Planning & Development Act, 2000 - 2022,
European Communities (Environmental Impact Assessment) Regulations 1989 (as amended), Planning & Development Regulations, 2001 (as amended)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Additional Information response - Planning Ref. SD22A/0333

EdgeConneX Ireland Ltd.
Data Centre (DUB06)
Ballymakaily

May 2023

MARSTON
PLANNING CONSULTANCY

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1. INTRODUCTION

1.1 A planning application was submitted by Edgeconnex Ireland Ltd. (the 'Applicant') in August 2022 under SDCC Planning Ref. SD22A/0333 for the third phase of development of the overall site following the permitted data centre developments granted by An Bord Pleanála under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and by SDCC under Planning Ref. S21A/0042. The application was accompanied by an Environmental Impact Assessment Report (EIA Report).

1.2 On the 10th October 2022 SDCC responded to the planning requesting Additional Information (AI) to be submitted. An Order dated the 29th March 2023 extended the period for submitting a response to the request up to and including the 19th July 2023 in accordance with the provisions of Article 33 (3) of the Planning and Development Regulations, 2001 (as amended). This included some technical queries relating to certain chapters of the EIA Report particularly relating alternatives considered, material assets and the document known as 'Government Statement on the Role of Data Centre's in Ireland's Enterprise Strategy', as well as some moderate design changes in term of a new hedgerow and a new open bio-swale.

1.3 As such, the applicant will now submit a revised EIA Report (the 'May 2023 Revised EIAR') to accompany the AI Response. Accordingly, the relevant design drawings and other supporting documents have been updated and have been used to inform the EIAR. Where relevant updated environmental impact assessments have been undertaken to assess the potential impacts and likely effects of the proposed development, the outcome of which has been presented in the EIAR.

1.4 The structure of this May 2023 revised EIAR is consistent with the August 2022 EIAR. For the May revised EIAR all chapters have been reviewed and where required have been amended. The form and documents included within the Appendix document remains the same apart from where it has been updated. No additional documents have been included within the Appendix. Other technical documents can be found within the documents submitted as part of the application, or as updated as part of this AI Response.

1.5 The Proposed Development is to be located on a site of c. 5.14ha. to the immediate west of the R120, and to the south of the Grand Canal. The location of the development is shown on Figure 1.1 below with the wider site outlined in blue. For the purposes of clarity all lands within the application boundary is under the ownership and control of the applicant.

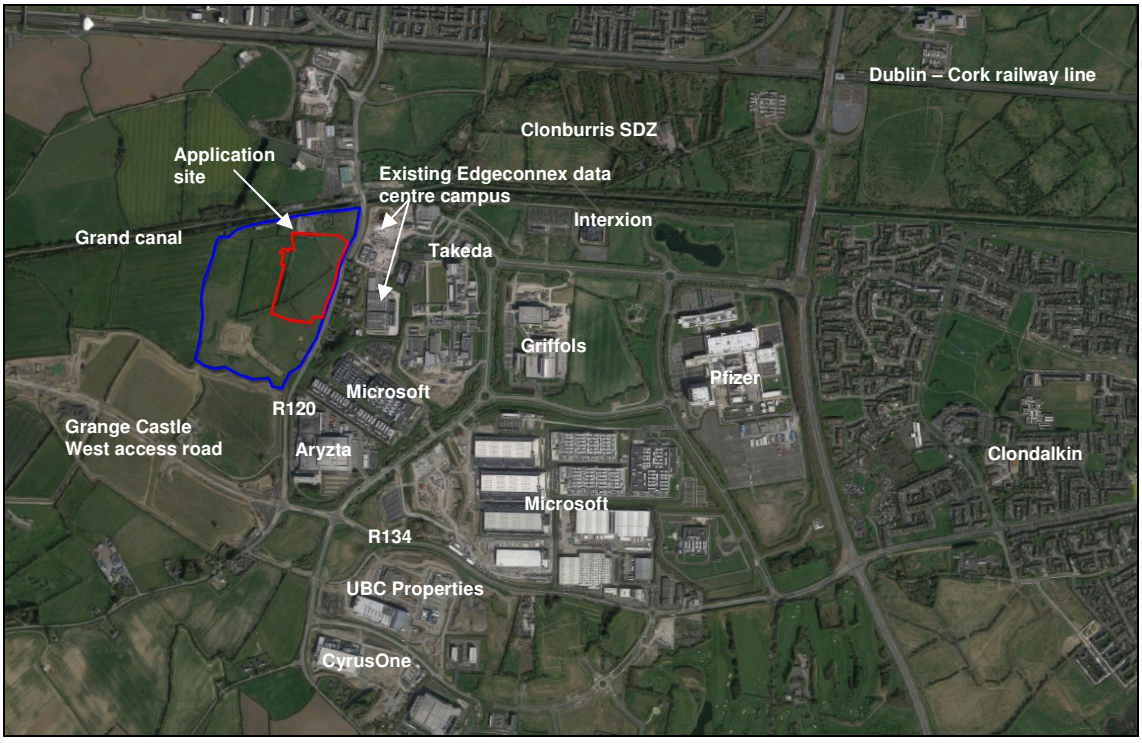

Figure 1.1 Site location map

1.6 The application lands are to the west of the Grange Castle Business Park, and to the north and north-east of the business park to be known as Grange Castle West that are aimed at attracting overseas investment to the area for which an internal access road has been recently undertaken. Located to the west of Clondalkin, the Grange Castle area has been the focus of significant international investment over the last several years.

1.7 The subject site is approximately 5km west of the M50 Orbital Motorway, and is close to the strategic road and mainline rail connections to the west and south of Ireland. The site is within 15 kilometres of the city centre and enjoys easy access to Dublin Airport and Dublin Port.

1.8 This EIA Report is prepared in respect of the two no. adjoined single storey data centres with associated office and service areas with an overall gross floor area of 15,274sqm. The associated structures include water tower and pump house as well as utility connections to the boundary of the site. The EIA Report has also cumulatively assessed with these works the permitted development on the site granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948, SDCC Planning Ref. SD21A/0042, SDCC Planning Ref. SD22A/0105 as well as the permitted development on the wider Edgeconnex site to the east of the R120.

1.9 In the case of the associated grid connection works to the permitted substation it is subject to a separate Strategic Infrastructure Development (SID) application and EIA Report (see ABP Ref. VA06S.314567) that is currently with the Board for determination. The applicant has responded in this EIA Report to the aspects of the environment as well as specific issues raised in consultation with the Planning Authority.

Nature and extent of Proposed Development

1.10 The proposal is to seek permission for development at this site of 5.14hectares that is located within the townland of Ballymakaily to the west of the Newcastle Road (R120), Lucan, Co. Dublin. The development will consist of the construction of two no. adjoined single storey data centres with associated office and service areas with an overall gross floor area of 15,274sqm that will comprise of the following:

- Construction of 2 no. adjoined single storey data centres with a gross floor area of 12,859sqm that will include a single storey goods receiving area / store and single storey office area (2,415sqm) with PV panels above, located to the east of the data centres as well as associated water tower, sprinkler tank, pump house and other services;
- The data centres will also include plant at roof level; with 24 no. standby diesel generators with associated flues (each 25m high) that will be located within a generator yard to the west of the data centres;
- New internal access road and security gates to serve the proposed development that will provide access to 36 no. new car parking spaces (including 4 no. electric and 2 no. disabled spaces) and sheltered bicycle parking to serve the new data centres;
- New attenuation ponds to the north of the proposed data centres; and
- Green walls are proposed to the south and east that will enclose the water tower and pump house compound.

1.11 The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042. The site will remain enclosed by landscaping to all boundaries. The development will be accessed off the R120 via the permitted access granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SD21A/0042.

1.12 A full description and details of the Proposed Development is provided in Chapter 2 (Description of the Proposed Development). It is noted that as part of this AI Response the description of the Proposed Development has not been amended. However, in response to the AI Request a new native hedgerow is proposed to the west and south of the proposed development to address the concerns raised under Point 7 and others of the AI request. An open bio-swale has also been added to the development in response to Point 14 of the AI request.

1.13 It is proposed to provide permanent power supply to the site via the permitted GIS substation located centrally within the site as originally granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and recently amended under SDCC Planning Ref. SD22A/0105. Its HV connection to a suitable point of connection is currently being defined by Eirgrid and has been applied for, under a separate Strategic Infrastructure Development (SID) application accompanied by an EIA Report (see ABP Ref. VA06S.314567.

1.14 The interim power supply to the Proposed Development will be provided by the permitted Power Plants that formed part of the permission granted under SDCC Planning Ref. SD21A/0042. These Power Plants were designed and scaled to provide permanent power for the data centres granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and amended under SD22A/0289; the data centres that were granted under SDCC Planning Ref. SD21A/0042 and the data centres that form part of this application. They are permitted to be provided on a phased basis in accordance with each data centre permission.

1.15 The Power Plants are required as a result of the limited existing capacity within the National Grid available currently in the Greater Dublin area. The third power plant will only be constructed if required to provide power to the current application, and if permanent power supply to the site has not been achieved at the time of the commencement of its operation.

1.16 Due to the Flexible Demand offer from Eirgrid for the site; the Power Plants will be required to provide additional reliability of power, and will act as a back-up source of power when the connection to the national grid is unavailable. This is likely to be for relatively short periods but longer than could be sustained by the standby generators associated with all data centres on site.

1.17 It is proposed to create a campus level of finish to the overall site as opposed to an industrial form of development with heavy landscaping already permitted throughout the overall site and on all boundaries and particularly to the north bounding the canal as permitted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and modified under SDCC Planning Ref. SD21A/0042 that included the creation of a public park that will provide a link between the canal and the R120 to the east. Two new attenuation ponds to the north of the site will address the new attenuation ponds of the Proposed Development. These will not impact the provision of the permitted publicly accessible park as granted under the most recent permission.

1.18 Over the past 10 years, a wide variety of service providers have begun offering IT infrastructure services to businesses in the form of web services - now commonly known as “cloud computing”. Cloud computing is a network of remote servers hosted on the Internet and used to store, manage, and process data in place of local servers or personal computers. One of the key benefits of cloud computing is the opportunity to replace up-front capital infrastructure expenses with low variable costs that scale with each business’s requirement. With the Cloud, businesses no longer need to plan for and procure servers and other IT infrastructure weeks or months in advance. Instead, they can instantly access hundreds or thousands of servers in minutes and deliver results faster.

Purpose of the Environmental Impact Assessment Report

1.19 The EIA Report sets out a description of the Proposed Development, an outline of the main alternatives studied by the developer (and an indication of the main reasons for this choice); a description of aspects of the environment which could be potentially affected by the Proposed Development; a description of the potential effects of the Proposed Development on the environment; a description of the forecasting methods used to assess the potential effects on the environment referred to above; a description of the measures envisaged to prevent, reduce and offset any potential adverse effects on the environment; and residual impacts. A non-technical summary of this information is provided in Chapter 2 of this EIA Report.

1.20 The potential impacts of the operation and construction phases of the Proposed Development have been assessed and summarised under the following environmental topics:

- Population and human health;
- Biodiversity;
- Land, soils, geology and hydrogeology;

- Hydrology;
- Noise and vibration;
- Air quality;
- Climate (separated from air quality under this May EIAR);
- Landscape and visual impact;
- Traffic and Transportation;
- Cultural heritage;
- Waste management;
- Material assets;
- Direct and indirect effects; and
- Interactions.

1.21 Mitigation measures have been integrated into the project with a preference given to measures that avoid potential environmental effects over measures that reduce and remedy potential environmental effects. Assessments were carried out on the basis of available access and information, i.e. on the basis of conditions that could be reasonably viewed or inferred from aerial photography, published reports and direct observation during site visits.

Requirement for this Environmental Impact Assessment Report

1.22 The requirement for EIA for certain types and scales of development is set out in the EIA Directives (2011/92/EU and 2014/52/EU), European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (the bulk of which came into operation in September 2018), the European Communities (Environmental Impact Assessment) Regulations 1989-2006, Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001-2023. It should be noted that this EIA Report is prepared in accordance with the 2011 EIA Directive (2011/92/EU), as amended by the 2014 EIA Directive.

1.23 The EIA Directives list those projects for which an EIA is mandatory (Annex I) and those projects for which an EIA may be required (Annex II). With regard to Annex II projects, Member States can choose to apply thresholds or use case by case examination or a combination of both to assess where EIA is required. In Ireland, a combination of both has been applied.

1.24 The project proposed is not listed under Annex I EIA Directives and whilst it is below the relevant threshold as set out in the Planning and Development Regulations 2001-2022 for Annex II projects. Industrial estate development projects, such as this, where the area would exceed 10 hectares, as set out in Part 2 of Schedule 5 of the Regulations, it was considered, due to the cumulative nature of the proposed development with the already permitted developments on the wider 22.1ha. site, including its link to the permitted power plants, that it was the most relevant threshold in the context of the Proposed Development. The Proposed Development site area in combination of the wider site exceeds this threshold and therefore an EIA Report is required for the Proposed Development.

1.25 The main objective of an EIA, as set out in Article 3(1) of the 2014 EIA Directive, is to identify, describe and assess the direct and indirect significant impacts of a project on population and human health, biodiversity, land, soils, water, air & climate (including noise), material assets, cultural heritage and the landscape and the interaction between the aforementioned factors. The EIA Report reports on the findings of the EIA process and informs the Planning Authority, statutory consultees, other interested parties and the public in general about the likely effects of the project on the environment.

Habitat and Birds Directive

1.26 The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species. Natura 200 sites in Ireland are European sites, including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs).

1.27 The Directive set out a key protection mechanism to consider the possible nature conservation implications of any plan or project on the Natura 2000 site network before any decision is made to allow that plan or project to proceed; the process known as Appropriate Assessment (AA). An AA

(Stage 1) Screening comprises an initial impact assessment of a project; examining the direct and indirect impacts that it might have on its own or in combination with other plans and projects, or one or more Natura 2000 sites in view of the sites' conservation objectives. An AA Screening was submitted as part of the application.

Format of the Environmental Impact Assessment Report

1.28 This Environmental Impact Assessment Report (EIA Report) has been prepared in accordance with the requirements of the following:

- EU Directive /337/EEC; 2011/92/EU and 2014/52/EU;
- Planning and Development Act 2000 (as amended);
- Planning and Development Regulations 2001 (as amended);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018);
- *Guidance on the preparation of the Environmental Impact Assessment Report (EU, 2017);*
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* Draft September 2015 (Environmental Protection Agency); and
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports 2022* (Environmental Protection Agency).

1.29 It is prepared in the Grouped Format Structure following the guideline structure set down in the Environmental Protection Agency (EPA) "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports" (*2022). The "*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment"* (August 2018) and the European Commission *Guidance on the preparation of the Environmental Impact Assessment Report* have been considered in the preparation of the EIA Report.

1.30 Using the Grouped Format Structure, the EIA Report examines each environmental aspect in a separate chapter. Each chapter generally covers the following:

- Receiving Environment;
- Characteristics of the Proposed Development;
- Potential Impacts of the Proposed Development;
- Do-Nothing Scenario;
- Remedial and Mitigation Measures;
- Predicted Impacts of the Development; and
- Residual Impacts.

1.31 A Schedule of Mitigation measures to be implemented as part of the Proposed Development is included in Appendix 2.2. Cumulative effects for each environmental topic are assessed within each Chapter of this EIA Report. Interactions i.e. the interrelationship between each environmental aspect, are assessed as they occur in each chapter. Chapter 17 shows where interactions have been identified and how they have been addressed.

Need for the development

1.32 The Applicant has a number of existing data centres within this part of the Grange Castle area that includes a large and developing campus to the east of the Proposed Development site and to the east of the R120. The extent of the Operators Irish facilities have increased in recent years to cater for the growing demand for online services across the globe and it is expected that this will continue to grow in the coming years.

Company background

1.33 The applicant are a lead provider of cloud and carrier-neutral colocation data centre services in Europe and the USA. Since late 2013, they have built data centres across the US and are currently expanding its network across Europe enabling their customers to securely deliver mission-critical applications and content to end consumers, with excellent response time performance. Their existing state-of-the-art data centres provide space, power and cooling with reliability and

performance that goes beyond industry standards. The Applicant is committed to running its business in the most environmentally friendly way possible. Please refer to Chapter 2 (Characteristics of the Proposed Development) for additional details.

Consultation

1.34 Marston Planning Consultancy (MPC), the applicant and the project team have liaised with the relevant departments of South Dublin County Council (SDCC) in advance of lodgement of the application in August 2022. An initial meeting was held with SDCC on the 14th of June 2022 with representatives of the Planning, and Roads/Transportation, Parks, Sanitary Services and Heritage Departments. The key aspects addressed during scoping included:

- The nature, location and scale of the Proposed Development;
- The existing environment, including any vulnerable or sensitive site features or uses;
- The likely and significant impacts of the proposal on the environment, and particularly in relation to visual impact, noise and air quality; and
- The likely concerns of local residents, land users and other interested parties.

1.35 In addition, the relevant environmental specialists have liaised directly and independently with statutory bodies (including the Water Services and Parks departments of SDCC, Irish Water, Eirgrid, ESB, NPWS, and the Department of Defence etc.) by correspondence during the course of the EIA Report preparation. Other consultees are referred to in individual chapters. Further meetings were had prior to the lodgement of the AI response, particularly having regard rto the western hedgerow. All EIA contributors/authors have incorporated advice and comments received from consultees into the relevant chapters of this EIA Report.

Regulatory control

1.36 The proposed data centre facility activity is not an EPA regulated activity in terms of the Industrial Emissions Directive 2010/75/EU (which replaced the IPPC directive). In accordance with the recent legislation relating to the Medium Combustion Directive (EU 2015/2193), the generators will be registered as required with the EPA. However, the diesel generators of the data centres are exempt from complying with the emission limit values set out in the Directive, as they will not operate for more than 500 hours per annum.

1.37 The already permitted Power Plant facility and its gas based generators will require an EPA Greenhouse Gas (GHG) Emissions permit in accordance with the Environmental Protection Agency Act 1992, as amended. This will be applied for by the Applicant in due course prior to commencement of the scheduled activity.

Description of effects

1.38 The quality, magnitude and duration of potential effects are defined in accordance with the criteria provided in the EPA *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'* (2022) as outlined in Table 3.4 of the Guidelines, is summarised below.

Table 1.1 Description of Effects as per EPA Guidelines (2022)

Effect Characteristic	Term	Description
Quality of Effects	Positive	A change which improves the quality of the environment
	Neutral	A change which does not affect the quality of the environment
	Negative	A change which reduces the quality of the environment
Significance of Effects	Imperceptible	An impact capable of measurement but without noticeable consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
	Profound	An impact which obliterates sensitive characteristics
Describing the Extent and Context of Effects	Extent	Describe the size of area, the number of sites and proportion of a population affected by an effect
	Context	Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions
Probability of Effects	Likely Effects	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
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 seven to fifteen years
	Long-term Effects	Effects lasting fifteen to sixty years
	Permanent Effects	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone, for example through remediation or restoration
	Frequency of effects	How often an event will occur
Type of Effects	Indirect Effects	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.	
'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out	
`Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail	
Indeterminable	When the full consequences of a change in the environment cannot be described	
Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost	
Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect	
Synergistic	Where the resultant impact is of greater significance than the sum of its constituents	

Additional assessments required

1.39 This section addresses the additional approvals and assessments required under other EU Directives and legislation.

Appropriate Assessment Screening Report

1.40 A screening report has been completed for the Proposed Development (and was submitted as part of the application), as required under the Habitats and Birds Directive (92/43/EEC and 79/409/EEC) and is included as a stand-alone report undertaken by Scott Cawley, Consulting Ecologists. This document forms part of the application. The AA screening process has identified that the potential impacts associated with the Proposed Development do not have the potential to affect the receiving environment and, consequently, do not have the potential to affect the receiving environment and, consequently, do not have the potential to affect the conservation objectives supporting the Qualifying Interest/Special Conservation Interests of any European sites. Therefore, the proposed development is not likely to have significant effects on any European sites.

1.41 As the proposed development itself will not have any effects on the QIs/SCIs or conservation objectives of any European sites, and taking into account the policies and objectives of the statutory plans referred to above, it is concluded that there is no potential for any other plan or project to act in combination with it to result in significant effects on any European sites. In assessing the potential for the proposed development to result in a significant effect on any European sites, any measures intended to avoid or reduce the harmful effects of the project on European sites are not taken into account.

