrounding area may be subject to noise disturbance from the Overall Project. Construction noise and vibration can result in disturbance behavioural impacts, stress and displacement from feeding grounds for various species. Therefore, noise mitigation measures will be implemented during the construction phase of the Overall Project to minimise potential impacts arising from the proposed works, refer to Chapter 8: Noise and Vibration for further details.

However, it should be noted that the Site is located within a predominantly urban environment with associated road infrastructure. Therefore, there are elevated levels of human and noise related disturbance within the area and as a result, any species utilising the area will be habituated to elevated levels of activity or will avoid this area. In addition, the construction works are temporary in nature and species can and will move away from any temporary disturbance to alternative habitats within the wider surrounding area.

Mitigation measures are outlined in section 5.5.1.5 to mitigate against the unintentional introduction of invasive specifies during construction stage.

Operation Phase

Nocturnal mammals such as bats and badgers are impacted by lighting. Therefore, it is important that lighting installed within the Site is completed with the sensitivity of local wildlife in mind whilst still providing the necessary lighting for human use.

The external lighting onsite will be installed as per the original grant of planning for the Permitted Development (Planning Registration No. SD21A/0186). The approved lighting plan was designed to mitigate against potential impacts on nocturnal species in line with the Bat Conservation Trust (BCT) Guidelines on '*Bats and Artificial Lighting in the UK*, and the NRA (now TT) guidance for Bats. These design measures included:

- Avoidance of excessive lighting;
- Light Emitting Diodes (LEDs) will be used and the brightness will be set as low as possible;
- Lighting will be aimed only where it is needed, with no upward lighting;
- Lighting will be directed away from landscaped areas and retained sections of hedgerows and trees; and,
- Lighting will be turned down / off when not required.

Following the installation of the lighting for the Overall Project, the project ECoW will undertake a further Site inspection in order to check the lighting patterns and lux levels along the Site boundaries.

The proposed drainage system and fuel storage onsite has been designed to avoid adverse effects on water quality within the onsite drainage ditches and further downstream in the Grifeen and Liffey Rivers during the Operation Phase of the Overall Project. All elements of the Proposed Development are described in Chapter 2: Description of the Proposed Development and all elements of the Permitted Development are detailed under SDCC Ref. SD21A/0186. Both the Proposed Development and Permitted Development combine to form the Overall Project. All mitigation measures relating to water quality are described in Chapter 7: Water.

Taking into account the mitigation measures and proposed enhancement measures for the Site, it is considered that the construction and operational phase onsite will have an imperceptible residual impact on biodiversity.

21.3 Land & Soil, Geology & Hydrogeology

Construction Phase

As identified in Chapter 6 of this EIAR it is considered that there are no significant long term adverse effects likely to arise from the enabling works and construction phases, as summarised in Table 6.7, and therefore no additional mitigation or monitoring is considered to be required on the basis of the CEMP that has been provided.

We refer to table 6.7 in Section 6.11 of this EIAR for a comprehensive summary of likely residual effects with identified additional mitigation and monitoring.

Operation Phase

There are not considered to be any effects likely to arise once the Proposed Development and Overall Project is complete and occupied, as summarised in Table 6.7, and therefore no additional mitigation or monitoring is considered to be required.

21.4 Water

We refer to chapter 7 which identifies all of the water quality mitigation measures in full.

Sediment control measures will put in place to prevent suspended solids in runoff from entering the ditch network bordering the Site and ensure works are in line with the IFI guidelines. These measures will include the following:

- Silt traps will be placed on all outflows from the Site;
- A silt fence will be erected below along the south and east boundaries;
- Existing vegetation will be retained where possible;
- The working area will be clearly defined, and construction activities will be carefully planned to minimise ground disturbance; and,
- Runoff will be diverted away from stripped areas

The following best practice guidelines will be followed for the construciotn and operation phase of the Overall Project, which are based on Inland Fisheries Ireland and National Roads Authority guidance documents:

- Construction stage works will be undertaken in accordance with an approved CEMP;
- Weather conditions will be considered when planning construction activities to minimise risk of runoff from Site;
- All materials shall be stored at the main contractor compound and transported to the works zone immediately prior to construction;
- Any chemical / oils to be stored onsite will be placed within a bund on an area of hardstanding to ensure there is no seepage of pollutants into groundwater or surface water;
- All bunds will have the capacity of the largest tank volume plus 10 percent, at a minimum, with additional capacity to hold 30mm of rainfall;
- Prior to any works commencing, all construction equipment will be checked to ensure that they are mechanically sound, to avoid leaks of oil, fuel, hydraulic fluids and grease;
- Preventative maintenance and relevant maintenance logs will be kept for all onsite plant and equipment;

- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows;
- Any pouring of concrete will only be carried out in dry weather. Washout of concrete trucks will not be permitted on the Site;
- Washouts of equipment used for concrete operations will be done either offsite or within a designated washout area, which will comprise a container that will capture the washout material / water for reused or disposal offsite;
- Any spillage of cementitious materials will be cleaned-up immediately;
- Steel tanks will be protected from corrosion;
- All drainage from bund areas must be directed to secure containment prior to suitable disposal;
- Fuel will be delivered onsite by a dedicated tanker or in a delivery bowser dedicated to that purpose;
- The Appointed Contactor will put in place a specific, step-by-step refuelling procedure which will be communicated to all relevant employees onsite;
- All valves should be of steel construction and the open and close positions should be clearly marked;
- Fuels, lubricants and hydraulic fluids for equipment used in the construction Site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to current best practice;
- Vehicle or equipment maintenance work will be carried out in a designated area on the Site. In the event that refuelling is required outside this area a spill tray will be employed during the refuelling operation;
- No surface water runoff will be discharged onto public roads, foul sewers or adjacent property;
- In order to prevent potential water pollution risk when drainage lines are in place but not fully commissioned, no discharges to the surface water drainage system at the Site will be made until all drains are fully connected to the proposed and approved petrol interceptor; and,
  - Measures will be implemented to minimise waste and ensure correct handling, storage and disposal of waste.

The proposed measures to remove the risk from potential contamination and emergency procedures to be implemented in the event of an accidental release or spill of potentially contaminating substances are outlined below.

These procedures will be communicated to all relevant Site staff. At a minimum the following measures will be in place:

- Adequate spill kits including absorbent booms and other absorbent material will be maintained onsite;
- Any spillage of cementitious materials will be cleaned-up immediately;
- All contractor workers will be appropriately trained in the use of spill kits; and,
- Any sediments impacted by contamination will be excavated and stored in appropriate sealed containers for disposal offsite in accordance with all relevant waste management legislation.

21.5 Noise and Vibration

In order to sufficiently mitigate the likely noise impact, a schedule of noise control measures has been formulated for both construction and operational phases associated with the proposed development.

Construction Phase

With regard to construction activities, reference is made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be applied during the construction of the proposed development, including:

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration;
- Monitoring levels of noise and/or vibration during critical periods and at sensitive locations; and
- All site access roads will be kept even so as to mitigate the potential for vibration from lorries.

- Furthermore, a variety of practicable noise control measures will be employed. These will include:
    - Selection of plant with low inherent potential for generation of noise and/ or vibration;
    - Erection of barriers around the site perimeter, and if necessary to comply with construction noise criteria section 8.2.4, around items such as generators or high duty compressors; and
    - Situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

During any rock breaking or similar vibration-generating works, vibration from construction activities to off-site residences will be limited to the values set out in Table 8.7 through monitoring of vibration at the site boundary or at noise-sensitive locations. It should be noted that these limits in Table 8.7 are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%, as stated in BS5228.

Note - Appendix 8.4 presents an indicative construction noise and vibration management plan that will be implemented in terms during the construction period. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place (e.g. rock breaking) that have an increased potential noise and vibration generation.

Operation Phase

Building Services Noise / Emergency Site Operation

Noise from external plant will be controlled by adhering to the sound power levels of plant items and the application of attenuators and barriers as presented in Appendix 8.2. With due consideration as part of the detailed design process, this approach will result in the site operating within the constraints of the noise criteria that have been adopted as part of this detailed assessment.

The noise mitigation measures are summarised as follows:

- Adherence to the maximum sound power levels in Tables 2 and 5 of Appendix 8.2;
- Additional attenuation on with the insertion loss values in Table 3 of Appendix 8.2, on items as described in Table 2 of Appendix 8.2.
- A 3.5m high solid acoustic screen around the chiller compound to the south of the data centre building;
- A 4.5m high solid acoustic screen around the generator compound to the north of the data centre building;
- A 5.0m high solid acoustic screen around the OSPG compound.