1.42 Following an examination, analysis and evaluation of all relevant information and in view of the best scientific knowledge, and applying the precautionary principle, it can be concluded that the possibility of any significant effects on any European sites, whether arising from the project alone or in combination with other plans and projects, can be excluded, for the reasons set out within the Screening Report. In reaching this conclusion, the nature of the project and its potential relationship with all European sites within the zone of influence, and their conservation objectives, have been fully considered. Therefore, it is the professional opinion of the authors of this report that the application for consent for the proposed development does not require a Stage II Appropriate Assessment or the preparation of a Natura Impact Statement (NIS).

Flood Risk Assessment

1.43 A Stage 1 Flood Risk Assessment has been undertaken for the site and forms a stand-alone report that forms part of this application.

Forecasting methods and difficulties in compiling the specified information

1.44 Forecasting methods and evidence used to identify and assess the significant effects on the environment for each environmental aspect are set out in each chapter. There were no significant difficulties in compiling the specified information for this EIA Report. Any issues encountered during the assessment of individual factors are noted within the relevant chapters.

Contributors to the EIA Report

1.45 The preparation and co-ordination of this EIA Report has been completed by Marston Planning Consultancy in conjunction with specialist subcontractors. Specialist inputs were provided by the following (Table 1.2):

Table 1.2 Roles and responsibilities in the EIA Report

Role		**Company**
EIA Project Management		Marston Planning Consultancy (MPC) – Anthony Marston
Architectural Design		Henry J Lyons – Jason Murphy
Engineering Design		Pinnacle Consulting
EIA Chapter no.	**Chapter title**	**Company and consultant**
	Non-technical summary	MPC – input from each specialist
Chapter 1	Introduction	MPC – Anthony Marston
Chapter 2	Description of the Proposed Development	MPC – Anthony Marston
Chapter 3	Planning and Development context	MPC – Anthony Marston
Chapter 4	Consideration of Alternatives	MPC – Anthony Marston
Chapter 5	Population and Human Health	MPC – Anthony Marston
Chapter 6	Biodiversity	Scott Cawley – Colm Clarke and Shea O'Driscoll
Chapter 7	Land, Soil, Geology and Hydrogeology	AWN Consulting – Marcello Allende
Chapter 8	Hydrology	AWN Consulting - Marcello Allende
Chapter 9	Noise and Vibration	AWN Consulting – Mike Simms
Chapter 10	Air Quality and Climate	AWN Consulting – Dr. Edward Porter
Chapter 11	Landscape and Visual Impact	Kevin Fitzpatrick, Landscape Architecture – Kevin Fitzpatrick
Chapter 12	Traffic and transportation	Pinnacle Consulting – Ronan Kearns
Chapter 13	Cultural heritage	CRDS – Stephen Mandal
Chapter 14	Waste Management	AWN – Elaine Neary
Chapter 15	Material Assets	MPC – Anthony Marston
Chapter 16	Cumulative effects	MPC – input from each specialist
Chapter 17	Interactions	MPC – input from each specialist

Project Director / Selected Chapters - *Anthony Marston, MSc (Environmental Planning).* Anthony is a corporate member of both the Royal Town Planning Institute and the Irish Planning Institute. Anthony is the Principal of Marston Planning Consultancy with over 30 years' experience in EIA Management; and planning and development consultancy. He has project managed, co-ordinated, provided specialist input and contributed to numerous EIA Reports.

Biodiversity - *Colm Clarke* is a Principal Ecologist with Scott Cawley and has over seven years' experience in ecological consultancy. He obtained an honours degree in Natural Sciences, with a specialisation in Botany, from Trinity College Dublin, and a Masters in Biodiversity and Conservation from the same institution. Colm is a full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM), a member of the Irish Environmental Law Association (IELA), and chairperson of the Dublin Bat Group (an affiliate group of Bat Conservation Ireland (BCI)). He is part of the CIEEM's EcIA Accreditation Working Group, which is focused on driving quality standards in EcIA across Ireland and the UK. He keeps abreast of the latest developments in environmental case law and best practice in ecological assessment through attendance at training courses, and IELA events. Colm's principal specialisms are in botany (with experience in classification of habitats both to Fossitt (2000) categories and identification of EU Annex I habitats) and bats (including advanced survey techniques such as use of infrared night vision aids, and the capture and handling of bats), and he is Scott Cawley's lead bat specialist. Colm is also experienced in a range of other fauna surveys, including freshwater white-clawed crayfish, freshwater pearl mussel, amphibians,

reptiles, marsh fritillary butterfly, and terrestrial mammals. Colm regularly completes Ecological Impact Assessment (EcIA), Biodiversity Chapters of Environmental Impact Assessment Reports (EIAR), Appropriate Assessment Screening reports, Natura Impacts Statements and Technical Review of AA reports on industrial, residential and large infrastructure projects.

Shea O'Driscoll, Senior Ecologist with Scott Cawley Ltd, holds an honours degree in Zoology from University College Dublin and a Masters in Advanced Wildlife Conservation in Practice from the University of the West of England, Bristol. Shea has professional experience working in South Africa and the United States, as well as more recent experience within Ireland and the UK. He has experience in habitat survey and assessment in a range of terrestrial and aquatic environments, surveys for protected species including otter, bats and badger, he has undertaken a number of ecological clerks of works roles as well as invasive species surveys for public infrastructure works across Ireland. Since joining Scott Cawley Ltd., Shea has been project manager on ecological assessments that include PEA, EcIA and AA (both AA Screening and preparation of NIS) for a range of projects including tourism, industrial, residential and renewable energy developments.

Land, Soils, Geology, Hydrogeology, and Hydrology- *Marcello Allende*. is a Senior Environmental Consultant at AWN with over 15 years of experience in Environmental Consulting and water resources. Marcelo holds a degree in Water Resource Civil Engineering from the University of Chile. He has worked on a wide of range of projects including multi-aspect environmental investigations, groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, due diligence reporting, surface and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama.

Noise and Vibration – Mike Simms (Senior Acoustic Consultant) holds a BE and MEngSc in Mechanical Engineering and is a member of the Institute of Acoustics and of the Institution of Engineering and Technology. 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.

Air Quality & Climate – *Dr. Edward Porter.* Dr. Edward Porter is Director with responsibility for Air Quality with AWN Consulting. He holds a BSc from the University of Sussex (Chemistry), has completed a PhD in Environmental Chemistry (Air Quality) in UCD where he graduated in 1997 and is a Full Member of the Royal Society of Chemistry (MRSC CChem), the Institute of Environmental Sciences (MIEnvSc) and the Institute of Air Quality Management (MIAQM). He specialises in the fields of air quality, EIA and air dispersion modelling.

Landscape and Visual Impact - *Kevin Fitzpatrick, BA(Hons) Land Arch, MLA, MILI.* Kevin is a corporate member of the Irish Landscape Institute. Kevin is the Principal of Kevin Fitzpatrick Landscape Architecture with over 15 years' experience in landscape and visual Impact assessment for inclusion in EIAR. He has provided visual assessment and specialist landscape analysis and design input to numerous EIA Reports.

Traffic and Transportation – *Ronan Kearns.* Ronan is an Associate Transportation Planner with a Masters in Civil Engineering with 17 years of experience in the traffic and transportation field. He has been involved in a variety of projects involving transport planning, Modelling, Traffic and Transport assessments, sustainable mobility planning, and engineering design.

Cultural heritage – *Dr. Stephen Mandal*. Dr Stephen Mandal MIAI PGeo EurGeol is co-founder (in 1997) and managing director of CRDS Ltd. Stephen holds an honours science degree in Geology and a PhD in Geoarchaeology on the petrology of the Irish stone axe from (TCD). He also holds Certificates in Safety and Health and Occupational First Aid (UCD). On completion of his PhD, Stephen spent two years as a post-doctoral research fellow in the Archaeology Department, UCD, during which time he also undertook a three-month research fellowship in Cineca, Bologna, Italy. Since 1991 Stephen has been petrologist for the Irish Stone Axe Project. He is professional member of the Institute of Archaeologists of Ireland, the Institute of Geologists of Ireland, and the European Federation of Professional Geologists. Between 2009 and 2014 Stephen Vice Chairperson of the Archaeology Committee of the Royal Irish Academy Committee.

Waste Chapter - **Elaine Neary,** BA (Natural Sciences), MApplSc. (Environmental Science) and is a Chartered Member of the Institute of Waste Management (MCWIM). She is an Associate in AWN and has over 18 years' experience in environmental consultancy with extensive experience in Waste Management and Environmental Impact Assessment. She has project managed, coordinated and prepared specialist inputs including the Waste Management Chapters, Operational and C&D Waste Management Plans for numerous EIS/EIA's.

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 As described in Chapter 1 (Introduction), the Applicant is applying to SDCC for 2 no. single storey data centres, and associated ancillary development on a site of 5.14hectares, and this EIAR is undertaken as part of the May AI Response made to the Council under SDCC Planning Ref. SD22A/0333.

2.2 The following chapter presents a description of the Proposed Development, as defined below, as required by the relevant planning legislation, 2011 EIA Directive (2011/92/EU), as amended by the 2014 EIA Directive (2014/52/EU) (herein referred to as the EIA Directive) and the current EPA "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports"* (2017) (herein referred to the as the EPA Guidelines 2022) and with reference to the EPA Draft "*Advice Notes for Preparing Environmental Impact Statements"* (2015).

Characteristics of the site

2.3 The Proposed Development is to be located on a site of c. 5.14hectares to the immediate west of the recently realigned R120 within the townland of Ballymakaily, Lucan, Dublin 22. The site in terms of its current use forms open grassland to the south of the Grand Canal.

2.4 The majority of the site that remains in grassland contains field boundaries in the form of hedgerows and small trees that cut across the site along and adjacent to its western boundary; to the north-east along the boundary of the former access to the former farm buildings to the north; and diagonally across the site. These hedgerows extend to c. 572m in length. The wider campus site includes further hedgerow along its southern and western boundary that forms the townland boundary between Ballymakaily and Gollierstown to the west and Grange to the south that are to be retained as part of the wider development. The majority of the hedgerow crossing across the overall site has already been permitted to be removed, and replaced with additional hedgerows and planting under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SDCC Planning Ref. SD21A/0042. A former agricultural access road leads from the realigned R120 within the north-east of the application site to the former agricultural buildings.

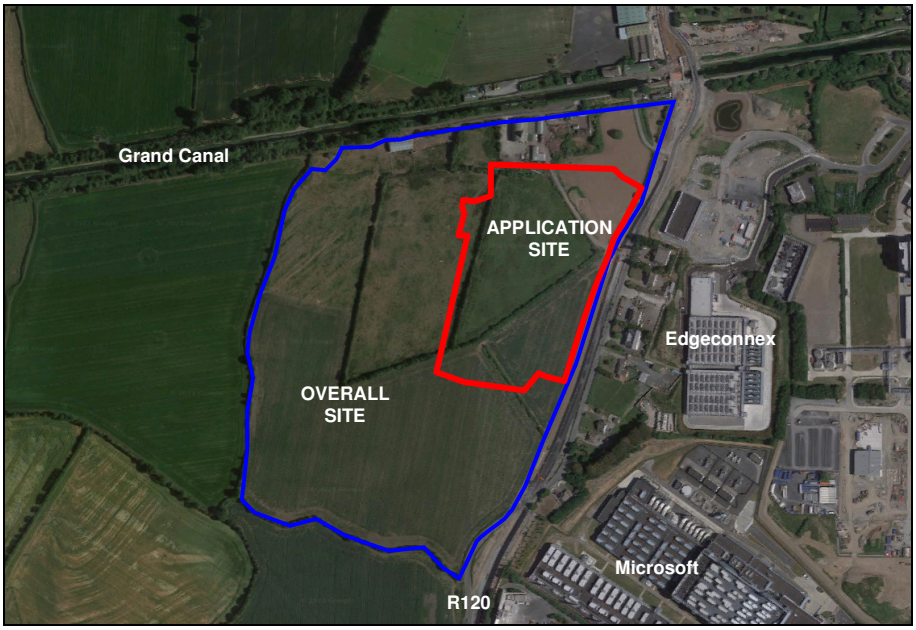

Figure 2.1 Aerial view of application site (refer to architectural drawings of Existing and Permitted Site Plan that accompany the application for greater detail)

2.5 The eastern boundary of the overall and application site was subject to a compulsory purchase order by South Dublin County Council to facilitate the Adamstown / Newcastle Road improvement scheme (R120). This has resulted in a significant length of hedgerow being removed by the Council to facilitate the road works for some 430m of the overall eastern boundary with lengths of hedgerows remaining of 100m to the south-east, and 60m to the north-east along the realigned road that is

within the site with the hedgerow in very poor condition to its north. The former road remains in situ at the south-east corner of the overall site.

2.6 The application site is bounded by land in the ownership of the applicant to the south of the Grand Canal, and a lane along part of its south side and planting, to the north. A dormer type property and both the original and new bridge over the Grand Canal lie to the north-east and outside the application site. The realigned R120 bounds the application site to the east with a number of residential properties bounding the road to its east. The data centre campus of the applicant granted and implemented that allows for future expansion under SDCC Planning Ref. SD16A/0214, SD16A/0345 and SD17A/0141/SD17A/0392 as well as SD18A/0298 is located to the rear of these residential properties to the east of the R120. The application site is bounded by the permitted substation as granted under SDCC Planning Ref. SD22A/0105; and the data centres granted under SDCC Planning Ref. SD21A/0042 to the west. The application site is bounded by the permitted data centres granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 to the west. The permitted three Power Plants are to be located to the south-west of the overall site. The enabling works permitted under SDCC Planning Ref. SD19A/004 have recently commenced on part of the overall site at the time of drafting this EIA Report. There is agricultural land zoned for development to the south and west. A traveller site is located some 180m to the south-west of the overall site.

2.7 A large electricity pylon is situated in the northern portion of the application site to the immediate south of the former farm buildings and in the north-west corner of the overall site. The power cables run across the application and overall site on a west-north-west to east-south-east axis. The eastern part of the site has been subject to a compulsory purchase order by South Dublin County Council to facilitate the R120 improvement scheme. This resulted in a temporary land take of some lands that has reverted back into the ownership and control of the applicant following completion of the road scheme, and therefore is usable and forms part of the landscape master plan for the overall development of the site that has already been permitted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SDCC Planning Ref. SD21A/0042.

2.8 The site is relatively flat though there is a slope up towards the north-east corner. The site is currently accessed only via agricultural access points from the east off the R120 and from the north off the access road to the abandoned agricultural buildings.

2.9 The site is located between the N4 and N7 national primary roads and is served by an improving local road network including the regional roads R120 (which has been recently upgraded including a new bridge over the Grand Canal), R134 and R136 (The Grange Castle Road) and the road network through the Grange Castle Business Park.

Permitted development on the site

2.10 The following section of the EIAR describes the permitted development on the overall site in chronological order.

SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948

2.11 Permission was granted by An Bord Pleanála on the 5th October 2020 under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 for the phased development of 4 single storey data halls all with associated plant at roof level, 32 standby generators, office and service areas, service road infrastructure, car parking, ESB substation/transformer yard. This permission is to be constructed to the south of the current application site and included the landscape master planning of the entire site to include berms and planting to all boundaries.

2.12 An EIAR was submitted with this application that had an overall gross floor area of 17,685sqm. The development also included a temporary gas-powered generation plant within a walled yard containing 19 no. generator units with associated flues (each 17m high) to be located to the west of the proposed data halls.

2.13 The decision of the Board was subject to 19 conditions. Condition no. 16 relating to noise outlined that operational noise shall not exceed 45dB(A) Leq 1 hour between 2000 and 0800, and 55dB(A) Leq 1 hour at all other times. The condition in full stated:

"The operational noise level shall not exceed 55 dB(A) Leq 1 hour (corrected for any tonal or impulsive component) at the nearest noise sensitive locations, including dwellings, between 0800 and 2000 hours, Monday to Friday inclusive, and shall not exceed 45 dB(A) Leq 1 hour at any other time. All sound measurement shall be carried out in accordance with ISO 1996-1:2016 "Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures". Procedures for the purpose of determining compliance with this limit shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development."

SDCC Planning Ref. SD21A/0042

2.14 Permission was granted by South Dublin County Council under SDCC Planning Ref. SD21A/0042 for Phase 2 (DUB05) of the development of the overall site on the 19th January 2022. The permission to be undertaken on lands to the west and south-west of the current application site, was for the development of two single storey data centres with associated office and service areas; and three gas powered generation plant buildings with an overall gross floor area of 24,624sqm. The data centres had 24 standby diesel generators with associated flues (each 25m high) as well as associated water tower and sprinkler tank and other services, including car parking. The permission also included for the phased development of 3 no. two storey gas powered generation plants (9,286sqm overall) within three individual buildings with associated 25m high flues (61 flues in total) and ancillary development to provide power to facilitate the development of the overall site, and to replace the temporary power plant granted permission under the 2019 application. The Power Plant is permitted to be located within the south-west part of the overall site. An EIAR was submitted with, and the landscape master plan was modified slightly under this application with a public park created on the lands within and to the immediate north of the application site.

2.15 Condition 3 of the permission stated:

"3. GAS Plants – Temporary
(i) Prior to the commencement date of the first operation of the first gas plant, the Planning Authority shall be contacted in writing to confirm the date on which the first gas plant shall first commence operation.
(ii) Five (5) years from the date the first gas plant first commences operation, the gas plants and all associated and related ancillary structures shall cease operation unless prior to the end of the five-year period, planning permission has been sought and granted for its continued use.
(iii) All structures related/associated with the gas plants shall be removed from the entire site within a year of the ceasing of operation, unless prior to the end of the five-year period, planning permission has been sought and granted for its continued use.
REASON: To enable the impact of the development to be reassessed having regard to changes in technology, climate action and energy supply options."

2.16 The severity of the wording of the condition creates significant uncertainty from the applicant's perspective and therefore was subject of a first party appeal. However, as no third party appeal was lodged the first party appeal was withdrawn, and the final grant of permission, which was subject to 21 conditions, was issued by SDCC on the 24th March 2022.

SDCC Planning Ref. SD22A/0289

2.17 Permission was granted on the 10th February 2023 for amendments to Condition no. 3(i) and 3(ii) of the permission granted under SD Planning Ref. SD21A/0042.

SDCC Planning Ref. SD22A/0105

2.18 Permission was granted on the 8th June 2022 for amendments to the substation compound and structures that are located to the immediate west of the current application site.

SDCC Planning Ref. SD19A/004

2.19 The enabling works permitted under SDCC Planning Ref. SD19A/004 have recently commenced on part of the overall site at the time of drafting this EIA Report. (see Figure 2.2 for master plan of the permitted developments on site in relation to the proposed development site boundary).

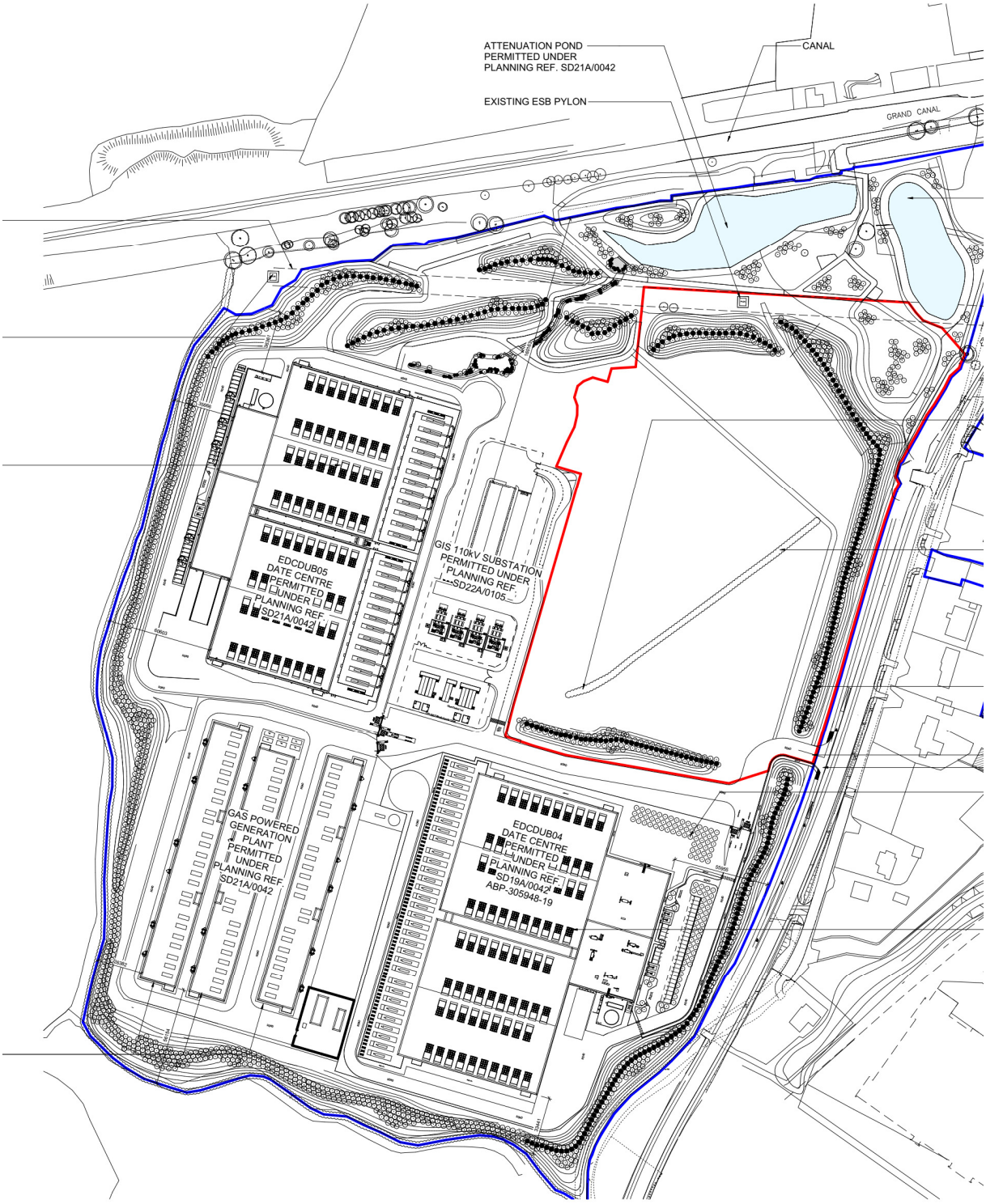

Figure 2.2 Permitted site layout plan

Proposed Development description

2.20 The Proposed Development is to develop two no. single storey data centres with associated office and service areas with an overall gross floor area of 15,274sqm. Figure 2.3 presents a site layout plan of the Proposed Development in the context of the overall permitted master plan development.

2.21 The Proposed Development with a gross floor area of 15,274sqm (as described and defined below) is to seek permission for a period of five years for a development that will consist of the following various works, as follows:

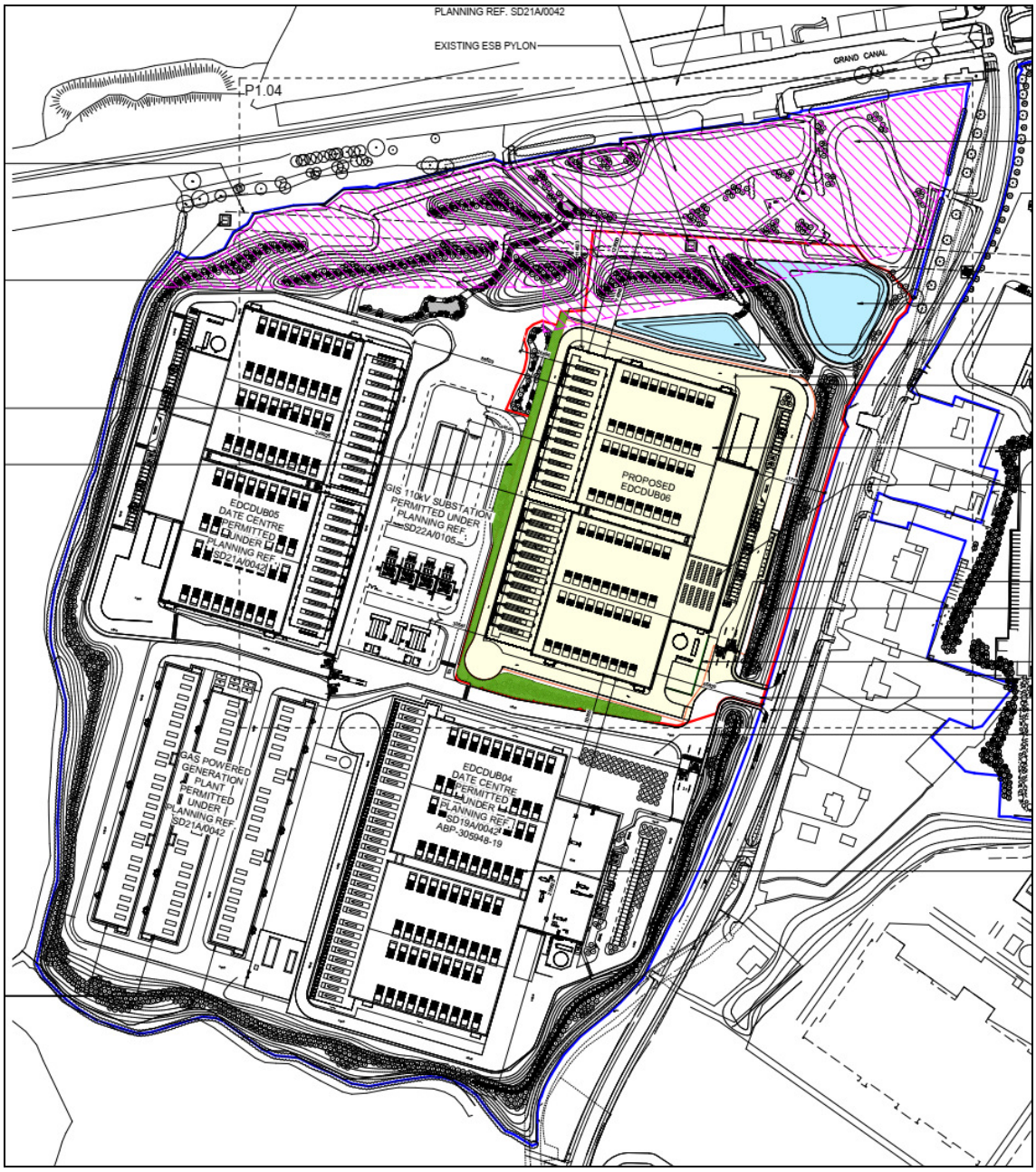

Figure 2.3 Proposed site layout plan in the context of the already permitted developments and with boundary and extent of RU zoning shown as well as moderate amendments under the AI response

2.22 The development will consist of the construction of two no. adjoined single storey data centres with associated office and service areas with an overall gross floor area of 15,274sqm that will comprise of the following:

- Construction of 2 no. adjoined single storey data centres with a gross floor area of 12,859sqm that will include a single storey goods receiving area / store and single storey office area (2,415sqm) with PV panels above, located to the east of the data centres as well as associated water tower, sprinkler tank, pump house and other services;
- The data centres will also include plant at roof level; with 24 no. standby diesel generators with associated flues (each 25m high) that will be located within a generator yard to the west of the data centres;

- New internal access road and security gates to serve the proposed development that will provide access to 36 no. new car parking spaces (including 4 no. electric and 2 no. disabled spaces) and sheltered bicycle parking to serve the new data centres;
- New attenuation ponds to the north of the proposed data centres; and
- Green walls are proposed to the south and east that will enclose the water tower and pump house compound.

2.23 The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042. The site will remain enclosed by landscaping to all boundaries. The development will be accessed off the R120 via the permitted access granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SD21A/0042.

2.24 It is noted that as part of this AI Response the description of the Proposed Development has not been amended. However, in response to the AI Request a new native hedgerow is proposed to the west and south of the proposed development to address the concerns raised under Point 7 and others of the AI request. An open bio-swale has also been added to the development in response to Point 14 of the AI request.

Proposed Data Centre Processes

2.25 A data centre facility is a centralised hub for the secure storage, management and distribution of information to individual businesses and organisations. With the levels of online activity increasing rapidly this facility will enable Edgeconnex to meet its clients growing demands. The proposed data centres offer clients the latest in power, cooling and connectivity with hardened security to control access to client information.

2.26 The data centre facilities when completed will house data halls which will allow Edgconnex's clients (individuals, businesses or organisations) to store their information at a secure and reliable facility off their premises for minimal cost and complexity compared to the traditional forms of in-house data storage systems. The data centre facilities are typically constructed on a relatively large scale compared to other forms of data storage which results in significant benefits in terms of economies of scale.

2.27 The Data Centre facilities have:

- Higher reliability and built in redundancy systems;
- 24/7 monitoring and maintenance of the facility and its systems by staff;
- Lower network latency and higher bandwith at lower cost; and
- specialist network and facilities engineers typically not viably employed by individuals, businesses or organisations..

2.28 The data halls are cooled via roof mounted cooling units utilizing external ambient air to provide cooling to the data centre. As the external air passes through a heat exchanger cooling the air circulating from the data centre the potential for any external contaminants entering the space is limited. As evidenced by the numerous other data centres recently developed in Ireland, the temperate climate is ideally suited to data centres. The naturally cool ambient temperature means the data halls require less cooling than if the facilities were located in regions of the world subject to greater temperature and humidity variation. The proposed Data Centre facilities have an overall IT load of c. 30MW when completed.

Phasing of development

2.29 The construction of the Proposed Development will be phased as part of the development of the overall site. As outlined on page 13 of this EIA Report the first data centre received a full grant of permission that included a temporary gas powered Aggreko Plant in October 2020. The Aggreko plant has been replaced with the Power Plants granted under the 2021 application that will serve each of the pairs of data centres, including that applied for under this application.

2.30 The Proposed Development will include the commencement of construction of development of the proposed data centres in Q1, 2023, assuming a grant of permission and no appeals being lodged. It is the intention that permitted Gas Plant 3 will provide power to the data centres that are the subject of this application. Construction of the proposed data centres under this application is envisaged to take a period of c. 18 months between Q1 2023 and Q3 2024. Construction of the already permitted Gas Plant 3, if required, is envisaged to take a period of c. 6 months between Q3 2023 and Q1 2024 so that it is in place prior to the need to operate the Proposed Development.

2.31 The timing of the development will be subject to commercial demand but it has been assumed based on other similar projects that it will extend over a c. 1.5 year period for the purposes of this EIAR, and has the potential to overlap with the construction of already permitted developments and the Strategic Infrastructure Development (SID) application within the overall site. The cumulative impact of this on the construction phase has been assessed under this application. This application forms the final phase of development on the overall site apart from the intended SID application that will be made directly to the Board following the Pre-Application Consultation that has been undertaken between the applicant and the Board (ABP Ref. VC06S.311907). This application will be for the provision of an underground 110kV transmission line connection between the Kishoge 110kV GIS Substation in Ballymakaily (the permitted substation on the overall site) and the permitted 110kV transmission line at Aungierstown – Castlebaggot. This application is expected to be lodged in Q3, 2022.

2.32 The interim power supply will be provided by the permitted Power Plants that formed part of the permission granted under SDCC Planning Ref. SD21A/0042. These Power Plants were designed and scaled to provide permanent power for the overall site, including the data centres proposed under the current application. They are permitted to be provided on a phased basis in accordance with each data centre permission.

2.33 The entire landscape master plan for the site is proposed to be in place within the first two years following the commencement of construction of the initial phase of development on the overall site, subject to minor amendments proposed under this application.

Description of Secondary Process/Activities

Administration element

2.34 The staff at the proposed data centre facilities will largely be housed in the administration portion located and adjoining its eastern elevation. The admin element of each building comprises the following main components:

- Reception Area;
- General Office Areas for staff and management;
- Offices space for clients and project teams;
- Canteen & Sanitary Facilities; and
- Conference Rooms/Meeting Rooms.

Surface Water Drainage

2.35 In accordance with the requirements of South Dublin County Council and the Design Guidelines of the Regional Code of Practice for Drainage Works and the Greater Dublin Strategic Drainage Study any new development must adhere to the overall design requirements of these documents. The proposed drainage network has been designed to convey the captured storm water on site and to direct it to the proposed 2 no. new attenuation areas to be located at the central northern boundary to the south of the Grand Canal.

2.36 Based on the hardstand and roof area for this current application, i.e. circa 33,400sqm (3.34ha.), the attenuation volume required has been calculated as being c. 2,724m^3, which will be provided for as mentioned above, in two attenuation ponds and two bio-swales (one new one added under this AI response). The remaining land area of 1.7ha. will be landscaped. The following volumes have been provided for storage within the site:

- SW Attenuation Pond 1 provides a storage volume of 1,000m^3

- SW Attenuation Pond 2 provides a storage volume of 1700m³
- SW Swale (with rain garden) provides a storage volume of 70m³
- Permeable Paving sub-base provides a combined storage volume of 54m³

2.37 A new open bio-swale between the attenuation ponds is provided in addition to the above. 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 for road areas; and
- Parking bays will be constructed with permeable paving.

2.38 The storm water system has been modelled to ensure no physical clashes with other utilities, notably the proposed foul system.

2.39 Prior to discharging into the proposed ponds / wetland area, 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 bio-swales. Site investigations have been carried out and the results have shown that the existing sub-soil would provide inadequate soil infiltration rates and thus it is not practical to install a soakaway system.

2.40 By way of complying with sustainability elements i.e. SuDS, the surface water run-off from the entire development, has been attenuated within the methods as described above, catering for a 1:100yr storm event + 20% climate change. The site QBar for this development is 6.6l/s and is based on the 3.34ha roof, road and carpark area.

2.41 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.

2.42 Further details are provided within the *Engineering Planning Report* and subsequent technical note submitted as part of the AI response, prepared by Pinnacle, Consulting Engineers, and in Chapter 7 of this EIAR and associated appendices.

Foul Drainage

2.43 It is proposed to discharge foul water from the proposed development, via a 225mm Ø gravity foul sewer outfall and discharge into the existing 450mm Ø connection, as granted under Planning Ref. SD19A/0042. The proposed network connects into the EX FOUL MH, with an invert level of 63.15m, prior to the ultimate outfall discharging into the Grange Castle Pumping Station, which has already been approved under the aforementioned permission.

2.44 It is proposed that all foul condensate effluent from the proposed new data centres, will be connected into head manholes adjacent to the data halls. The office building contains 6 no. WC's, with a predicted maximum number of daily staff being in the region of circa 40 people, over a 24hr period. Based on Irish Water's Code of Practice of 200ltr/hd/day, the peak wastewater flow will not be in excess of circa 0.54l/s. All on-site gravity foul sewers have been designed to be a minimum 150mm / 225mm diameter uPVC Class SN8 pipes, with gradients designed to achieve self-cleansing velocities. Further detail in relation to waste water emissions is presented in the Pinnacle Consulting Engineers *Water Engineering Planning Report*. A confirmation of feasibility was received from Irish Water (Ref. CDS 21008013, dated 2ns December 2021) confirming wastewater supply connection can be facilitated with no upgrades required to the network. Further reference is made to the sewerage and waste water treatment system is provided in the Engineering Addendum by Pinnacle, Consulting Engineers attached to this AI response, and in Chapter 8 Hydrology.

Water Supply

2.45 Water is required for cleaning, general potable supply for drinking and sanitary facilities, in addition to fire-fighting requirements. This will be sourced from mains water supply from the previously granted 150 mm Ø network within the site as permitted under SDCC Planning Ref. SD19A/0042 / ABP Ref.

PL06S.305948. This is fed from the existing 400mm Ø trunk main located along the R120 to the east of the site.

2.46 The design requires a total peak water demand (for both domestic and process demand) of up to 0.43litres per second (l/s) and an average water demand of 0.086l/s. As noted in the previous section and in the Pinnacle Engineering Planning Report, a PCE was submitted to IW (Ref. CDS21000754) which addressed water demand for the development. The overall water demand associated with the Proposed Development is in accordance with the water demand outlined in the submitted PCE. A positive response was received having regard to this. Further detail in relation to water supply is presented in the Pinnacle Consulting Engineers, Engineering Addendum attached to this AI response, and in Chapter 8 Hydrology and Chapter 15 Material Assets.

Power supply

2.47 The permanent power supply to the overall development of the entire site will be provided via the permitted two storey 110kV GIS Substation (Kishoge) with associated transformer compound that is located centrally within the Proposed Development site and to the west of the proposed data centres that are subject of this application. This will be connected via an 110kV transmission line from the permitted 110kV transmission line at Aungierstown – Castlebaggot.

2.48 The application for the provision of the transmission lines, which do not form part of this application, has been made directly to An Bord Pleanála following their determination that it amounts to a SID application and is currently with the Board for its determination under ABP Ref. VC06S.311907.

2.49 It is proposed to commence the substation and connections, following a receipt of permission in Q4, 2023 and be completed by end of 2024. The GIS Substation and transmission line will support power demand for the full development of the Proposed Development of the site.

2.50 The Permitted Development granted under SDCC Planning Ref. SD21A/0042 includes the construction of 3 no. power plants that will be provided in a phased basis to provide power in the short to medium term to each of the data centres already permitted and proposed under the current application.

2.51 There is a requirement for the Power Plants to provide both a short to medium term and back-up power solution to the Proposed and Permitted Development. This is due to the Flexible Demand conditional Eirgrid offer, which has been enacted by the applicant, that is in place for the site.

2.52 The permitted Power Plants form a back-up solution to the National Grid above that of the back-up diesel generators, once the Proposed Development is connected to the National Grid. This is due to the constrained nature of the National Grid within the Greater Dublin area. Flexible Demand is defined by Eirgrid as:

> *"Flexible demand is electrical load for a data centre that must be reduced on instruction from EirGrid via the National Control Centre (NCC). Where capacity availability in a particular area is constrained, EirGrid will reserve the right to apply flexible demand arrangements and this will be reflected as a requirement for connection offers for new data centres in that area. EirGrid identify constrained areas as areas where there is a risk or potential risk that the level of demand may be greater or has the potential to become greater than the level of supply currently available or that will be available in the coming years. Such risks are caused by the unavailability of electricity supply in a particular area to meet the demand requirements in the same area. At present, EirGrid has identified the greater Dublin region as constrained. Flexible demand is electrical load for a data centre that must be reduced on instruction from EirGrid via the National Control Centre (NCC). Where capacity availability in a particular area is constrained, EirGrid will reserve the right to apply flexible demand arrangements and this will be reflected as a requirement for connection offers for new data centres in that area. EirGrid identify constrained areas as areas where there is a risk or potential risk that the level of demand may be greater or has the potential to become greater than the level of supply currently available or that will be available in the coming years. Such risks are caused by the unavailability of electricity supply in a particular area to meet the demand requirements in the same area. At present, EirGrid has identified the greater Dublin region as constrained."*

2.53 Further details on the power supply for the Proposed Development are provided in Chapter 16 Material Assets. It should be noted that at all times two of the gas generators within each of the permitted Power Plants will be idle and will act as back up to the other generators within each Power Plant. This generates an 18 + 2 arrangement within Power Plants 1 and 2; and a 19 + 2 arrangement within Power Plant 3 that will serve the Proposed Development. The permitted Power Plants are required as Eirgrid have stipulated under the Data Centre Connection Policy 2019 that in order for the data centre to receive a firm grid connection, it must install on-site generation to match its load. Therefore, to get a connection to the national grid, the data centre must install on-site generation and Eirgrid have stipulated that this generation must be capable of running continuously for an extended period of time not limited by fuel reserves. This would be in multiple individual intervals during peak daily usage in winter that is estimated up to 500 hours per annum, to meet this requirement, gas engines have been chosen because no other renewable or storage technology can provide this at a commercial scale.

2.54 By bringing new flexible generation to the point of demand, not only does this ease grid constraints, it will also provide much needed flexible capacity on the grid to facilitate the increased level of renewables aspired to in the Climate Action Plan 2021.

Telecommunications

2.55 A fibre optic cable distribution network will be installed within the site for the entire Proposed Development and Permitted Development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

Generators and diesel storage

2.56 In the event of a loss of power supply i.e. temporary grid blackout, diesel powered back-up generators will be provided to maintain power supply. These generators are designed to automatically activate and provide power to the data centres pending restoration of mains power. (An uninterruptible power source is also provided for the short-term transition from mains power to diesel generators).

2.57 The data centres will be served by a total of 24 no. back-up diesel generators. Each generator will also include a diesel belly tank (all tanks will be bunded) with a single refuelling area to serve the proposed emergency generators. It is anticipated, based on the Operator's experience, that stand-by generators will rarely be used. They will be tested periodically to maintain operational readiness (See Chapter 10 – Air Quality for testing regime). The assessment of the impact of these emissions is presented in Chapter 10 - Air Quality and Chapter 11 - Climate.