With the implementation of these acoustic mitigation measures, predicted noise levels are within the criteria, as described in Table 8.19, Table 8.20, and Table 8.21.

Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

21.6 Air Quality

Construction Phase

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA based on the following publications:

- 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014);
- 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996);
- 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002);
- 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003);
- 'Fugitive Dust Technical Information Document for the Best Available Control Measures' (USEPA, 1997); and
- 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically

updated) (USEPA, 1986).

Site management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 for the windrose for Casement Aerodrome). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent will monitor the contractors' performance to ensure that the proposed mitigation measures are implemented, and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board will also include head/regional office contact details;
- Community engagement shall be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- The procedures put in place will be reviewed at regular intervals and monitoring conducted and recorded by the principal contractor. Reviews will be conducted on a monthly basis as a minimum.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and

- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust; and
- During periods of very high winds (gales), activities likely to generate significant dust emissions shall be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions;

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles shall be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK Office of Deputy Prime Minister, 2002); and
- Hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

<u>Summary of Dust Mitigation Measures</u>

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The identification of the site management responsibilities for dust issues,
- The development of a documented system for managing site practices with regard to dust control;

Operation Phase

The stack heights of the gas engines at 14m above local ground level and back-up generators at a stack height of 20m above local ground level have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the emissions and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations). No additional mitigation measures are proposed for the operational phase of the development.

21.7 Wind and Microclimate

The impact of the proposed development massing on the local wind environment has been determined (showing the wind flows obtained at the pedestrian level) using the permitted development as the baseline for this assessment.

Wind cannot be eliminated or mitigated as it depends on weather conditions which could vary. The data of the historical wind conditions collected and reported in the previous sections show that the wind speeds likely to occur on the site are below critical values and that a pleasant and comfortable microclimate can be maintained for most of the time and under the most frequent wind scenarios.

Gusts and storms can still occur, however, and they can create unpleasant and sometimes unsafe conditions. The pedestrian activities concerning the Lawson Comfort and Distress Criteria are not in general carried out during those weather conditions.

Having considered the above, no further changes to the development design and further increase of the landscaping are suggested, as safety and pedestrian comfort are maintained under Lawson Comfort and Distress Criteria.

Construction Phase

As this assessment focuses on wind microclimate for completed versions of the permitted and proposed developments, this **section** explains that this

The wind microclimate chapter does not assess the stages involved during the building's actual construction as pedestrian activity on the site during construction would vary depending on the builders plans and which may be different from what is expected to be available to the public (following the intended pedestrian use stated in the application being sought) for pedestrian use after the development's completion.

Therefore, no mitigation measures are proposed for the construction phase of the proposed development in relation to wind microclimate.

Operation Phase

In summary, the following conclusions can be made by observing the results of the wind microclimate analysis and comparing the results obtained, under the same wind conditions for the baseline scenario versus the proposed development scenario:

- The assessment of the proposed scenario has shown that no area is unsafe, and no conditions of distress are created by the proposed development.
- The area is already interested by similar wind conditions to the ones obtained after the construction of the proposed development and the proposed development do not pose any increased risk related to wind comfort and distress.
- The wind microclimate of the proposed development is suitable for the type of activities expected on the type of structure (walking).
- The proposed development does not enhance any critical wind conditions on the off site areas compared to the actual existing wind conditions on the same place.

Therefore, no mitigation measures are proposed for the operation phase of the proposed development in relation to wind microclimate.

21.8 Landscape and Visual Impact Assessment

Incorporated Design Mitigation of Visual Impact

The mitigation of potential negative impacts has influenced the design and layout of the development. Various measures have been incorporated in the permitted scheme as well as in the proposed development.

The mitigation measures that have been considered and implemented in the design of the proposed development, as described in section 2.3.1 of this EIAR, include the following:

- Replacement of hot air plenum towers with panels screening the generator flues is an important element of the front façade design. Flues' height matches the height of the screens, so the flues are not visible from the public road. Screens concealing the flues are clad with light grey horizontally fixed cladding. They are further enhanced with stainless steel wire mesh vertical panels. The flue screens with mesh detail assist in breaking up the otherwise visually heavy massing of the long dark grey front elevation. It adds greater detail to the otherwise monolithic façade and makes it more interesting.
- Provision of a 'green wall' and additional native trees in front of the OSPG compound to conceal the solid enclosure wall and mitigate the negative visual impact of a large expanse of metal cladding. Thanks to this measure the OSPG compound merges visually into the landscape.