Other infrastructure

2.58 The data centres will be served by a sprinkler water tanks and associated pump rooms.

Off-site traffic movements

2.59 There will be a small increase in traffic owing to staff movements to and from the Proposed Development once operational. This traffic will use the existing public road network which has more than adequate capacity. Operational access will be from the R120 via the already permitted vehicular access into these lands as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948, and subsequently amended slightly under SDCC Planning Ref. SD21A/0042. The wider area has excellent links to the National primary routes. Further details in relation to the potential impact of the Proposed Development in terms of traffic are presented in Chapter 13 Traffic and Transportation.

Security and lighting

2.60 All traffic intending on accessing the facility will approach and access the site through the permitted access road off the R120, and via the slightly realigned and new access road within the site. A maximum speed limit of 30km/hour will be in place on the internal access road.

2.61 A pair of security access gates are proposed to provide individual access to the data centres under the current application. Already permitted security gates provide secure access to each of the data centre sites as well as the Power Plant part of the site. The need for different security access gates for different elements of the overall site relates to potential end users. The security gates will be controlled from inside the permitted data centre and maintained by security personnel 24/7. Security will ensure that the procedure for accessing the facility is followed at all times. A record will be maintained of all personnel visiting the site (including deliveries etc.). All visitors to site will be monitored and supervised at all times.

2.62 A 2.4m high security fence will be constructed around the perimeter of the proposed data centre. The already permitted planting around the overall site will obscure this from views from outside of the site. The security fence for this data centre passes to the outside of the internal access road that extends in an anti-clockwise direction around the Proposed Development.

2.63 The Proposed Development will be well screened from the R120 by the permitted berms and planting. The intention is that boundary berms and planting will be significant as set out under the landscape master plan (refer to Chapter 11 Landscape and Visual Impact). The planting is likely to have been in place for a few years as it was primarily permitted under the original permission granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948. CCTV cameras will be installed at strategic locations around the site to ensure all boundaries and approaches to the site are adequately monitored.

2.64 An Intruder Detection System (IDS) combined with CCTV and security lighting will be utilised. The lighting design (both security and environmental lighting) has been assessed and optimised for the site, to ensure no obtrusive glare, light spillage or other light nuisance on neighbouring residential receptors or business users.

2.65 The Lighting design for the site during operation is designed in accordance with the following guidance:

- Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2020);
- Bats & Lighting - Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, December 2010); and
- Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2018).

2.66 Adhering with these guidelines ensures sensitive siting and design of the lighting elements and will include careful consideration of light placement on buildings, column heights and luminaire design. The following recommendations based on the above guidance have been considered in relation to the detailed construction and operational lighting design, and have been reviewed by a suitably qualified and experienced ecologist:

- Lighting will be restricted to the building perimeter, plant areas, roadways and car parking;
- All pathways will be illuminated using bollards;
- All columns will be a maximum of 5 metres high with sharp cut off luminaires, located to minimise light back spill; and
- LED-based lighting.

2.67 The design has been modelled to ensure the solution achieves the twin aims of having safe circulation routes external to the proposed facility but whilst not having a long term impact on foraging, commuting and bat roosts. The lighting model indicates that the illumination levels fall off to 0.5 lux within 2m of the roadways etc. (1 lux is accepted as being equivalent to a moon lit night). This is further detailed and assessed within Chapter 6 – Biodiversity.

Waste management

2.68 Chapter 14 contains a description of waste management relating to the Proposed Development. A detailed Operational Waste Management plan will be prepared in advance of the commencement of

the activity at the site to ensure best practice is followed in the management of waste from the Proposed Development.

Description of process inputs and outputs

2.69 The primary inputs to the Proposed Development are power, water (mains) and diesel fuel (for emergency generators as and when required). The main outputs are waste air, water, waste and emissions from the generator stacks (when the generators are in operation).

Inputs

Power

2.70 The proposed data centre development will have a critical capacity of c. 30MW. This power will be provided by the National Grid in the medium-term; but will require the use of power from the permitted Gas Power Plants in the short to medium-term to provide power adequate to facilitate the full utilization of the already permitted development, as well as the proposed data centre under this application.

2.71 The third Gas Plant has the capacity to provide a short to medium-term power supply for the Proposed Development. These permitted Power Plants will provide the back-up power in the medium term above that of the short-term back-up generators attached to the data centres. This permanent back-up power is required by EirGrid due to the Flexible Demand offer.

2.72 Eirgrid have stipulated under the Data Centre Connection Policy 2019 that in order for the data centre to receive a firm grid connection, it must install on-site generation to match its load as has been granted under SDCC Planning Ref. SD21A/0042. Eirgrid have stipulated that this generation must be capable of running continuously for an extended period of time not limited by fuel reserves. This would be in multiple individual intervals during peak daily usage in winter that is estimated up to 500 hours per annum, to meet this requirement, gas engines have been chosen because no other renewable or storage technology can provide this at a commercial scale.

Emergency Back Up Fuel

2.73 In the event of a loss of power supply due to a local event and loss of power the emergency diesel generators are designed to automatically activate and provide power to the data centre facilities. The generators will be supplied by diesel. Each generator will be supplied from the 24 no. bunded diesel tanks serving the data centres.

Outputs

Air

2.74 One of the primary outputs from the facility will be excess air that is removed continually by motorised fans in the mechanical cooling system. This air is not technically coming out of the data centre buildings, but rather being drawn across the coils of the condensers located on the roof. Outside air will be used to pressurise the data halls and provide humidification control to the space. This air is not extracted from the building but leaks out via openings in doors to the surrounding spaces.

2.75 As part of the development of the project, the applicant considered the offload/reuse/exchange of waste heat with neighbouring industrial facilities or other potential users within the environs of the business park. However, at the time of preparation of the May EIAR no feasible outlet was appropriate. However, the facility has the capacity to be retro-fitted for the future proofing of the building fabric and the safeguarding of pipe network routes up to site boundaries to facilitate future connection to district energy networks in the area.

Water and wastewater

2.76 The facility will generate waste water in terms of both storm water and foul water. Storm water i.e. rain water runoff will be collected in site storm water drainage from roofs and yards and discharged

through the site attenuation system in compliance with SUDs (refer to Planning Engineering Report by Pinnacle Consulting Engineers).

2.77 The facility design includes bio-swales to ensure the quality of storm water discharge prior to discharge. Further details are supplied in Chapter 7 and the Engineering Planning Report that accompanied the application and the note from Pinnacle, Consulting Engineers that accompanies this AI response. Foul water will be generated from sanitary facilities and the cooling process and will be discharged to the public foul sewer. Domestic effluent from toilets, sinks, etc is estimated to be 0.54l/s.

Emissions from engine and boiler stacks

2.78 As outlined above it is anticipated that the diesel back-up generators will rarely be used however, they will be maintained for emergency readiness by being tested once a week individually i.e. each generator will be turned on four times per month for one hour to maintain operational readiness when required waste exhaust gases will be vented to air via the 25m stacks along the eastern edge of the building.

2.79 The already permitted Gas Power Plants will operate on a permanent basis until such time as the permanent power supply is provided, and intermittently as a back up to the National Grid, on the failure of, and a significant event on the National Grid. An assessment of the impact of these emissions as applied for under this application, and cumulatively, is presented in Chapter 10 Air Quality and Climate.

Wastes

2.80 A small amount of domestic waste will be produced at the data centres. A more detailed description is provided in Chapter 14 Waste Management and Chapter 15 Material Assets.

Existence of the project

2.81 Under the current EPA "*Guidelines on the information to be contained in EIA Reports*" (2022), the description of the existence of the project is required to define all aspects of the proposed lifecycle of the facility under the following headings:

- Construction;
- Commissioning;
- Operation;
- Decommissioning; and
- Description of other developments.

2.82 The following sections present a description of each of these aspects.

Description of construction

2.83 The construction of the data centres will comprise three main stages, namely:

- Site preparation works;
- Building construction; and
- Commissioning.

2.84 In terms of the Proposed Development, it is proposed that site preparation works will be completed prior to commencement of development. The total peak construction population on site is estimated to be of the order of c. 250 staff (average 150). Site staff will include management, engineers, construction crews, supervisors and others during the three year construction process. During construction access to the site will be via the permitted access off the R120. Further details are including in Chapter 13.

Working hours

2.85 The construction of the Proposed Development will be completed during normal construction hours i.e. 7am to 7pm Monday to Friday with a half day working on Saturday (8am-2pm). However, it is possible that the appointed contractors may wish to carry out certain operations, such as concrete pouring, outside these hours i.e. evening hours during long summer days etc.. Such occurrences will be notified to the local authority, where required and generally kept to a minimum. Where they do occur, contractors will ensure they take place over as short a timeframe as possible and as such they will not cause disturbance that would impact local residential amenity.

Site preparation works

2.86 Construction of the Proposed Development is projected to commence, subject to a grant of planning permission, and no appeals in Q4, 2023. Site Preparation works will include site clearance, soil excavation and levelling; as well as the removal of some trees and hedgerow that cross the site.

2.87 The site has already been subject to initial archaeological investigations in the form of a geophysical survey of the site under licence no. 19E0038. The findings of these investigations are detailed within Chapter 14 of this EIAR.

Noise, vibration and dust nuisance prevention

2.88 With regard to construction activities, reference will be made to BS 5228 (i.e. BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014) *Code of practice for noise and vibration control on construction and open sites*, which offers detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures have been considered and will be implemented during the construction of the Proposed Development, such as:

- Limiting the hours during which site activities which are likely to create high levels of noise are permitted, e.g. soil levelling/excavations;
- Establishing channels of communication between the contractor/developer, local authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration, and;
- Monitoring typical levels of noise during critical periods and at sensitive locations.

2.89 Furthermore, it is proposed that a variety of practicable noise control measures will be employed. These will include:

- Selection of plant with low inherent potential for generation of noise;
- Erection of acoustic barriers as necessary around items such as generators or high duty compressors; and
- Siting of noisy plant as far away from sensitive receptors as permitted by site constraints.

2.90 Noise and vibration control measures are discussed in detail in Chapter 9 - Noise and Vibration.

2.91 The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of dust produced will be deposited close to the generated source.

2.92 In order to ensure that no dust nuisance occurs, a series of measures will be implemented including:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads will be restricted to essential site traffic only;
- If required, any area/road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, this will be 20km/hour, and on hard surfaced roads as site management dictates;

- In all conditions vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- Wheel washing facilities will be provided for vehicles exiting the site to ensure that mud and other wastes are not tracked onto public roads;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary; and
- At all times, these procedures will be strictly monitored and assessed. In the event of dust emissions occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

2.93 Dust nuisance control measures are discussed in further detail in Chapter 10 and 11 (Air Quality and Climate).

Water discharges

2.94 Welfare facilities will be provided for the contractors on site during the construction works. Portable sanitary facilities will be provided. Any surface water run-off will be adequately contained and treated prior to being discharged into the SDCC drainage network. See Chapter 7 - Hydrology for a full description of mitigation measures proposed.

Building structure construction

Foundations and structure

2.95 Following the completion of site preparation, all structures will require foundations to structural engineer specifications. Building structures will comprise standard structural steel frames. The foundations will require moderate scale excavations. Local minor dewatering may be required during excavation works and groundworks dependent on the weather conditions at the time of works.

Levelling/Cut and Fill

2.96 It is proposed that some of the spoil generated will be reused under landscaped areas and/or in the formation level for roads and/or the construction compound. Any temporary storage of spoil required will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment etc.

2.97 Any excess spoil not suitable and/or required for reuse on site will be removed offsite for appropriate reuse, recovery and/or disposal as required (see Chapter 15 – Waste Management). The importation of fill will be required from various locations within the Greater Dublin Area to facilitate construction. This fill material will be sourced by suppliers available as close as possible to the site. Pinnacle Consulting Engineers, have estimated that the importation of fill material would be required for the permitted schemes but that the Proposed Development has the potential to enable a balancing of the level of fill material required for the overall site that enables the majority of soil and subsoil to be used within the site.

2.98 Contractors for the Proposed Development will be required to submit and adhere to a method statement (including the necessary risk assessments) indicating the extent of the areas likely to be affected and demonstrating that they will achieve the minimum disturbance necessary to achieve the required works. Any temporary storage of spoil will be managed, as set out under the Outline Construction Management Plan (CEMP) to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment etc.

Building envelopes and finishes

2.99 The construction of the walls and roofs of the buildings will closely follow the completion of structures. Typically, the contractors will start by building from the centre of each building and begin fitting out the 1st data storage room within each building as early as possible in the process. The construction of the rest of the building will continue around it.

Roads, services and landscaping

2.100 The internal road system will initially be composed of hard-core material, rolled and compacted sufficiently to support initial construction including civil/structural sub grade works. The data centre facilities will have their own and independent access road and car parking. Most of the soft landscaping will be undertaken to the east and north of the proposed buildings under this application, and to the west and south of the overall site as well as already granted. Only minor modifications to the modelling of the landscaping is proposed in this instance with the berms remaining of the same height around the site, with a small break provided to the north-west to facilitate attenuation. The majority of these already permitted landscaping works, to all boundaries, will be in place within the first planting season following the use of the first data storage room of the originally permitted development granted under SDCC and will therefore be in place ahead of the operation of the proposed data centre.

Material sourcing, transportation and storage materials

2.101 Key materials will include steel, concrete, composite cladding, piping, electrical cabling, process equipment and architectural finishes. A 'Just in Time' delivery system will operate to minimise storage of materials on site.

Sourcing

2.102 Where possible it is proposed to source general construction materials from the Dublin area to minimize transportation distances. Specialised data centre facility equipment will likely be imported.

Storage

2.103 Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure area in the construction compound to prevent contamination. Liquid materials will be stored within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications – BS EN 1992-3:2006) to prevent spillage.

Transportation

2.104 Construction materials will be brought to site by road along the R134 and R120. Construction materials will be transported in clean vehicles. Lorries/trucks will be properly enclosed or covered during transportation of friable construction materials and spoil to prevent the escape material along the public roadway.

Construction and commissioning schedule

2.105 Subject to a grant of a five year planning permission, construction work will be undertaken on a phased basis for the Proposed Development over a circa 1.5 year period and based on customer demand. Based on customer demand this schedule may decrease but for the purposes of the EIA Report the longest possible construction period (worst case scenario) has been taken. A summary of the proposed target dates (earliest possible dates) for the construction of the data centres and power plants are set out below:

- Application for planning permission – Q3, 2022;
- Additional Information Response – Q2, 2023
- Commence site construction works for the proposed data centres (subject to grant of planning permission) – Q4, 2023;
- Complete construction works of Data Centre – Q2, 2025;

2.106 Each of the following EIAR chapters (Chapters 3-17) include an assessment of the potential impact of all aspects of the construction phase on their individual aspect and set out the relevant mitigation measures relating to that aspect.

2.107 In general, the impact of the construction period will be short term in nature. The permanent HV connections, which will be subject to a separate SID application, are proposed to be completed within a year, once and if permitted is granted.

Construction Management Plan

2.108 Each of the following EIA Report chapters (Chapters 3-17) includes an assessment of the potential impact of construction works on their individual environmental aspect and set out the relevant mitigation measures relating to that aspect. A Construction Management Plan (CEMP) will be put in place by contractors to minimise the impact of all aspects of the construction works on the local environment. The CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. A Draft CEMP was submitted with the application.

2.109 The primary potential effects from construction are short to medium term and will include:

- Potential effects in terms of nuisances relating to the air quality of the environs due to dust and other particulate matter generated from excavation works and effects on the noise environment due to plant and equipment involved in construction;
- Potential effects on the land, soils, geology & hydrogeology of the site during construction i.e. some loss of protection of the underlying aquifer to contaminants during site clearance, levelling and excavations etc.; and
- Potential effects on the local road network and its environs due to construction workers and other staff attending site during preparation, construction and commissioning phases.

2.110 Mitigation measures to address each of these potential short to medium term effects are presented in each individual EIA Report chapter.

Commissioning

2.111 Once the first data storage room is built, specialist contractors will be mobilised to complete the commissioning of the first data storage room and related plant within each data centre. Commissioning will be carried out on a phased basis as each data storage room is completed, over a period of several months. This commissioning process will be repeated across each of the two data centre facilities. Any hard landscaping will be completed following completion of the construction of the core of each of the facilities.

Operation of the project

Data Centre Facility Operation

2.112 Once operational, each data centre facility will "go live" and serve data customers on an ongoing basis. The server systems and the supporting infrastructure will be monitored by site staff and faults identified and remedied as required. Staff are primarily required onsite for security, ongoing monitoring and maintenance of plant and equipment.

Staffing and parking

2.113 Once operational, c. 40 full time employees will be present on site daily in the Data Centre facilities. Security staff (6 no. total) will be required at all times as well as service staff from outside the data centre facility. During the night shift a reduced number of staff will be required with 10 in the data centre facilities.

2.114 Accordingly, it is proposed to provide 36 car parking spaces on site. This assumes a vehicle occupancy level of c. 1-2 persons/vehicle and take account of an allowance for visiting/maintenance staff as well as enabling a smooth transition between shifts. Included within this shall be 4 no. spaces provided for disabled parking and 2 no. E-charging spaces (with all spaces being future proofed for E-charging purposes).

2.115 The facility will operate on 3 no. 8 hour shift basis (8am to 4pm; 4pm-12am and 12am-8am). Working hours are expected to be 24 hours a day, 7 days a week. The total persons anticipated to travel to and from the site over a 24 hour period, and therefore employed directly on site, is therefore c. 100.

Additional service staff and other deliveries etc. would be addition to this. Traffic relating to staff movements has been assessed as part of the Traffic and Transportation chapter of this EIA Report (Chapter 13).

Decommissioning of the project

2.116 The lifespan of the Proposed Development is not defined but it is anticipated that it will be at least 20 years from full completion. It is likely that regular maintenance and periodic upgrading of the facility over time will enable it to continue to meet future demands. Upon closure all buildings, plant, equipment, drainage networks etc. at the site will be fully decontaminated and decommissioned in accordance with prevailing best practice. The buildings once rendered environmentally safe will more than likely be retained or sold on for future use following closure.

Description of other developments

2.117 A list of the other developments in the vicinity of the Proposed Development is provided in Chapter 3 (Planning and Development Context) of this EIA Report. The Permitted Developments in the overall site is outlined within Chapter 3 as well as earlier within this Chapter.

Sustainability energy efficiency & resource use

2.118 The Operator is committed to running its business in the most environmentally friendly way possible. The Proposed Development has been designed to take into account these policies with energy efficiency central to the decision-making process, minimising power and water consumption.

Energy efficiency benefits

2.119 A typical data centre facility achieves approximately 65% server utilization rates versus 15% at on-premises servers. This typically means companies moving their data storage to the cloud require less than a quarter of the server infrastructure they would need if provided on-premises. A typical on-premises data centre is 29% less efficient in their use of power compared to a typical large-scale data centre that uses world-class facility designs, cooling systems, and workload-optimized equipment. Adding these together (fewer servers used plus better power efficiency), cloud customers need 16% of the power required by those on-premises infrastructure. This represents an 84% reduction in the amount of power required.

Sustainability

2.120 In preparation for this application, the Operator and their design team have undertaken an assessment of a variety of sustainable design measures to assist with achieving its overall sustainability and energy efficiency targets. The energy strategy for the Proposed Development is set out in an *Energy Statement* by Ethos Engineering which formed a stand-alone document that accompanied the planning application. Some of the key measures incorporated into the design as set out in the Heat Recovery Feasibility Report have been summarised below. A report by Ethos Engineering addressing sections 12.10.1, 12.10.2 and 12.10.3 of the South Dublin County Development Plan 2022-2028.

2.121 The location of the facility in Ireland allows for the use of free-cooling media without the need for mechanical cooling, to take advantage of this, the air handling equipment will be fitted with airside condensers to utilise this outdoor air to cool the space. The Heat Recovery Feasibility Report also describes how waste heat associated with the facility could be utilised with a future district heating scheme developed by others. The Permitted Development ensures the future proofing of the site from that perspective, and the current proposal would integrate and link into this infrastructure.

Health & safety

Design and Construction Health and Safety

2.122 The Proposed Development has been designed in accordance with the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005) as amended and the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. 299 of 2007) as amended and associated regulations.

2.123 The Proposed Development has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience based on a number of similar existing facilities operated by the Operator.