- There is overall 10. no flues associated with 10 no. generators located within the OSPG compound, which extend up to approx. 14-15m above ground. The flues have been grouped by 5 no. This results in a much lesser visual impact of the flues and their support structures.

The overall project, as described in section 2.3.2 of this EIAR, in addition to the measures listed below also includes the following visual impact mitigation measures:

- Due to the prominent location of the development and a requirement for a high architectural standard prescribed in the Development Plan 2016-2021 (see below), considerable effort was put to develop an attractive façade approach and reduce the effect of building massing.

  Specific objectives relating to EE-zoned land:

  ET3 Objective 5: To ensure that all business parks and industrial areas are designed to the <u>highest architectural</u> and landscaping <u>standards</u> and that natural site features, such as watercourses, trees and hedgerows are retained and enhanced as an integral part of the scheme.

- External stairs are natural features on the rear elevation which assist in breaking up the massing. External stairs are clad with stainless steel woven mesh cladding. Their steel support structure and stringers will be painted red, to add interest to the rear façade.

- Separation of building function into Data Centre and office area further assists with breaking up the massing of this large building. It has been translated into the façade design using different materials and colours:
  - The Data Centre is clad with horizontally fixed, composite flat metal panels, powder coated to a dark grey colour (RAL 7016 Anthracite). The cladding is decorated using metal fins, installed at 2.5m distances and 150mm depth. The colour of the fins matches the cladding colour, which adds texture to the large flat surface of the wall cladding.

The office block features a curtain wall which extends across the north and west façade. There are glazing mullion feature fins, like fins used on the Data Centre elevations. Solid sections of the front-of-house facades are clad with fibre-cement cladding panels, with vertical grooved texture. Panels are in mid-grey colour ('granite'). The curtain wall framing will be in a selected grey colour to match the cladding.

Landscape mitigation

Landscape mitigation includes all design measures that assist in the integration of the development within the existing landscape and further improve the visual impact.

The majority of the overall landscape design proposal as per the Landscape Masterplan drawing DB80-MA-LS-XX-DR-L-PLNT-1050, revision P04, submitted with the current planning application (Appendix 11.7), has been included in the already permitted scheme SDCC Ref. SD21A/0186. The landscape mitigation measures for the proposed development, as described in section 2.3.1 of this EIAR, include the following:

- Provision of a 'green wall' and additional native trees in front of the OSPG compound to conceal the solid enclosure wall and mitigate the negative visual impact of a large expanse of metal cladding (as already noted under 12.8.1). It also enhances the biodiversity of the site, providing foraging opportunities, shelter and resting habitats for the wildlife. The wire trellis system will be mounted on the wall with a combination of fast-growing climbers: Wisteria and Persian Ivy. The system can reach the full height of the enclosure.

- Addition of 2 no swales near the south and east boundary. Swales are shallow drainage channels formed in the terrain with gentle side slopes where water running off a site can collect and soak away. These have been added instead of underground attenuation tanks, which have been omitted. Swales are natural drainage elements, that assist in the protection of biodiversity on site (please refer to section 6.5.3.2 of this EIAR for further information).

The other landscape mitigation measures have already been included in the permitted scheme:

- It is proposed to maintain the existing hedgerow and protect it by the provision of an 8m landscaped protection zone along it – a bee-friendly Native Wildflower meadow. The hedgerow will be enhanced by the planting of a new hedge mix including Blackthorn, Holly and Hawthorn as well as new Birch and Oak trees. Swales and an attenuation pond will be incorporated within that protection zone. (Please refer to section 6.4.2 of this EIAR for further information)
- Introduce an attractive visual screening to the north boundary along Old Nangor Road by introducing a raised berm and trees (Field Maple) and reducing the impact of the building massing.
- Provide visually attractive planting to attenuation pond edges (Black alder and goat willow) together with paths and benches along the pond. (Please refer to section 6.5.3.2 of this EIAR for further information)
- Provide visually attractive ornamental planting to the edge of the road within the forecourt area: lavender, rosemary, and heather.
- Provide a visually attractive setting for the building entrance and landscaped break-out area for staff and visitors in the 'Entrance Plaza' including decorative trees and shrubs (Cherry Blossom, Japanese Maple, Magnolia and Crab Apple), screening from vehicular routes in form of raised planters and benches.
- Provide visual screening along Falcon Avenue to include a continuous hedge.
- Break up ('soften up') the continuous row of car parking spaces with green islands with trees every 10 spaces.
- Provide greening treatments throughout the site: In the car parking area, in the forecourt area, and the Entrance Plaza.
- The proposed development will have minimal impact on the existing tree cover on the site. Additional replanting will mitigate any loss of trees as a result of the Ash Dieback and will be a net positive to the tree cover in this particular location. The proposed landscape plan details the planting of a significant number of new native broadleaf trees.

A detailed landscaping masterplan and Landscape Architects Design Report has been prepared by Murray Associates Ltd and submitted with the current planning application (Refer to Appendix 11.6).

Construction Phase Mitigation

The same construction mitigation measures are planned for the proposed development and the overall project.

Construction works will be carried out in line with the preliminary Construction Environmental Management Plan (referred to as pCEMP) prepared by Malone O'Regan Environmental Consultants and submitted with the current planning application. The specific mitigation measures have been assessed there and listed in Table 5-4 and section 3.1 of pCEMP. (Please refer to Appendix 11.8)

Mitigation measures referring to visual and landscape impact in summary include:

- Provision of solid hoarding around the site area.
- Vegetation to be retained, that will be close to the construction areas will be fenced off by construction-proof barriers before the commencement of works.
- Buffer zones of unexcavated ground will be maintained along the retained vegetation to protect root systems.
- The roof protection zone will also assist in the prevention of any significant soil compaction or root damage by machinery.
- No materials or equipment will be stored within proximity to vegetation to be retained.
- An Ecological Clerk of Works will be appointed to the project and will inspect the site monthly to ensure that works are completed in line with mitigation measures.
- Temporary construction compound lighting will be directed downwards and will not illuminate the landscape areas.

The protection measures for existing trees and hedges will be implemented in line with the Arboricultural Inventory and Impact assessment incorporating Tree Protection Strategy prepared by Murray Associates, prepared based on the survey carried out on the 21st of April 2021 and including findings of this survey and assessment of mature trees and hedgerows on the subject site, which has been submitted with the previous planning application (Refer to Appendix 11.5). It specifies the details of the tree protection fencing and signage and their locations.

Given that there were no changes to this strategy, this document has not been reissued for the current planning application.

Landscape planting works will be undertaken by a competent landscape contractor, following landscape specifications to be prepared by Murray Associates. Outline specification has been submitted for this planning application: Landscape Architect's Design Report including Landscape Specifications and Landscape Management Plan (refer to Appendix 11.6).

Operational Phase Mitigation

The same operational mitigation measures are planned for the proposed development and the overall project.

A preliminary Landscape Management Plan has been included in the Landscape Architects Design report submitted for this planning application (refer to Appendix 11.6).

The client will enter into a maintenance contract with the landscaping subcontractor to look after the vegetation on site upon completion.

In summary, the maintenance work will include:

- Maintaining all plants in a healthy state
- Fertilizing once a year
- Cutting pruning once per annum

21.9 Traffic and Transport

Construction phase

The Proposed Development for which consent is being sought under SDCC Ref. SD22A/0156 includes modifications to the permitted Data Centre granted under SDCC Ref. SD21A/0186 has set working hours based on the grant of permission relating to SDCC Ref. SD21A/0186.

Condition 3F of SDCC Ref. SD21A/0186 out the requirement for the applicant to submit a Construction Traffic Management Plan to the Local Authority prior to commencement.

A Construction Traffic Management Plan (CTMP) would be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road.

The extent of the heavy vehicle traffic movements and the nature of the payload may create problems of:

- Fugitive losses from wheels, trailers or tailgates; and
- Localised areas of subgrade and wearing surface failure.

The contractors shall ensure that:

Loads of materials leaving each site will be evaluated and covered if considered necessary to minimise potential dust impacts during transportation.