General operational health and safety

2.124 The Operator implements an Environmental Safety and Health Management System at each of its facilities. Prior to start up a comprehensive set of operational procedures will be established (based on those used at other similar facilities) to ensure a smooth roll out of operations at each facility.

Major accidents / disasters

2.125 The 2014 EIA Directive and associated EPA Guidelines 2022 require that the vulnerability of the project to major accidents, and/or natural disasters (such as earthquakes, landslides, flooding, sea level rise etc.) is considered in the EIA Report. The site has been assessed in relation to the following external natural disasters; landslides, seismic activity and volcanic activity and sea level rise/flooding as outlined below. The potential for major accidents to occur at the data centre has also been considered with reference to Seveso/COMAH.

Landslides, Seismic Activity and Volcanic Activity

2.126 There is a negligible risk of landslides occurring at the site 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 site. There are no active volcanoes in Ireland so there is no risk of volcanic activity. Further detail is provided in Chapter 7 - Land, Soils, Geology & Hydrogeology.

Flooding/Sea Level Rise

2.127 The potential risk of flooding on the site was also assessed. A Stage 1 Flood Risk Assessment was carried out and it was concluded that the development is not at risk of flooding. The assessment indicates that the Proposed Development would not adversely impact on the flood risk for other neighbouring properties. Further detail is provided in Chapter 8 - Hydrology and the accompanying Stage 1 Flood Risk Assessment undertaken by Pinnacle, Consulting Engineers that forms a stand-alone document as part of the planning application. Given the inland location of the site, it is not at risk from sea level rise.

Seveso/COMAH

2.128 The Proposed Development 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.

Minor accidents/leaks

2.129 There is a potential impact on the receiving environment as a result of minor accidents/leaks of fuel/oils during the construction and operational phases. However, the implementation of the mitigation measures set out in Chapters 7 and 8 will ensure the risk of a minor accident/leak is low and that the residual effect on the environment is imperceptible.

Potential impacts of the Proposed Development

2.130 The proposed data centre element of the development is to be located on EE zoned lands with the objective "*To provide for enterprise and employment related uses" under the South Dublin County Development Plan 2022-2028* and located adjacent to extensive industrial development. The development, when operational, will generate limited additional traffic, air, noise and water emissions and waste generation from activities etc.. The attenuation ponds and landscaping associated with the proposed and permitted developments are the only elements that are located within the RU zoning within the north of the overall site (See Figure 2.3 for further details).

2.131 During construction, there is the potential for short to medium term nuisance impacts from traffic, dust, noise and construction waste, if not carefully managed. The Operator will require contractors to implement a CEMP to ensure each of these potential impacts are minimised.

2.132 Each chapter of this EIA Report assesses the potential impact of the construction and operation of the Proposed Development on the receiving environment. Please refer to each specialist chapter respectively.

Residual Impacts

2.133 The residual impacts of the Proposed Development following the implementation of mitigation measures have been addressed in each of the following chapters. These mitigation measures are similar to those approved in the existing planning permission for a data centre facility development at the site.

Do Nothing Scenario

2.134 Each of the following chapters addresses the Do-Nothing scenario as required in the EPA Guidelines (2022). The Do-Nothing scenario is to retain the site in its existing state with one derelict and one abandoned residential property, and associated buildings and farmland (all of which have already been permitted to be demolished and removed under the previous permissions).

Related development and cumulative effects

2.135 The Regulations require that all likely significant effects of a development are taken into account, including cumulative effects. There is no prescriptive guidance on the methodology for the assessment of cumulative effects in Ireland. However, the Institute of Environmental Management & Assessment (IEMA) Guidelines18 identifies two types of cumulative effects:

- Type 1 – **Intra-Project Effects**: Combined effects of different types of impact or 'impact interactions', for example the multiplying effects arising from noise, dust and visual impacts during the construction of the proposed development on a particular sensitive receptor; and
- Type 2 – **Inter-Project Effects**: Combined or additive effects generated from the proposed development together with other planned or likely foreseeable developments and also referred to as 'in-combination effects'. These other developments may generate their own individually insignificant effects but when considered together could amount to significant cumulative effects, for example, combined transport and accessibility impacts from two or more (proposed) developments. Additive effects were considered where relevant.

2.136 As Stated in Table 3-3 of the EPA Guidance, under 'Describing the Types of Effects' synergistic effects should be considered. Synergistic effects are considered within the inter-project cumulative effects, also known as additive effects. Where the proposed development would likely result in additive effects, these will be identified within the relevant EIAR chapter.

Intra-Project Cumulative Effects

2.137 As mentioned above, there is no established EIA methodology for assessing and quantifying the intra project cumulative effects of individual effects on sensitive receptors. Therefore, we have used an approach that uses the defined residual effects of the proposed development to determine the potential for effect interactions and so the potential for intra effects of individual effects.

2.138 Intra-project cumulative effects from the proposed development itself on existing off-site and future onsite sensitive receptors during the demolition and construction stage and operation stage have been considered. It is possible, however, that depending on the predicted individual 'completed developments' effects, only the demolition and construction stage effects would actually be considered as often they generate the greatest likelihood of interactions occurring and hence significant effects. Indeed, demolition and construction stage effects are usually more negative (albeit on a temporary basis) than effects as a result of the operation stage.

2.139 Dependent on the relevant sensitive receptors, the assessment focusses either on key individual receptors or on groups considered to be most sensitive to potential interacting effects. The criteria for identifying those receptors which are considered to be potentially sensitive include existing land uses, proximity to the demolition and construction works and the site, and likely duration of exposure to impacts.

2.140 It should be noted that only residual effects that are slight, moderate, significant, very significant or profound in scale have been considered within this assessment. Imperceptible and not significant effects are not considered in the assessment. Due to the 'cross-boundary' and 'overlapping' nature of these effects across various environmental topics, and the assessment approach adopted, the results of intra-project cumulative effects are presented within each individual chapter.

2.141 With regard to the potential for cumulative effects to occur, it is anticipated that standard mitigation measures can be applied to prevent temporary significant effects from the interaction of effects occurring on-site. It is also anticipated that a site-specific Construction Environmental Management Plan (CEMP) would be secured by SDCC by means of an appropriately worded planning condition.

Inter-project cumulative effects

2.142 The Regulations require an assessment of potentially significant cumulative effects of a proposed development along with other 'existing and/or approved projects'. There are no legislative or policy requirements which set out how an inter-project cumulative impact assessment should be undertaken.

2.143 Accordingly, inter-project effects arising from the proposed development in combination with, or in addition to, 'cumulative development' during the demolition and construction stage and operation stage, have been considered in the EIA.

2.144 Each technical EIAR chapter presents the assessment of combined effects of the proposed development with certain other cumulative developments. Schedule 6 of the Regulations states that only developments which are existing and/or approved should be considered, i.e. developments built or under construction or with a planning permission.

2.145 Spatial considerations and scale of development criteria has been developed based on professional judgement to determine whether cumulative developments have the potential for cumulative effects when combined with the proposed development's effects. The criteria applied to the cumulative developments are those which are either:

- Data centres that are permitted/approved or have resolution to grant or are currently at early stage of demolition and enabling/construction; and
- are within 1km of the application site.

2.146 The cumulative developments have been quantitatively assessed on a topic by topics basis, subject to the availability of development information in the public domain. Where information is not available, or cumulative developments do not comply with the above criteria, qualitative approaches have been adopted based on professional judgement. The location of the cumulative developments considered in the EIAR, in addition to the planning history of the overall site under Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 (17), SD21A/0042 (18) as well as Ref. SD22A/0105 (19). These are described in greater detail in Chapter 3 within the planning history of the overall site within that chapter. Where possible, the status of cumulative developments' construction works have been taken into account. For example, where construction has progressed to a material degree, such as to affect local views, traffic flows and air quality, such schemes have been considered as part of the existing baseline. These are set out in date order, with the oldest first, with location of each campus shown in Figure 2.4 on the following page. The nature of these campuses is that there are several overlapping permissions on each site. The following provides a synopsis of the most relevant permissions.

Planning Ref. SD07A/0632 – Microsoft (1)
Construction of a two storey data centre with plant at roof level with a gross floor area of 51,155sqm. Grant permission – October 2007

Planning Ref. *SD11A/0211 – Microsoft (2)*
Construction of single storey data centre adjoining existing two storey data centre of 11,090sqm, which amended the permission granted under SD07A/0632, and it forms the eastern data centre to the south of the original Edgeconnex campus.
Grant permission – November 2011

Planning Ref. SD14A/0194 – Microsoft (3)
Revisions to and extension of the data centre complex DUB06 granted under SD13A/0265. Revisions included the overall reduction in floor area of permitted DUB06 from 35,000sqm to 21,350sqm and provision of an additional 6 buildings providing data facilities of 31,828sqm in total.
Grant permission – November 2014 (completed)

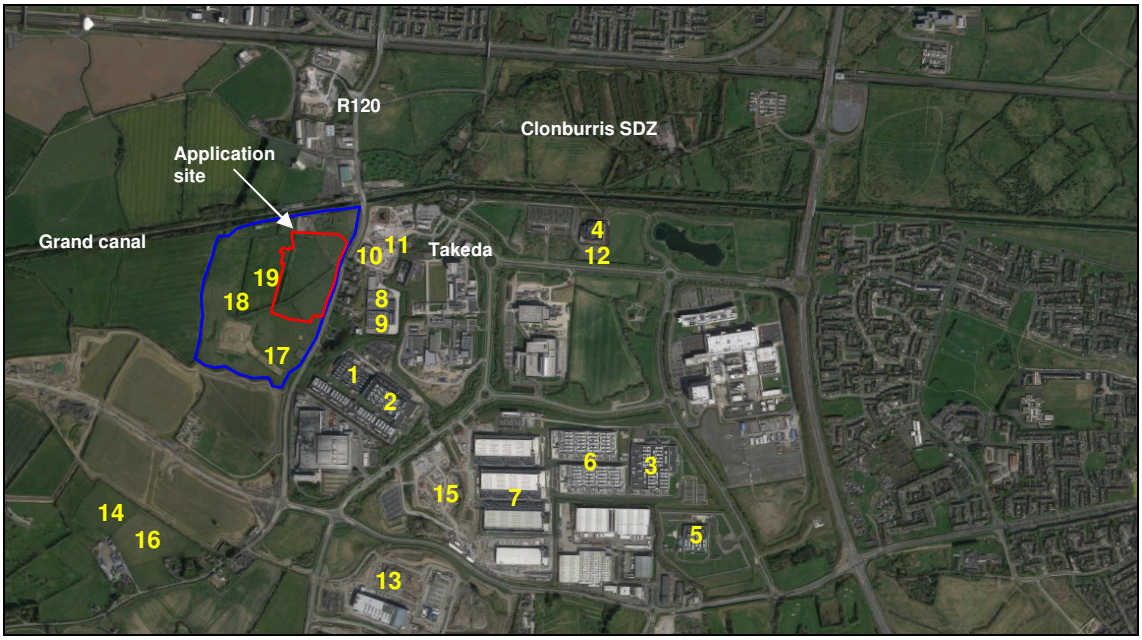

Figure 2.4 Inter-project locations

Planning Ref. SD15A/0034 – Interxion (4)
Construction of a single storey data centre (4,214sqm) with services above.
Grant Permission – 18th May 2015 (completed)

Planning Ref. SD15A/0133 – Microsoft (5)
Construction of a single storey data centre (DUB011) with a total gross floor area of 7,609sqm to be located to the south-east of DUB06, 07 and 08 that was permitted under SD14A/0194.
Grant permission – November 2015 (completed)

Reg. Ref. SD15A/0343 – Microsoft (6)
Development of two data centres (DUB07 and DUB 08) to the immediate west of the existing data centre (DUB06). Each data centre contained five no. flues each 25m high, with each data centre having an overall height of up to 13m high and with an overall gross floor area of 33,800sqm.
Grant permission – 23rd February 2016 (completed)

Planning Ref. SD16A/0088 – Microsoft (7)
Development of four single storey data centres (DUB09, DUB10, DUB12 and DUB13) located west of DUB06, 07 and 08. The gross floor area of each data centre and accompanying offices etc. was 17,598sqm with an overall gross floor area of 70,392sqm in total. The height of each data centre will range from 6.1m and 13.3sqm with flues amounting to five per data centre and 25m in height.
Grant permission - 6th May 2016 (completed)

Planning Ref. SD16A/0214 – Edgeconnex Ireland Ltd. (8)
The proposed data centre and associated elements has a gross floor area of 5,839sqm amounting to a site coverage of 9% over the entire site of 6.5hectares on lands to the east of the R120.
Grant permission – 11th August 2016 (completed)

Planning Ref. SD16A/0345 - Edgeconnex Ireland Ltd. (9)
Construction of a new data hall of 4,176sqm to the immediate south of the data hall of 4,435sqm and single storey office of 1,341sqm permitted under Reg. Ref. SD16A/0214 on lands to the east of the R120. The permission also included permission for a temporary gas generation plant.
Grant permission – 10th January 2017 (completed)

Planning Ref. SD17A/0141 – Edgeconnex Ireland Ltd. (10)
A new stand-alone single storey data hall of 1,515sqm to the immediate north of the data hall, and its extension, permitted under Reg. Ref. SD16A/0214 and SD16A/0345.
14th August 2017 (completed)

Planning Ref. SD17A/0392 / ABP Ref. ABP-300752-18– Edgeconnex Ireland Ltd. (10)
Extension of 125sqm and other modifications to the permission granted under SD17A/0141.
26th July 2018 (completed)

Planning Ref. SD18A/0298– Edgeconnex Ireland Ltd. (11)
Development of 2 no. new single storey data halls and associated office areas, and plant, with a gross floor area of 5,823sqm and forms the final phase of the Edgeconnex campus to the east of the R120.
Grant permission - 27th November 2018 (completed)

Planning Ref. SD18A/0034 – Interxion (12)
Construction of a two storey data centre with services above.
Grant Permission – 10th December 2018 (commenced but not completed)

Planning Ref. SD20A/0121- UBC Properties -Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 (13)
The development will consist of the demolition of the existing two-storey dwelling of Ballybane and associated farm buildings (565sqm) and the construction of three two-storey data centres with mezzanine floors at each level of each facility and associated ancillary development that will have a gross floor area of 80,269sqm on an overall site of 16.ha..
Grant Permission– 9th September 2020 (commenced but not completed)

Planning Ref. SD20A/0058 – Data and Power Hub Services Ltd. (14)
Power generation facility that will contain two power units and a battery energy storage system on a site to the north-west of the Peamount Road of 8.2ha.
Grant Permission– 9th November 20 (not commenced)

Planning Ref. SD20A/0283 – Microsoft (15)
Demolition of existing single-storey vacant house, garage and outhouse (total gross floor area (GFA) approximately 291.2sqm) and removal of existing temporary construction car park; construction of a single one- to four-storey central administration building and two two-storey (with mezzanine) data centres (DUB14 & DUB15) all to be located west of data centres DUB9, DUB10, DUB12 & DUB13 within the MS campus.
Grant Permission – 29th March 2021

Planning Ref. SD20A/0324 – Data and Power Hub Services Ltd. (16)
The development will consist of the demolition of the existing dwellings and the construction of 2 no. two storey ICT facilities with a gross floor area of 30,518sqm on a site to the north-west of the Peamount Road of 8.2ha.
Grant Permission– 15th June 2021 (commenced)

2.147 The cumulative effect of the Proposed Development together with other relevant developments, as well as those within the overall site, as outlined within Chapter 3, have been considered within each chapter of the EIAR under the heading cumulative impact. Due to the location of the Proposed Development site, the cumulative assessment has focussed on the build out of the overall site. Other adjacent developments, as listed above, have also been considered where appropriate and relevant to that particular chapter, with particular emphasis under Chapter 16, Material Assets as was required under Point 17 (c) of the AI request.

2.148 The permitted 110kV GIS Substation and the future 110kV underground transmission lines from the substation to the permitted 110kV transmission line at Aungierstown – Castlebaggot will be located centrally within the overall site. The provision of the transmission lines are subject to their own SID application that is currently with An Bord Pleanála.

2.149 There is potential for both developments, and other permitted developments, to be in construction at the same time, although this is dependent on customer demand, and dates of final grants of permission. On completion of the Proposed Development, the overall site will be fully permitted subject to the determination of the SID application. In each of the chapters, the impact of the already permitted, planned and the Proposed Development has been considered in terms of them being in construction and operating at the same time.

2.150 With mitigation for each environmental aspect, it is anticipated that the potential cumulative impact of the Proposed Development in conjunction with the other developments will generally be slight/moderate, negative/neutral and short term in duration across all environmental topics during construction. With mitigation for each environmental aspect, it is anticipated that the potential cumulative impact of the Proposed Development in conjunction with the other developments will generally be slight, negative/neutral and long term in duration across all environmental topics once in operation.

3. PLANNING AND DEVELOPMENT CONTEXT

3.1 The following section details compliance of the Proposed Development, as described in Chapter 2, with regard to national policies and objectives as well as local planning policy under the South Dublin County Development Plan 2022-2028.

National Planning Framework

3.2 The National Planning Framework (NPF) was published in February 2018 setting out a vision for Ireland in land use and planning terms to 2040. The NPF replaced the National Spatial Strategy once it was adopted as the long term land use and planning vision for Ireland.

3.3 National Strategic Outcome 6 of the NPF relates to the creation of *"A Strong Economy Supported by Enterprise, Innovation and Skills"*. This strategic outcome is underpinned by a range of objectives relating to job creation and the fostering of enterprise and innovation. The following objective, relating to Information and Communications Technology (ICT) infrastructure (including datacentres) is included under National Strategic Outcome 5:

"Promotion of Ireland as a sustainable international destination for ICT infrastructures such as data centres and associated economic activities."

3.4 The Proposed Development comprises the provision of 2 no. new data centre facilities and associated ancillary development, in a location which is well suited and serviced to accommodate such a use. The NPF also states under National Strategic Outcome 6:

"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 storage facilitys. 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."

3.5 The NPF is favourably disposed to the location of data centre / ICT infrastructure in Ireland, and the Proposed Development, which comprises of such data centre infrastructure, is therefore considered to be wholly in accordance with this key body of national planning policy.

Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly

3.6 The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Regional Assembly (EMRA) includes Regional Policy Objective (RPO) 8.25 which states the following:

"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 storage facilities and associated economic activities at appropriate locations.*
- *Promote Dublin as a demonstrator of 5G information and communication technology."*

3.7 The site is therefore considered to be an appropriate location for the development of data centre / ICT facilities under this Strategy.

Statement on the Role of Data Centres in Ireland's Enterprise Strategy

3.8 The Government issued a revised Statement on the Role of Data Centres in Ireland's Enterprise Strategy on the 27th July 2022. This document sets out "Principles for Sustainable Data Centre Development" which will inform applications for future data centre development over the coming years.

3.9 The Statement acknowledged that all demand for such development will not be capable of being accommodated, however, it also stated that:

> *"Data centres are core digital infrastructure and play an indispensable role in our economy and society. Data centres provide the foundation for all almost all online aspects of our social and work lives, including video calling, messaging and apps, retail, banking, travel, media, and public service delivery such as healthcare and welfare."*

3.10 The Government Statement provides a pathway towards new data centre development subject to the following considerations:

> *"Within the constraints of sectoral emissions obligations, these principles set out the positive role that data centres can play, subject to meeting the requirements set out under the applicable planning and grid connection processes."*

3.11 We can confirm that there is no moratorium on processing or granting of data centre applications within the Greater Dublin Area under RSES, NPF or any Government Policy. The policy encourages a plan-led approach to data centre development, and recognises the need for Ireland to be an attractive hub for digital services provided by data centres. The Statement recognises the importance of data centres as being the backbone of the knowledge economy for the benefit and prosperity of society and future generations.

South Dublin County Development Plan 2022-2028

3.12 The South Dublin County Development Plan is the statutory planning document that covers the entire South Dublin administrative area. The Plan was adopted in June 2022 and came into effect on the 3rd August 2022, just prior to the making of this application on the 16th August 2022.

3.13 The data centre element of the Proposed Development is to be located within an area zoned EE (Enterprise and Employment) under the County Development Plan. The zoning Objective EE seeks: "*To provide for enterprise and employment related uses".* The norther part of the site is zoned as RU with the objective "*to protect and improve rural amenity and to provide for the development of agriculture*". We note that only landscaping works that are already permitted and attenuation ponds that form part of the current application are located within the RU zoned lands. This has not altered under the AI response.