The transportation contractor shall take all reasonable measures while transporting waste or any other materials likely to cause fugitive loses from a vehicle during transportation to and from site, including but not limited to:

- Covering of all waste or material with suitably secured tarpaulin/ covers to prevent loss; and
- Utilisation of enclosed units to prevent loss.

The roads forming part of the haul routes will be monitored visually throughout the construction period and a truck mounted vacuum mechanical sweeper will be assigned to roads along the haul route as required.

In addition, the contractor shall, in conjunction with the local authority:

- Undertake additional inspections and reviews of the roads forming the haul routes one month prior to the construction phase to record the condition of these roads at that particular time.
- Such surveys shall comprise, as a minimum, a review of video footage taken at that time, which shall confirm the condition of the road corridor immediately prior to commencement of construction. This shall include video footage of the road wearing course, the appearance and condition of boundary treatments and the condition of any overhead services that will be crossed. Visual inspections and photographic surveys will be undertaken of bridges and culverts that are along the haul roads.

- Where requested by the local authority prior to the commencement of construction operations, pavement condition surveys will also be carried along roads forming part of the haul route. These will record the baseline structural condition of the road being surveyed immediately prior to construction.
- Throughout the course of the construction of the proposed development, on-going visual inspections and monitoring of the haul roads will be undertaken to ensure any damage caused by construction traffic is recorded and that the relevant local authority is notified. Arrangements will be made to repair any such damage to an appropriate standard in a timely manner such that any disruption is minimised.

Upon completion of the construction of the proposed development, the surveys carried out at preconstruction phase shall be repeated and a comparison of the pre and post construction surveys carried out. Where such comparative assessments identify a section of road as having been damaged

Operational phase

The analysis carried out in this Chapter has confirmed that the proposed access arrangements would accommodate anticipated levels of traffic visitation and that as such the traffic generated by the development would have no material adverse impact on the operation of all junctions assessed.

It has been shown by the application` of recognised assessment techniques that there is a slight increase in traffic levels arising from the development and the distribution of resultant flows around the adjacent road.

The results in terms of flows and movements can be accommodated by the neighbouring junctions with an anticipated slight uplift in congestion and delays at these locations.

This assessment has also considered the transportation aspects of the internal arrangements of the development and has concluded that the proposals would provide enhanced facilities and improved accessibility for all users of the site.

Accordingly, no remedial or reductive measures are proposed for the operational phase.

21.10 Waste Management

Section 13.6 of the waster management chapter outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

The concept of the ‘waste hierarchy’ and ‘Circular Economy’ is employed when considering all mitigation measures. The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The circular economy principle aims to keep materials, components, and products in-use in the economy for as long as possible. In circularity, the key objective is to design consumption and production systems to create and retain value.

Construction Phase

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

As previously stated, a project specific RWMP has been prepared in line with the requirements of the requirements of The EPA, *Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects’ (2021)* and is included as Appendix 13.1. The mitigation measures outlined in the RWMP will be implemented in full and form part of mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (Appendix 13.1) in agreement with SDCC and in compliance with any planning conditions, or submit an addendum to the RWMP to SDCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases and should treat the document as outlined in the guidance as a live document.

  A quantity of topsoil and sub soil will need to be excavated to facilitate the proposed development. The project design team have estimated that c. 973.11m^3 of excavated material will need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with

Regulation 27 of the EC (Waste Directive) Regulations (2011-2020). EPA approval will be obtained prior to moving material as a by-product.

These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the EMR Waste Management Plan 2015 – 2021. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

Operation Phase

The following mitigation measures will be implemented during the operational phase of the proposed development:

All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins, skips or other suitable receptacles in a designated, easily accessible areas of the site.

- The Operator / Buildings Manager of the Site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – for the implementation of an Operational Waste Management Strategy, ensuring a high level of recycling, reuse and recovery at the Site of the proposed Development.
- The Operator / Buildings Manager will regularly audits the onsite waste storage facilities and infrastructure, and maintain a full paper trail of waste documentation for all waste movements from the site.

  The following mitigation measures will be implemented:

- The Operator will ensure on-Site segregation of all waste materials into appropriate categories, including (but not limited to):
  - Packaging Waste
  - General Non-Hazardous Waste
  - Office/Canteen / Kitchen Waste
  - Non-Haz and Haz WEEE
  - Landscaping waste
  - UV & Fluorescent Tubes
  - Waste Oil
  - (Wet) Batteries
  - (Dry) Batteries.
- The Operator will ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- The Operator will ensure that all waste collected from the Site of the proposed development will be reused, recycled or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- The Operator will ensure that all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed Project is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste*

Management Plan (2015 - 2021) and the SDCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

21.11 Material Assets – Utilities

There are no specific mitigations required for the power and telecommincations associated with the proposed development and overall project.