3.14 The status of data centres within the EE zoned lands has been subject to significant debate and consideration by both the Planning Authority, and recently the Office of the Planning Regulator and the Minister for Local Government and Planning. The following provides a synopsis of the change and clarification in the status of data centres within the EE zoned lands.

3.15 The South Dublin Draft County Development Plan 2022-2028 recognised the important role of data centres and that they form one of the most extensive land use types in the County. The Draft Plan also recognised that Dublin is one of the fastest growing data centre markets in Europe with a significant element of this growth in the administrative area of South Dublin County Council. The Draft Plan identified data centres as a specific land use, which they weren't previously under the 2016 Plan, and where they would be considered as being as '*Open for Consideration'* uses within the EE zoning. Open for consideration uses were defined as:

> *"Land uses that are listed as 'open for consideration' in the land use zoning tables may be acceptable to the Planning Authority subject to detailed assessment against the principles of proper planning and sustainable development, and the relevant policies, objectives and standards set out in this Plan.*
>
> *Proposed uses in this category will be subject to full assessment on their own merits and particularly in relation to their impact on the development of the County at a strategic and a local level. Such uses may only be permitted where they do not materially conflict with other aspects of the County Development Plan."*

3.16 In considering the Draft Plan a motion, which was carried sought to Amend Table 13.10 Zoning Objective 'EE' so that 'Data Centre' was moved from being '*Open for Consideration*' to being '*Not*

Permitted'. This change in the status of a data centre use was considered as a Material Alteration of the Draft Plan and was published as such for public consideration and submissions on the 29th March 2022. Despite a number of submissions being made against this Material Amendment that included a letter from the Planning Regulator stating that it would be contrary to Government policy, and a recommendation from the Chief Executive of the Council that it should not be adopted, the Members made the Plan that included a "moratorium" on data centres within the plan area during the lifetime of the Plan.

3.17 Following this, the Office of the Planning Regulator recommended to the Minister in a letter dated the 19th July 2022, to issue a Direction under section 31 AM(8) of the Planning and Development Act 2000 (as amended) to reinstate the data centre use class as an 'open for consideration' use within the EE zoning. The Draft Direction from the Minister to South Dublin County Council was issued on the 29th July 2022.

3.18 This Draft section 31 Direction issued in July 2022 is deemed to be included within the adopted Development Plan as per section 31AN (11) of the Planning and Development Act 2000 (as amended). This application is therefore made on the basis that a data centre is an open for consideration use under the EE zoning as it removes the Material Amendments adopted in relation to data centres under the EE zoning.

3.19 The new Plan also recognises the need for land extensive uses, such as data centres, and requires them to be located at appropriate locations having regard to infrastructural, transport and environmental considerations as well as the need for orderly growth (Policy EDE7). Objective 1 under Policy EDE7 sets that such land uses, insofar as possible, should be located outside of the M50 on zoned lands adjacent to public transport. The proposal is located outside of the M50 and therefore is fully in accordance with this Objective.

3.20 Policy EDE7 Objective 2, sets out a list of requirements for space extensive enterprises, such as the proposed development, need to demonstrate, as follows:

"To require that space extensive enterprises demonstrate the following:

- *Strong energy efficiency measures to reduce their carbon footprint in support of national targets towards a net zero carbon economy, including renewable energy generation;*
- *Maximise onsite renewable energy generation to ensure as far as possible 100% powered by renewable energy, where on site demand cannot be met in this way provide evidence of engagement with power purchase agreements (PPA) in Ireland;*
- *Sufficient capacity within the relevant water and wastewater and electricity network to accommodate the use proposed;*
- *Measures to support the just transition to a circular economy;*
- *Measures to facilitate district heating or heat networks where excess heat is produced;*
- *A high-quality design approach to buildings which reduces the massing and visual impact;*
- *A comprehensive understanding of employment once operational;*
- *A comprehensive understanding of levels of traffic to and from the site at construction and operation stage;*
- *Provide evidence of sign up to the Climate Neutral Data Centre Pact."*

3.21 This Policy is comprehensively addressed as part of the Planning Report that accompanies the AI response. The overall design has introduced energy efficiency measures that are detailed within the update Energy and Climate Action Statement prepared by Ethos Engineering that accompanies this AI response; measures to support a circular economy; has a connection agreement in place and there is adequate capacity within the relevant networks with additional detail on this provided within Chapter 16, Material Assets of this EIAR.

3.22 The site includes a Specific Local Objective within the RU zoned ands to the north of the site. This objective, EDE4: SLO1 states:

"To investigate the full potential for the 12th Lock lands as centrally located within growing employment and residential areas, with tourism and active travel potential along the Grand

Canal and have cognisance of the potential for the lands and associated heritage buildings to become a hub supporting the surrounding land uses while protecting the natural environment."

3.23 Section 10.2.5, and policies within that section of the Plan (Policy E6, Objective 1) sets out that development proposals for new industrial and commercial developments such as data centre require future proofing and are required to promote the development of waste heat technologies and the utilisation and sharing of waste heat where feasibility is proven for its re-use as part of a low carbon district heating network

3.24 The nature of the overall design has been informed by a site analysis of environmental issues as well as the various design policies and Green Infrastructure policies of the new County Development Plan. These include reference to Policy GI1, Objective 4; s well as GI2, Objectives 1, 2, 4 and 5 in formulating the application that now forms this AI response. The application is considered in relation to all these policies and the Green Space Factor under the accompanying reports and documents that form part of the AI response.

3.25 The landscape approach to both the overall site and proposed development in providing berms, mature native planting of new hedgerows and planting, provide wildlife and biodiversity corridors around the site that will connect with existing planting and hedgerows that form surrounding green infrastructure, but also will provide a natural screen to the Proposed Development, even at year 1 of operations. Given the already permitted landscaping around the site, which will be implemented as part of the permission granted under SDCC Planning Ref. SD19A/0042 the majority of the landscaping could be close to 5 years or more prior to the proposed development coming into operation, and therefore the assessment included within the EIAR whilst based on best practice, significantly underplays the degree of screening of the proposed development.

Figure 3.1 Connectivity into GI Infrastructure within and adjacent to the site (Drawing no. 203, KFLA)

3.26 The landscape plan accompanying this application proposes heavy landscaping throughout with initial tree planting being in rows of three at c. 4.5m height across the landscape berms. The maturity of the trees within a short timeline will aid the visual integration of the Proposed Development within this commercial area.

3.27 Existing hedgerows and other vegetation will be retained wherever possible and strengthened with native planting, and new hedgerows planted to mitigate any hedgerow required to be removed. This will create commuting and foraging corridors within the Proposed Development site for a range of fauna species that will connect into existing GI surrounding the site. This will be further aided by proposed bat boxes and bird boxes. All of these measures, will ensure that the Proposed Development fully accords with green infrastructure policies of the County Development Plan and provide a net biodiversity gain for the site.

3.28 The enhancement and creation of new bio-diversity corridors to fully integrate the scheme into the surrounding environment to ensure that direct and cumulative effects on biodiversity are addressed in the overall design. Suitable attenuation and sustainable drainage systems have also informed the design. This mitigation of design as already permitted, also significantly increases native tree planting within the site from its current position. The design incorporates SUDS fully in accordance with policies of the Plan.

3.29 In conclusion it is considered that the proposal is in accordance with the policies and objectives of the South Dublin County Development Plan 2022-2028 as well as regional and national land use planning policy.

Planning history

Proposed development site

Planning Ref. SD19A/0004

3.30 A separate planning application was lodged with South Dublin County Council for enabling works on the southern part of the Proposed Development site to carry out the required earthworks and site preparation works to facilitate the development proposed under this application. This application was granted permission in 2019. The enabling works permitted under SDCC Planning Ref. SD19A/004 have recently commenced on part of the overall site at the time of drafting this EIA Report.

SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948

3.31 Permission was granted on the 5th October 2020 for the phased development of 4 single storey data halls within two data centre buildings all with associated plant at roof level, 32 standby generators, office and service areas, service road infrastructure, car parking, ESB substation/transformer yard, and has recently commenced on site An EIAR was submitted with the application for the development that had an overall gross floor area of 17,685sqm. The development also included a temporary gas-powered generation plant within a walled yard containing 19 no. generator units (15 + 4 arrangement) with associated flues (each 17m high) to be located to the west of the proposed data halls.

3.32 Following a request for Further Information, the number of generators within the Power Plant was reduced to only 8 operating with two back up units and limited to a lifespan of two years.

3.33 The decision of the Board was subject to 19 conditions. Condition no. 16 relating to noise outlined that operational noise shall not exceed 45dB(A) Leq 1 hour between 2000 and 0800, and 55dB(A) Leq 1 hour at all other times. The condition in full stated:

> *"The operational noise level shall not exceed 55 dB(A) Leq 1 hour (corrected for any tonal or impulsive component) at the nearest noise sensitive locations, including dwellings, between 0800 and 2000 hours, Monday to Friday inclusive, and shall not exceed 45 dB(A) Leq 1 hour at any other time. All sound measurement shall be carried out in accordance with ISO 1996-1:2016 "Acoustics - Description, measurement and assessment of environmental noise - Part*

1: Basic quantities and assessment procedures". Procedures for the purpose of determining compliance with this limit shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development."

3.34 This permission has recently commenced on site.

SDCC Planning Ref. SD21A/0042

3.35 Permission was granted by South Dublin County Council under SDCC Planning Ref. SD21A/0042 for Phase 2 (DUB05) of the development of the overall site on the 19th January 2022, following a request for Additional Information and a Clarification of that Additional Information. The primary issue being the issue of the availability of power, grid constraints and the compatibility of the application with the Climate Action Plan 2021, as well as the inclusion of green walls and improvements in the public park access and design within the north of the site.

3.36 All these issues were comprehensively addressed under the CAI response that led to the positive decision from the Planning Authority. The permission is granted to be undertaken on lands to the west and south-west of the current application site, and is for the development of two single storey data centres with associated office and service areas; and three gas powered generation plant buildings with an overall gross floor area of 24,624sqm.

3.37 The data centres had 24 standby diesel generators with associated flues (each 25m high) as well as associated water tower and sprinkler tank and other services, including car parking. The permission also included for the phased development of 3 no. two storey gas powered generation plants (9,286sqm overall) within three individual buildings with associated 25m high flues (61 flues in total) and ancillary development to provide power to facilitate the development of the overall site, and to replace the temporary power plant granted permission under the 2019 application. The Power Plant is permitted to be located within the south-west part of the overall site. The landscape master plan was modified slightly under this application with a public park created on the lands within and to the immediate north of the application site.

3.38 Condition 3 of the permission stated:

"3. GAS Plants – Temporary
Prior to the commencement date of the first operation of the first gas plant, the Planning Authority shall be contacted in writing to confirm the date on which the first gas plant shall first commence operation.
Five (5) years from the date the first gas plant first commences operation, the gas plants and all associated and related ancillary structures shall cease operation unless prior to the end of the five-year period, planning permission has been sought and granted for its continued use.
All structures related/associated with the gas plants shall be removed from the entire site within a year of the ceasing of operation, unless prior to the end of the five-year period, planning permission has been sought and granted for its continued use.
REASON: To enable the impact of the development to be reassessed having regard to changes in technology, climate action and energy supply options."

3.39 The severity of the wording of the condition creates significant uncertainty from the applicant's perspective and therefore was subject of a first party appeal. However, as no third party appeal was lodged the first party appeal was withdrawn, and the final grant of permission, which was subject to 21 conditions, was issued on the 24th March 2022 and has not commenced on site.

SDCC Planning Ref. SD22A/0105

3.40 Permission was granted on the 8th June 2022 for amendments to the substation compound and structures that are located to the immediate west of the current application site.

SDCC Planning Ref. SD22A/0289

3.41 Permission was granted on the 10th February 2023 for amendments to Condition no. 3(i) and 3(ii) of the permission granted under SD Planning Ref. SD21A/0042.

Planned development

3.42 The final phase of development on the overall site will be the SID application that has been made directly to the Board (ABP Ref. VA06S.314567). This application is for the provision of an underground 110kV transmission line connection between the Kishoge 110kV GIS Substation in Ballymakaily (the permitted substation on the overall site) and the permitted 110kV transmission line at Aungierstown – Castlebaggot. This application is due for decision imminently.

Consultation with South Dublin County Council

3.43 The project team have liaised with the relevant departments of South Dublin County Council (SDCC) in advance of lodgement of the application and this AI response. A pre-planning meeting (PP041/22) was held with SDCC on the 14th June 2022 and representatives of the SDCC Planning, Engineering and Roads/Transportation Departments attended. The meeting raised a number of points of relevance to the application. These were considered and have been addressed in the overall planning application package and within the EIA Report.

3.44 In addition, the relevant project team specialists have liaised with the Department of Defence, Water Services and Parks Departments of SDCC by correspondence during the course of the EIA Report preparation. EIA contributors/authors have incorporated advice and comments received from SDCC into the relevant chapters of this EIA Report. Further discussions were had in relation to the issue of the western hedgerow specifically, and the need for it to be removed to facilitate the development has been fully justified under this AI response and under this EIAR.

Conclusions

3.45 The Proposed Development, described in Chapter 2 of this EIA Report is fully in accordance with local, regional and national land use planning policy. The subject site is suitably zoned for enterprise and employment purposes and the precedent for data centre development on such zoned lands is well established and clearly set within the wider local area with the use open for consideration within this zoning, and where permission is already in place for alternative power to serve the proposed development.

3.46 A construction car park and compound will need to be located on the Proposed Development site. This is envisaged to be located to the immediate north-west of the proposed data centre to the north of where the permitted substation as granted under Reg. Ref. SD19A/0042 / ABP Ref. PL06S.305948 is proposed to be located.

3.47 Its central position within the site will ensure that there is no delay in creating the landscaping around the site. The final details of the construction compound will be dependent on the appointed contractors and the implementation of other aspects of the various permissions on site. If a compound is required outside of the application boundary, then this will be subject of a separate agreement with the land owner. The construction compound is temporary in nature and again allowable under the zoning objective with precedent for similar temporary compound arrangements on EE zoned lands both within and outside the Grange Castle Business Park.

3.48 The content of this EIA Report identifies potential environmental risks and how they will be addressed and mitigated in the design, during construction and during the operational phases of development. Details of the various environmental topics are identified and discussed in the following chapters of the EIA Report.

4. CONSIDERATION OF ALTERNATIVES

4.1 The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 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 (e.g., in terms of design, technology, location, size and scale), studied by the Applicant and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. This Chapter has been updated having regard to Point 17(a) of the AI request of the Planning Authority and includes a further consideration of alternatives.

4.2 This chapter of the EIAR therefore explores the objectives of the proposed development, its design evolution and the reasonable alternatives considered. In doing so, the chapter considers the analysis of the site and existing environmental conditions which informed the design evolution of the proposed development. The following three alternatives were considered:

- The do-nothing alternative
- Alternative locations and uses; and
- Alternative design / layouts of the proposed development.

Development objectives

4.3 The proposed development aims to develop the existing low grade agricultural land to meet development aspirations set out within local and regional policies. The specific development objectives for the proposed development are to deliver:

- Add to Irelands national IT and data storage infrastructure;
- Generation of employment;
- Provision of 4 data modules;
- Create a high-quality Business Park environment;
- Provision of SuDs and green infrastructure;
- Increased biodiversity;
- Increase the ecological value of the Grand Canal corridor; and
- Reduced climate impact of the proposed development and increase climate resilience

Development considerations

Policy considerations

4.4 The development considerations for the site are set out in the following planning policy and guidance documents at national, regional and local levels:

- National Planning Framework (NPF) (2018);
- National Development Plan (NDP) 2021-2030 (2021);
- National Climate Action Plan 2021;
- Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy;
- Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Regional Assembly (EMRA)7 – in particular Regional Policy Objective (RPO) 8.25: *"Support the national objective to promote Ireland as a sustainable international destination for ICT [information and communications technology] infrastructures such as data centres and associated economic activities at appropriate locations"*; and
- South Dublin County Council (SDCC) Development Plan 2022-2028– in particular Objective EE: *"To provide for enterprise and employment related uses" and new GI policies*.

Site considerations

4.5 The following site considerations informed the design process:

- Sensitive residential receptors located close to the north-east boundary of the application site;
- Site allocations under aforementioned planning policies; and

- On-site environmental features, such as existing trees and hedgerows as well as closeness to the Grand Canal pNHA and its amenity corridor.

Environmental considerations

4.6 The design has considered the following primary environmental constraints:

- Baldonnel Airfield Height limit for the area;
- On site trees and hedgerows;
- The surrounding landscape and visual character;
- Greenhouse gases;
- Flood risk at the site;
- Biodiversity of the site and connectivity of the site to surrounding green infrastructure as is required under the new GI policies of the County Development Plan.

Additional Information request

4.7 On the 10th October 2022 SDCC responded to the planning application requesting Additional Information to address a number of issues as outlined in Chapter 1. The design process has therefore been an iterative one, as the design team has sought to respond and address these issues raised at the different stages of the planning process. This has therefore produced 'alternatives' or different ways in which the development objectives could be feasibly achieved on-site. The resulting proposed development as submitted under the AI response, particularly in relation to Green Infrastructure policies, is discussed in detail in Chapter 2: Description of the Proposed Development, Chapter 6: Biodiversity and Chapter 12: Landscape and Visual Impact.

Alternatives

Do-nothing alternative

4.8 The 'Do Nothing' scenario is a hypothetical alternative conventionally considered, albeit briefly, in EIA as a basis for comparing the development proposal under consideration.

4.9 For the purposes of the EIAR, the 'Do Nothing' scenario is where no development occurs on the site and therefore remains vacant and unchanged. Should the proposed development not be brought forward, the Applicant would implement the already consented development on the overall site.

4.10 When considering the 'Do-Nothing' alternative, the following is noted:

- The site is currently largely underutilised agricultural lands and needs to be re-purposed, as has already been accepted under the previous permissions granted on the overall site;
- The site is located to the immediate west Grange Castle Business Park, on land which is designated in the SDCC Development Plan 2022-2028 as Objective EE to provide for enterprise and employment uses. This gives the encouragement for development which seeks to provide alternative uses to those that have recently occupied the site. Furthermore, the provision of the proposed data centre would support RPO 8.25 to promote Ireland as a sustainable international destination for ICT infrastructures (such as data centres)
- The Applicant owns the application site and the overall site for which planning consent was secured under Planning Ref. SD19A/0042 and SD21A/0042 for the development of two data centres (refer to Chapter 2 and 3 of this EIAR for further information);
- The proposed development, consisting of one data centre building, would sit within a cluster of data centres within the overall site and area;
- The area has excellent fibre connectivity; and
- The do-nothing alternative does not meet any of the Development Plan's objectives for the site.

4.11 In the event the proposed development at the site, or any other development, did not come forward, a number of negative effects and lost opportunities would result:

- Loss of opportunity for further economic and employment growth;
- Loss of opportunity to maximise the productive use of the site;

- Loss of national and international data storage capacity and IT infrastructure;
- Loss of opportunity to further establish the overall site and the surrounding area as a data centre hub; and
- Loss of opportunity to improve on-site biodiversity and green corridor connectivity with the wider network in South Dublin in line with the various GI policies of the South Dublin County Development Plan 2022-2028.

4.12 The Applicant has therefore not considered the 'Do Nothing' alternative further

Alternative project locations

4.13 No alternative sites have been considered by the Applicant for the following reasons:

- The site is owned by the Applicant and therefore the Applicant did not consider alternative sites which are the property of a third-party;
- The site is adjacent to and within the overall site of the consented development site as granted under Planning Ref. SD19A/0042 and SD21A/0042 which is under the Applicants ownership and provides an opportunity for an extended and co-ordinated data centre campus, for which power is available through the permitted power plant as granted under Planning Ref. SD21A/0042 and amended under SD22A/0289;
- The site is located within an area identified in SDCC's Development Plan 2022-2028 as an area for enterprise and employment uses (as previously stated);
- The site would provide a key development opportunity to contribute to the regeneration of an underutilised site and with the land use identified in ROP 8.25 (as previously stated);
- The site sits within a wider area dominated by data centres which has good network provision and fibre suppliers, that suit the needs of the site and is thus an ideal location for the proposed development to be situated;
- Alternative sites in the Dublin area may lack adequate power provision and alternative sites in the west of Ireland may lack fibre connectivity;
- A new EirGrid substation is to be constructed, located to the immediate west of the application site boundary;
- Under the permissions granted under Planning Ref. SD21A/0042 and amended under SD22A/0289, the Applicant will provide on-site power generation to provide support and capacity to ensure that the development would reinforce the grid and not lead to supply disruption in the surrounding area at peak demand;
- Permitted berming and trees; which will be implemented as part of the already granted developments on the site, particularly along the north and east boundaries of the overall site create a natural and already permitted visual screen. Its removal to the east along the R120 as a result of the retention of the western hedgerow that was requested under the AI request would reduce
- There is no evidence of site contamination; and
- The level terrain is suitable for large floorplate buildings.

4.14 As detailed above, the Proposed Development is a logical addition to the land use pattern of Grange Castle, and the various permitted developments that have already been granted on this site, as it met the highest proportion of the necessary criteria. The site has the required infrastructure available or close to the development site. The 110kV GIS Substation is already permitted, and has been recently been amended to meet new requirements and its 110kv connections are subject to an SID application that is with An Bord Pleanála for determination.

Alternative land uses

4.15 The proposed land use has been informed by prevailing local and regional policy (as previously stated). Accordingly, no other land uses were considered outside of the proposed development. Additionally, due to the site utilities connections and the surrounding uses the Applicant does not propose any other form of development.

4.16 The site shape and area meet the Applicants requirements for the viability of building the data centre due to the developable floorspace and space for the number of required data modules. The site has

always been identified since the original application was made for the site under Planning Ref. SD19A/0042 that this site would form Phase 3 of the development of the overall site.

Alternative design / layouts

4.17 The Project Architects carried out a number of studies for the overall utilization of the site. A number of alternative layouts for the site were considered for the Proposed Development based on the already permitted developments. These were informed and defined by the various permitted developments that have been granted on the overall site, and the SID application and the need to provide wayleaves for the 110kV transmission lines that pass to the north and east of the proposed data centre.

4.18 As the application site is approximately rectangular in shape a number of iterations of site layout were considered to arrive at the proposed arrangement of buildings, access and site infrastructure, which was informed by the two zonings on the site, with all new development works beyond attenuation and landscaping being provided on EE zoned lands (see below). A layout that included for buildings within the RU zoned lands was not considered as being an acceptable alternative layout.

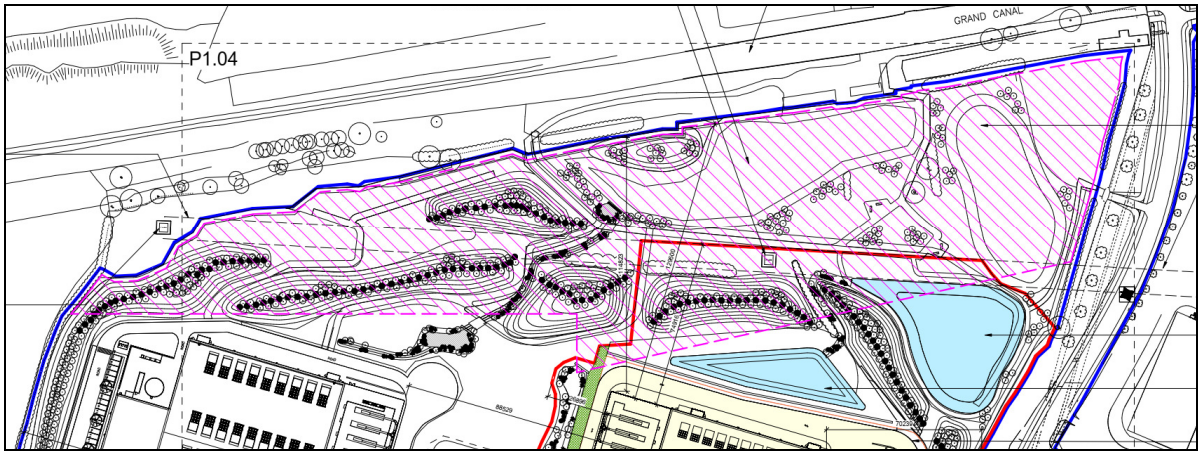

Figure 4.1 Excerpt from Drawing no. P1-03 by Henry J Lyons Architects

4.19 The Additional Information request, and particularly point 7 of it, requested the applicant to consider the retention of the western hedgerow that was indicated to be removed as part of the current application. A comprehensive review of the overall master planning of the site was therefore undertaken in assessing this alternative layout.

4.20 This internal review concluded that in order to retain the western hedgerow, there would be a need to move the proposed development eastwards. This would require the removal of the permitted berming and extensive planting granted permission on the eastern side of the site and bounding the western side of the R120.

4.21 The removal of all the permitted berming and planting, which would be needed to facilitate the retention of the western hedgerow, would result in the proposed and permitted developments becoming far more visible and contrary to the LVIA assessments under the various EIAR's undertaken as part of the permitted developments.

4.22 It would also remove the permitted new green infrastructure and biodiversity link along the eastern side of the site. This would be contrary to the green infrastructure policies and objectives of the South Dublin County Development Plan 2022-2028 as well as the good planning principles established principally for the site under Planning Ref. SD19A/0042 and SD21A/0042.

4.23 This is clearly shown in the drawing on the following page, with the alternative layout outlined in pink, that indicates the clear conflict between retaining the western hedgerow (shown in green), the need to move the data centre to the east, and the permitted green infrastructure on the eastern side of the site.

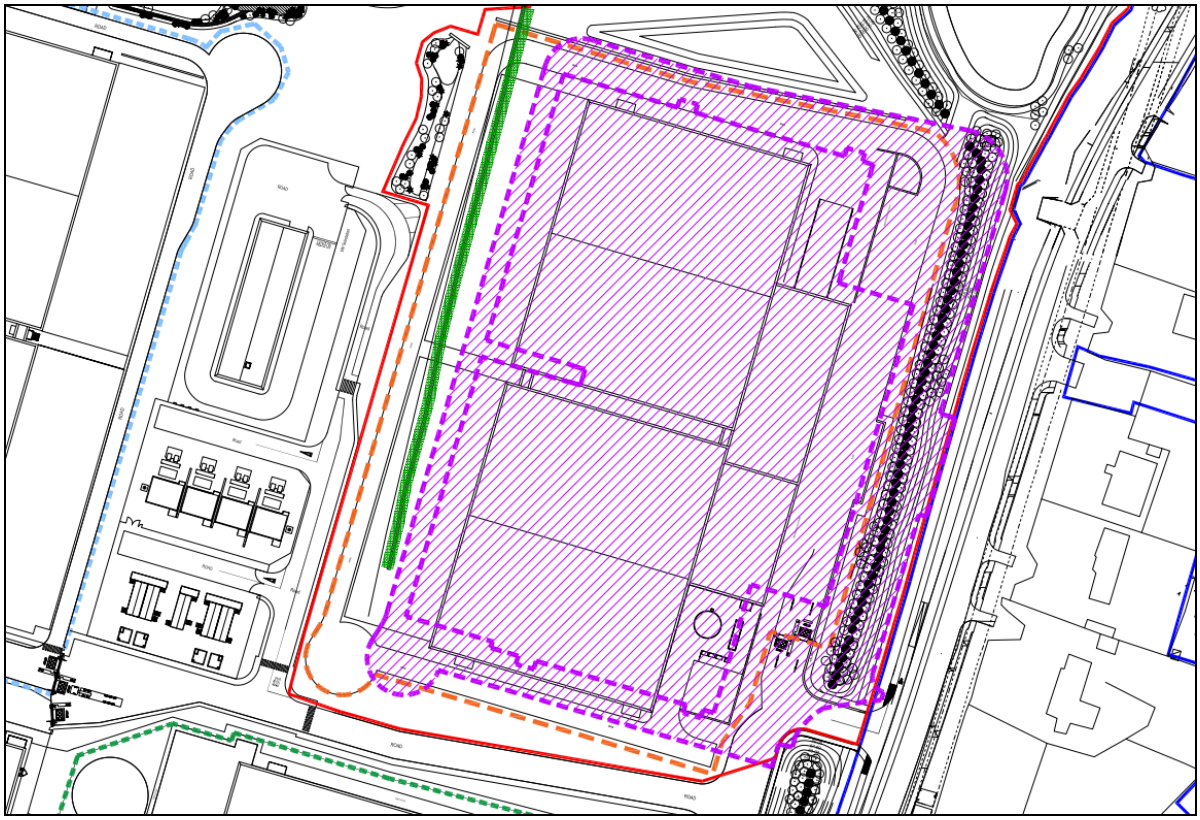

Figure 4.2 Plan showing alignment of western hedgerow (green), proposed development as applied for (outlined in orange), and the indicative position of the proposed development (magenta shading) if the hedgerow were to be retained – note removal of all eastern permitted berming and planting

4.24 As part of the Additional Information response the following changes to the layout were undertaken to address the GI policies and objectives of the South Dublin County Development Plan 2022-2028. The proposed development layout, in terms of internal roads and external areas were squeezed around the data centre, and this alternative layout has enabled as part of the AI response, to incorporate a new native hedgerow that would run parallel to the existing hedgerow to be removed along the western side of the application site.

4.25 The new hedgerow will also extend along the southern side of the proposed data centre creating strong biodiversity links within the site that replicate, and improves upon the existing green infrastructure, as it matures. It will also enable this new planting to link into the already permitted green infrastructure that passes east to west centrally within the site, and along the eastern side of the site creating green infrastructure and biodiversity gains within the site of the proposed development. A full and robust justification for this is provided as part of the AI response. In addition a new bio-swale has been added to replace an interceptor and underground surface water pipes to the north of the proposed data centre. These are set out under Figure 4.3 on the following page

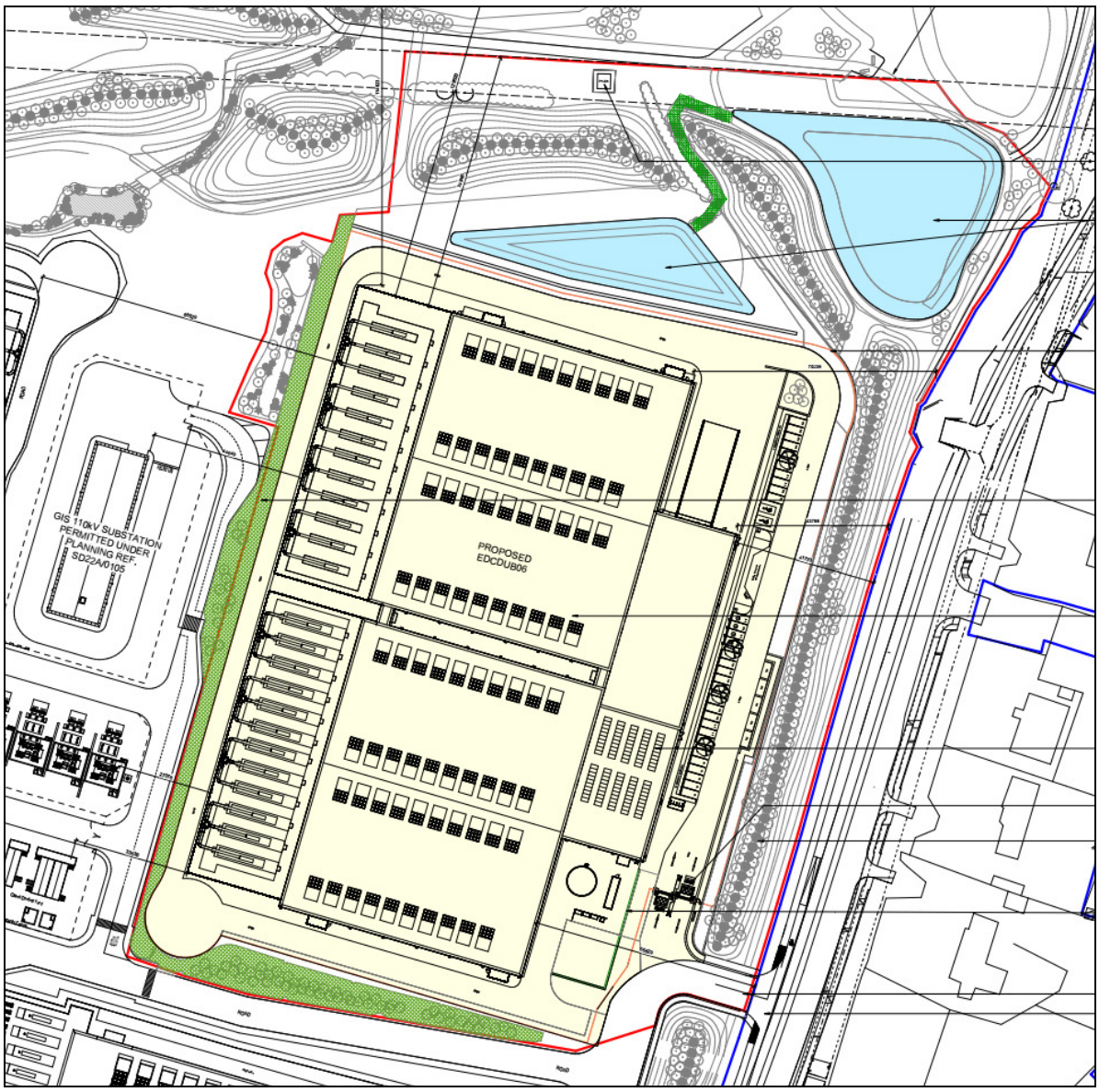

Figure 4.3 Plan showing alignment of new western and southern hedgerow (green), proposed new bio-swale to north (dark green)

Revised proposed development

4.26 The revised proposed development has been chosen for the reasons afore summarised in the upfront section of this chapter. This section of the chapter described in detail how the proposed development design has responded to environmental constraints and the outcome of these design changes.

Water recourse, flood risk and rainfall

4.27 The design has sought to minimise flood risk through incorporating natural solutions across the site through:

- Incorporating increased above ground attenuation ponds providing SuDs for flood water compensation and attenuation to aid the downstream culvert to reduce flood risk;
- Collection of rainwater from roof generator yard areas and discharge of this into new on-site attenuation ponds; and
- Hardstanding (where required) would be designed to collect and attenuate rainwater from the road areas of the data halls to reduce flood risk.

4.28 The proposed development provides above ground surface water attenuation in the north and north-eastern section of the site and in the south western section of the site and SuDs to remove the need for below ground attenuation.

Landscaping

4.29 The proposed development will not require any trees to be removed under this application, with the overall site that is subject to grants of permission under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SDCC Planning Ref. SD21A/0042 having already been permitted to allow for one tree to be removed. The proposed and permitted development will include significant levels of native tree planting.

4.30 Under the current application it is proposed to plant 484 new semi-mature trees (c. 5m in height) with permitted development providing for 1,854 new semi-mature trees on the permitted development site. In addition to this it is permitted to plant 3,843 standard trees (c. 2m in height) under the permitted development with another 912 of these trees proposed to be planted within the application boundary. In addition to this, it is permitted to plant 18,458 saplings (c. 0.5m in height) across the permitted site and with a further 3,586 proposed under this application.

4.31 This current application proposes to remove 572m of hedgerow, which includes the western hedgerow, which is of low ecological value, as referred to under point 7 of this AI request, that will be replaced by 250m of hedgerow under this application, and with 1,113sqm of new hedgerow already permitted under the permitted development.

4.32 The design has sought to protect existing trees and hedgerows as far as reasonably possible, and retaining biodiversity corridors, through:

4.33 During the phasing sequence of the proposed development, landscaping would be undertaken at the earliest opportunity in order to help the features to mature ahead of the proposed development being fully built out and operational, which would be primarily undertaken in the implementation of the permissions granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SDCC Planning Ref. SD21A/0042.

- Achieving a net gain of trees and hedgerow planting;
- Implementation of a tree protection strategy; and
- Implementation of a heavy landscape scheme throughout the overall site.

Green Infrastructure Network Connectivity

4.34 The landscape proposals for the proposed development have been revised to strengthen connectivity to the wider green infrastructure network in the area in accordance with the various GI policies of the South Dublin County Development Plan 2022-2028.

4.35 These measures include retaining and enhancing woodland belts, bio-swales proposed SUDs features and meadows across the site. These strengthened linkages are primarily to the Primary GI Corridor of the Grand Canal to the north but also to other green infrastructure to the west and south.

Biodiversity

4.36 The design has sought to create areas for biodiversity to thrive and create a network of habitats within an ecologically rich landscape. There will be significant habitat creation through the planting of woodland hedgerows, wildflower meadow and wetland meadows which will support local flora and fauna, increasing local biodiversity, as well as connect to the existing vegetation around the site, enhancing green infrastructure links. In addition, a series of bird and bat boxes are proposed at the site.

Landscape and Visual Impact

4.37 The built footprint of the proposed development has been orientated to reduce the landscape and visual impact through the orientation of the data centre so that the flues and generator yard are located centrally within the overall site, and the furthest away from the public realm. Additional

planting of berm and large trees along the northern and eastern frontages will provide further visual screening. The inclusion of green walls to the south-east corner of the data centre contributes to the high quality landscaping along the dominant facades and provides further visual screening.

Site Access

4.38 The layout of the site has been developed to reduce disturbance and ease traffic management to/from the site, minimising impacts on the local road network by the security gate being set well back from the internal turning point within the site, and positioned so that this junction is also set well back from the entrance into the overall site from the R120.

4.39 Safe travel and sustainable transport have been encouraged through the provision of a Travel Plan, which will form the basis of a Mobility Management Plan, once the development becomes operational. This is aided by the cycle lane and footpath connectivity along the eastern boundary, adjacent to the R120, to connect to the site.

Climate change

4.40 Data centres are typically carbon intensive developments and therefore, the Applicant has looked to reduce climate impact through a variety of energy efficient measures, as well as the incorporation of PV panels to generate renewable electricity. In addition, the applicant has designed the proposed development to incorporate the potential for a district heating provision in the future should there be demand in the area.

4.41 The applicant is currently actively pursuing the possibility of virtual PPA's where they work with a renewable energy developer to commit to buying a portion of power that has been generated from a renewable source that is located in another region (i.e. offsite). Where they are able to source suitable renewable energy, due to the volatile nature of green energy supply, the applicant targets a maximum of 20% green energy penetration if possible.

Policy objective EE

4.42 During the design of the site, the Applicant looked to maximise efficiency in terms of net floor space and employment gain, further detail on which is contained in the Planning Report which accompanies the application, and AI response.

Alternative mitigation

4.43 For each aspect of the environment within Chapters 6 – 16 of this EIA Report, each specialist has considered the existing environment, likely impacts of the Proposed Development and reviewed feasible mitigation measures to identify the most suitable measure appropriate to the environmental setting of the Proposed Development. In making a decision on the most suitable mitigation measure each specialist has considered relevant guidance and legislation (these are identified in the table of mitigation measures in Chapter 2 – Appendix 2.2). In each case, the specialist has reviewed the possible mitigation measures available and considered the mitigation in terms of the likely residual impact on the environment.

4.44 The four established strategies for mitigation of effects have been considered: avoidance, prevention, reduction and offsetting (not required in this development). Mitigation measures have also been considered based on the effect on quality, duration of impact, probability and significance of effects. These represent the best practice for achieving minimal impact on the receiving environment. Whilst alternatives were considered in the EIAR process, the measures presented represent the best options for the site.

Conclusions

4.45 The Proposed Development site is considered an excellent location for the two adjoined data centre facilities from both an environmental and a planning perspective. The site has excellent access to the required utility infrastructure (most notably the future power and fibre telecommunications networks) which will mean minimal disruption to adjacent site users and nearby sensitive receptors during site development.

4.46 The Project Design as proposed provides the most appropriate design and layout that maintains the permitted landscaping in terms of berms and planting to boundaries, with one minor amendment to the north east of the proposed development to facilitate attenuation, that will create the 80-100m landscape buffer to the Grand Canal and high quality elevation treatment that includes the use of vertical shaded green panels of various length and shades to the east, south and north elevation. This elevational treatment, accepted by the Planning Authority on previous Edgeconnex data centres on this site as well as the green wall that will extend around the water tank and pump house compound, helps to visually integrate the development into the surrounding area, and particularly in the context of views from the canal.

4.47 In the do-nothing scenario, if the facility were not to proceed on the selected site then it is likely that the site will be developed in accordance with a future granted planning permission. However, the proposed development of a state of the art data centre facility if granted permission would maximise the use of this site and make it a substantial asset in the local regional and national economy, particularly in light of the emergence of Ireland as a "Digital Hub" for Europe.