Construction Phase

Ongoing consultation with the Irish Water, EirGrid, ESB Networks, GNI and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure a smooth construction schedule without disruption to local and business community.

The general contractor will be obliged to put best practice measures in place – as set out in the The Construction Environment Management Plan (CEMP) that has been prepared by Malone O'Regan Environmental Consultants and is included with the EIAR (Appendix 11). – to ensure that there are no interruptions to these utilities, unless this has been agreed in advance.

Coordination and consultation between the project team and ESB and Irish Water and other relevant service providers within the locality as the design progresses.

All mitigation measures outlined therein will be implemented, as well as any additional measures required pursuant to planning conditions which may be imposed. These measures include surface water protection measures, including silt control features and measure for the management of spills. In order to mitigate any impact on surface water runoff, the new drainage network shall be constructed on a phased basis and temporary pipes and detention ponds shall be constructed, as required.

During construction, liquid materials should be stored within temporary bunded areas, doubled skinned tanks or bunded containers.

Operation Phase

It is envisaged that consultation with the Irish Water, EirGrid, ESB Networks, and other relevant service providers within the locality and compliance with any requirements or guidelines they may have, will ensure that there will be no ongoing impacts on material assets.

21.12 Cultural Heritage (Architectural)

Construction Phase

A strategy of ensuring the preservation of the townland boundary and its associated vegetation and ditch should be put in place. Any limited breaches of the boundary should be limited in nature, in consultation with archaeologist / architectural historian. A buffer zone of 10m should be considered.

Operation Phase

Any works affecting the boundary should be preceded by consultation with archaeologist / architectural historian. A buffer zone of 10m should be in place.

21.13 Cultural Heritage (Archaeological)

Construction Phase

Since it is not possible to have a geophysical survey prior to the construction phase due to previous disturbance of the ground, it is recommended that on site monitoring by a licensed archaeologist during the construction phase is undertaken.

Operation Phase

It will not be necessary to have mitigation measure during the operational phase.

22.14 Sunlight and Daylight

During the design process the position and mass of the building, the finished floor level, the height of parapets and mechanical plant of the Overall Project were technically assessed to mitigate any potential effect on the daylight, sunlight and overshadowing of the adjacent properties, by prevention and reduction. This informed the final design.

Construction Phase

During the construction phase all scaffolding, hoarding and cranes would only be in use for as long as necessary to facilitate the construction of the Overall Project. The impacts of these are considered negligible.

Operational Phase

As the completed structure of the Overall Project would represent the greatest mass on site, it is considered that the Overall Project represents the worst-case in terms of assessing the effect on daylight, sunlight and overshadowing. This is not projected to change over the operational phase of the development.

22.15 Climate

Construction Phase

The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimized wherever possible during the construction phase of the proposed development and the overall project. The measures will include:

- All vehicles will be required to switch off engines when stationary (no idling);
- All vehicles will be serviced and maintained to ensure emissions are minimised;
- Embodied Carbon will be investigated at detailed design stage;
- Where practicable, materials will be reused within the extent of the Proposed Development; and
- Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport.

Operation Phase

The gas engines and diesel generators will be regularly serviced to ensure that they operate to their maximum efficiency. In addition, the data centre is designed to minimize energy use including the use of PV roof panels. A heat recovery building is also provided in the event future connection can be made to a district heating system in the area. In addition, an IT cooling system will cool water via free cooling air cooled chillers. From the chillers, water is circulated into data hall fan arrays which distribute cooled recirculated air back into the data hall.

The delivery of sustainable gas is presented in Gas Networks Ireland 2050 vision. This presents a clear strategy to transition to a zero carbon grid through the use of renewable gas, carbon capture and hydrogen to ensure sustainable gas delivery. In addition, the Climate Action Plan 2023 includes KPI for 20 AD plants producing 1TWh of biomethane per year by 2025 and 5.7TWh by 2030 from up to 200 AD plants which the plant has been future proofed to utilise.