4.48 The assessment of the design and location of the flues and back-up generators, in the project design have been considered to minimise environmental effects. The tallest buildings and those generating the most noise have been located furthest away from noise and visually sensitive receptors along the R120. The site has the required infrastructure readily available or in close proximity for the development. This includes the permitted 110kV GIS Substation within the centre of the site as well as a Flexible Demand offer from Eirgrid to the applicant. As detailed in Chapter 2, the Flexible Demand Offer requires the already permitted Power Plants to remain following the connection to the National Grid as a source of a back-up power supply to the Proposed and already permitted development on site.

4.49 The siting and design of the Proposed Development at an existing greenfield site in Grange Castle has been carefully selected based on a consideration of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) and having undertaken a comparison of environmental effects. The Proposed Development will considerably enhance the utilisation of the site. In conclusion it is considered that the proposed site has significant capacity for development and is highly suitable for a data centre facility use.

5. POPULATION AND HUMAN HEALTH

5.1 This chapter of the EIA Report considers and assesses Population and Human Health having regard to employment, settlement patterns land use patterns, baseline population, demographic trends, human health and amenity as set out under the EPA Guidelines 2022. This chapter assess more broadly the impact of the Proposed Development on the land use of the area, recent trends in population, employment and economic performance, and the community. The assessment also considers the mitigation measures necessary to reduce, and if possible remedy, significant adverse effects on these elements of the environment.

5.2 Population and human health comprise one of the most important elements of the *"environment"*. Any potential impact on the status of the population or human health by the Proposed Development must therefore be assessed. The principal concern is to ensure that human beings experience no significant unacceptable diminution in aspects of *"quality of life"* as a consequence of the construction and operation of the Proposed Development. Relevant components in this section of the EIA Report, include land use, population, employment, and amenity aspects.

5.3 In addition to the impacts on population and human health dealt with under this chapter, the impacts on human beings are also considered in Chapter 9 – Noise and Vibration; Chapter 10 – Air Quality and Climate; and Chapter 11 – Landscape and Visual. The impacts on property are considered in Chapter 15 - Material Assets. The cumulative effect is addressed in the individual chapters of this EIA Report. Interactions are addressed in Chapter 16 of this EIA Report.

Methodology

5.4 This assessment was undertaken in accordance with the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports 2022* (EPA); Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018); *Guidance on the preparation of the Environmental Impact Assessment Report (EU, 2017);* and *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* Draft September 2015 (Environmental Protection Agency).

5.5 An examination of the following information was undertaken in order to establish the existing land use pattern, location of residences and services. A desktop survey of the west Dublin area as well as an analysis of the local area and its facilities was undertaken. The desktop analysis included a review of background studies and reports; maps and aerial photography of the area; and review of demographic characteristics of the area as ascertained from Census of Population data and other statistics released by the Central Statistics Office (CSO) including the preliminary CSO data for Census 2022.

Impact assessment rating

5.6 In undertaking the assessment of the impact of the Proposed Development on population and human health the following impact criteria was employed. Both positive and negative impacts are considered and the significance of the impacts rated as imperceptible, slight, moderate, significant and profound as per the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports 2022* (EPA). Table 1.2 in Chapter 1 of this EIAR presents definitions for the impact levels used in this study, as defined by the EPA.

Receiving environment

5.7 This section describes the existing environment with regard to employment, human health and amenity.

Land use

5.8 Land use can have a key impact on population health and amenity. The Proposed Development is to be located in the north-east portion of the overall site. The application site is currently greenfield, with the overall and wider site including further greenfields, field boundaries and includes an abandoned agricultural property and associated buildings, some of which have recently collapsed

located to the north along the boundary with the canal within the over. The abandoned property is in very poor condition with a further former property in ruins along this northern boundary along the canal. These former houses were permitted to be demolished as part of the previous permission granted on the site under SDCC Planning Ref. SD21A/0042 in order to facilitate the attenuation pond proposed under that application. Neither property are of architectural interest, and offer no potential to be reused for residential purposes. Some of the lands along the eastern boundary were subject to works and were used as construction compounds under the R120 realignment.

5.9 There is a single residential property that bounds and is outside the overall site to the north-east adjacent to the old canal bridge and lock. This house is located within the RU zoning and is served by a rear garden that backs onto the canal. The house is located some 120m from the application boundary and 200m from the north-east corner of the nearest proposed data centre. The proposed attenuation ponds will be located between the already permitted attenuation pond and either side of the mitigation landscaping permitted under the previous applications on the site to the north-east of the proposed data centres.

5.10 The residential properties to the immediate east of the application site are primarily in a ribbon form of development and almost entirely located on the east side of the Adamstown / Newcastle Road (R120). There are three residential properties located to the east of the R120 opposite the main development part of the site being applied for under this application. There are further ribbon development to the north along the eastern side of this realigned road, as well as either side of the road further south. A travellers halting site (Rock Road Mansions) is located some 540m south-west of the southern extent of the proposed data centres under this application.

5.11 The area in which the proposed site is located lies within the functional area of South Dublin County Council. Under the Council's Development Plan, a variety of land use objectives are established for the area. These objectives include providing for high quality developments, which are entirely appropriate to and fully compatible with the Proposed Development. This has been further corroborated by the further expansion of the EE zoning on the land to the west of the subject site under Variation no. 1 of the 2016 County Development Plan that has been corroborated.

5.12 Economic clusters and corridors are geographic concentrations of competing, complementary or interdependent firms and industries that may do business with each other and or have common needs for talent, technology and infrastructure and rely on the services of other cluster firms in the operation of their business. The areas of and surrounding Grange Castle and City West (existing established industrial areas) are cited as two particularly important areas for the creation of a cluster of high end economic development based around Foreign Direct Investment manufacturing and support industries. The positive characteristics of these areas is the availability of large plot sizes, infrastructure and heavily landscape corporate park models.

5.13 Grange Castle Business Park and surrounding lands is already home to several industrial facilities and comprises a number of different land uses (See Figure 5.1) These include the permitted development on the site; the permitted Edgeconnex data centre facility and associated offices on the lands to the east of the R120; two large biotechnology facility campuses – Pfizer Ireland and Takeda Pharma Ireland Ltd. Microsoft's data centres are also located within the business park to the immediate south-east, and in close proximity to the site of the Proposed Development. They are currently constructing a much larger data centre campus to the immediate west of the Pfizer campus that will significantly extend the proposed use in this location.

5.14 Aryzta AG (Cuisine de France) have a purpose built food facility located south-east of the proposed development site. A further application for a larger data centre within Grange Castle South Business Park has been granted by the Planning Authority and is subject to a third party appeal to An Bord Pleanála. Other land uses adjacent to the application site include agricultural lands zoned as EE to the west and south; the traveller site to the south-west; and the Newcastle Golf Centre and Peamount Hospital further to the south-west.

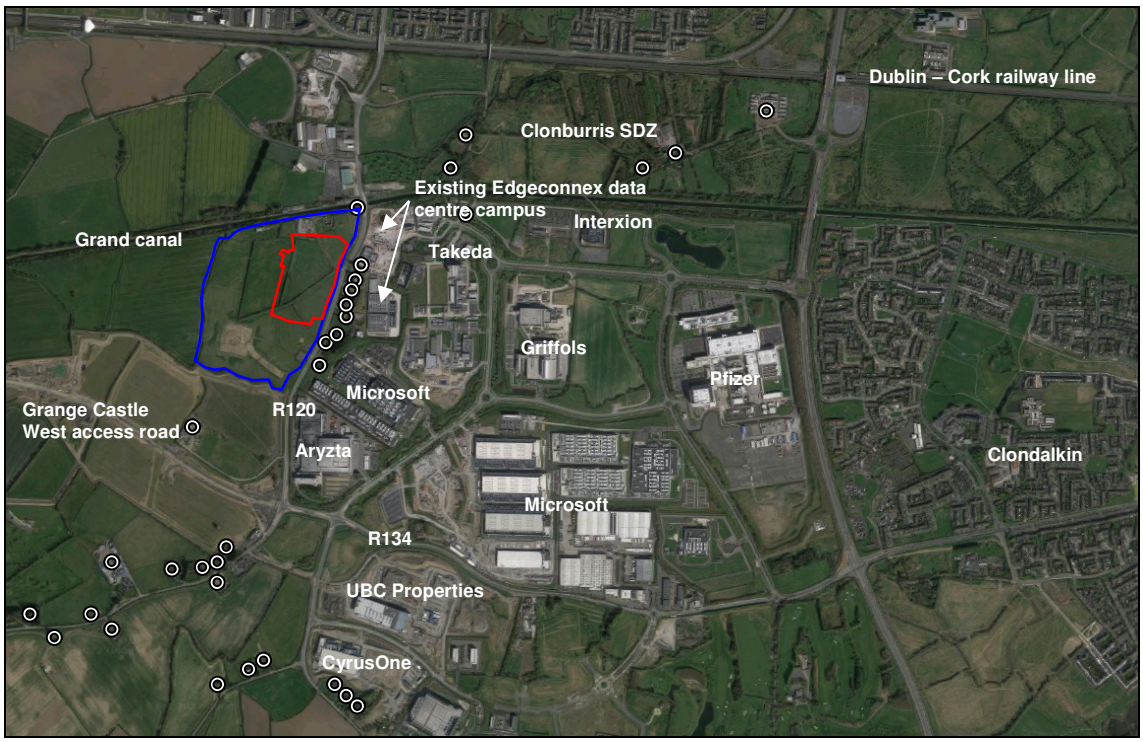

Figure 5.1 Existing and proposed land use in vicinity of subject site (individual residential properties outlined by white ring)

5.15 The large residential area of Clondalkin sits some distance away and to the east of the R136 that connects different parts of the outer part of west Dublin that include Griffeen Valley and Adamstown to the immediate north and wider west Lucan area.

5.16 The area has excellent transport infrastructure due to its strategic location on the outskirts of the Greater Dublin Area. The subject site and adjacent Grange Castle Business Park lies between the N4 and N7 National Primary Routes and approximately 7km to the west of the M50 motorway. The Nangor Road and the R136 Outer Ring Road provide access to the site via the Grange Castle Business Park. The N7 can be accessed by way of the R136. The site is also close to the mainline rail connections to the West and South of Ireland, including the new Adamstown commuter railway station, and planned others, and enjoys easy access to Dublin city centre, Airport and Dublin Port.

5.17 The Proposed Development is situated on suitably EE zoned lands with no development beyond already permitted mitigation landscape and attenuation located within the RU zoned lands to the immediate south of the canal that forms an 80-100m landscape buffer to the already permitted and Proposed Development. Furthermore, the location will minimise the potential environmental impacts through careful design, master planning and mitigation measures as described in various chapters of this EIA Report. Various other objectives of the County Development Plan as outlined throughout this EIA Report (see Chapter 12) relate to the protection of amenity and the environment of the Grand Canal (pNHA).

5.18 Specific details of potential impacts in relation to these resources are dealt with in the relevant chapters within this EIA Report. In conclusion it can be stated that the Proposed Development complies fully with the stated requirements of SDCC and will be a strategic asset in the continued economic development and growth of the Dublin area.

Population

5.19 The Proposed Development site is located within the north-eastern corner of the Newcastle Electoral Division and immediate west of the Clondalkin-Dunawley Electoral Division which extends to the south of the Canal to Clondalkin to the east. Both ED's form part of the Clondalkin Local Electoral Area which is made up of lands that lie almost wholly to the west of the M50, and extend to beyond Rathcoole and Saggart to the south-west; and beyond Lucan and Newcastle to the north.

5.20 The most recent Census for which population data is available is 2022, that are currently considered as being preliminary data. These preliminary Census figures indicate that the Newcastle Electoral Division was estimated at 5,566 in 2022 and this represents a 30.7% increase in population between 2016 and 2022. This represented a significant increase in population growth from the previous inter-censal period although a population increase of 42.5% occurred between 2006 and 2011. These large population increases are reflective of the availability of serviced residential zoned land in the ED.

5.21 This compares to the 0.6% population decline in the Clondalkin-Dunawley Electoral Division (ED) between 2011 and 2016 that is reflective of this areas primarily employment zoning; and indicates a further stagnation of its population from a 4.4% increase between 2011 and 2016 and near static population between the previous Censal dates.

5.22 The change in population within the Newcastle ED was further aided by to changes to household composition during this period.

Table 5.1 Population levels in the study area in 2006, 2011, 2016 and 2022

	2006	2011	2016	2022	% change 2016 - 2022
Newcastle ED	2,631	3,749	4,257	5,566	+30.7%
Clondalkin-Dunawley ED	10,873	10,877	11,358	11,285	-0.6%
South Dublin CC	246,935	265,205	278,767	299,793	+7.5%
State	4,239,848	4,588,252	4,761,865	5,123,536	+7.6%

5.23 The South Dublin administrative area underwent very high levels of population growth during the early 2000s, although this happened primarily outside of the immediate environs of the application site. This growth, which is more similar to County and Regional levels, is evident in new suburban areas to the north and south that were constructed around the western fringes of Dublin during this period as well as Newcastle to the west. The very small population increase within the Clondalkin – Dunawley ED is indicative of the fact that there is very little undeveloped residentially zoned land within the ED and that the western part of the ED is covered by the Grange Castle Business Park and similarly zoned land for employment based development.

5.24 There is very little population close to the subject site to provide any guide to trends in population. This is reflective of the fact that there is very little undeveloped residentially zoned land within the ED and that the western part of the ED that is covered by the Grange Castle Business Park and similarly zoned land for employment based development.

Employment

5.25 The economic conditions in Ireland that stemmed from 2008 resulted in high unemployment levels. However, after a prolonged period of economic recovery, the number of persons on the Live Register of unemployment fell in the State from 428,876 in February 2013 to 205,209 in March 2020. It is noted that the number of persons on the Live Register of unemployment in June 2022 was 186,819 (including seasonal adjustments this decreased to 184,600).

5.26 The number of persons on the Live Register of unemployment has continued to also fall in Dublin in recent years from 57,284 in February 2018; to 44,218 in February 2020; but has increased slightly following the Coronavirus pandemic to 47,813 in June 2022

5.27 The changes in persons in work, labour force and unemployed within the wider study area as outlined in Table 5.2 is indicative of the change in the economic circumstance that has been experienced across the State since 2008. The Preliminary Census 2022 figures do not have the breakdown of information as set out under Table 5.2. These trends are expected to have continued within each sector when the finalised 2022 Census become available.

Table 5.2 At work by industry type 2011 and 2016 (source: CSO, 2006, 2011 and 2016)

	Year	Newcastle ED	Clondalkin-Dunawley ED	Clondalkin Local Electoral Area
Agriculture	2011	30	5	78
	2016	26	4	65
Construction	2011	126	162	1,034
	2016	127	244	1,283
Manufacturing	2011	223	405	2,343
	2016	198	429	2,280
Commerce	2011	483	1,051	6,144
	2016	523	1,117	6,065
Transport	2011	171	423	2,383
	2016	193	442	2,434
Public administration	2011	163	25	1,316
	2016	154	195	1,184
Professional services	2011	322	799	4,552
	2016	381	950	4,778
Other	2011	230	738	3,949
	2016	319	1,008	5,064
Total at work	**2011**	**1,748**	**3,808**	**21,799**
	2016	**1,921**	**4,389**	**23,153**

5.28 In relation to employment type the CSO Newcastle ED figures for 2006, 2011 and 2016 indicate that employment particularly in building and construction as well as agriculture, forestry and fishing have reduced during the Census periods 2006 to 2016. It is expected that the figures for construction will have increased during the last six year inter-censal period.

5.29 In terms of manufacturing the figures showed an increase in numbers between 2006 and 2011 followed by a reduction in those employed in that particular sector. This trend is expected to have continued between 2016 and 2022. It is also notable that employment in commerce and trade, transport and communications, public administration, professional services and other areas (non-stated within the CSO data) have continued to increase during each census period. This trend continued since the last Census of 2016, based on the continuing decrease in the number of people on the Live Register up until June 2022.

Community facilities and amenity

5.30 The Proposed Development will be located on the periphery of a largely built up urban area where various industrial activities are the main activity. Tourism is not a major industry in the immediate environs of the site. The wider area does contain a small number of hotels and other tourist accommodation (B&B's etc.) which generally increases towards the east in the direction of Dublin city and its many tourist sites. The Lucan Sarsfield GAA pitches lie to the north of the canal off the newly realigned R120 within 100m of the northern Proposed Development boundary with their clubhouse 220m from this boundary; and the Lucan pitch and putt course is located 200m to the north-east of the north-east corner of the site.

5.31 In terms of landscape amenity, SDCC recognise that the landscape, natural heritage and amenities of South Dublin have an important role to play in contributing to a high quality of life for residents and a positive experience for visitors. The primary area of landscape amenity in the vicinity of the site is the Grand Canal that bounds the northern edge of the site and is c. 60m from the northern boundary of the site and c. 130m from the nearest part of the Proposed Development. The amenity value of the canal is recognised by both SDCC and Waterways Ireland and other organisations in that it provides a key amenity link between the city centre and the suburbs and beyond. This is recognised under the recently adopted County Development Plan that includes a Specific Local Objective (EDE4, SLO:1 for the canal either side of the 12th Lock that is located to the north-east of the application site. This objective states:

> *"To investigate the full potential for the 12th Lock lands as centrally located within growing employment and residential areas, with tourism and active travel potential along the Grand Canal and have cognisance of the potential for the lands and associated heritage buildings to become a hub supporting the surrounding land uses while protecting the natural environment."*

5.32 The impact on this tourism and amenity resource, and objective, has been considered as part of this assessment. Further discussion of impact on landscape amenity is presented in Chapter 11: Landscape and Visual Impact.

5.33 Residential development is primarily located to the immediate east and to the immediate north-east of the subject site and are almost entirely located on the east side of the Adamstown / Newcastle Road (R120) apart from the house immediately bounding the overall site to the north-east. There are several residential properties bounding the east side of the R120 facing the application site that are c. 40-50m from the eastern boundary of the site. There are no occupied residential properties within the site. Both the derelict and abandoned residential property within the overall site are already permitted to be demolished as part of the permission granted under SDCC Planning Ref. SD21A/0042.

5.34 There are a number of other residential properties to the north of the canal. A traveller site is located some 540m to the south-west of the site. The western edges of Clondalkin are located some distance to the east. The extended Clonburris SDZ and other residentially zoned land extend down to the immediate north-east of the subject site and canal. The potential impact on these undeveloped lands and existing communities and population has been addressed within the EIA Report.

5.35 The population of the surrounding areas is serviced by schools in the surrounding areas of Newcastle, Clondalkin, Lucan, Tallaght and Rathcoole. The nearest hospital to the facility is located at the Adelaide and Meath Hospital incorporating the National Children's Hospital, Tallaght, Dublin 24. There is a Garda station in Clondalkin and fire station at Belgard Road, Tallaght, Dublin 24. Grange Castle Business Park has 24 hour on site security to the immediate east.

5.36 Local and regional bus services connect the local and wider area with Dublin city centre. The Dublin to Cork mainline railway passes to the north of the site. A new station at Adamstown and at Fonthill provide a new commuter service into the city centre.

5.37 The Casement Air base and its associated buildings bound the Baldonnel Road and are located some 3km to the south-east of the application site.

Characteristics of the Proposed Development

5.38 The Proposed Development is to develop 2 no. data centre facilities with associated ancillary facilities and infrastructure as well as three no. two storey gas powered Power Plants. A full description of the Proposed Development is set out in Chapter 2 of the EIAR.

Potential impacts of the Proposed Development

Construction phase

5.39 The construction of the Proposed Development will be phased based on customer demand over 1.5 years. The proposed data centres are proposed to be constructed over a 1.5 year period at the start of the overall construction period. This construction phase will depend on customer demand and it has been assumed as reflecting a worse-case scenario for the purposes of this EIAR. A shorter period of construction will result in different elements of the Proposed Development being constructed at the same time.

5.40 The Proposed Development will result in the creation of a construction site on a single stand-alone site that will have a potential short-term negative impact on the immediate local environment, the amenity of existing residents, the amenity of recreational / sport facilities, and workers within nearby facilities. This will primarily occur during the 1.5 year construction period of the proposed data centre facilities and its associated ancillary elements.

5.41 The following temporary local impacts during the construction phase have the potential to affect the local population and amenity:

- increased vehicular traffic;

- increased noise, dirt and dust generation; and
- increased employment opportunities.

5.42 While temporary inconvenience may be caused to the existing population and amenity in the area as a result of construction, these impacts will be limited to the construction period. The population with greatest potential for construction impacts are the residential properties abounding the application site to the north-east and those to the east along the R120.

5.43 There will be ongoing noise disturbance as a result of construction traffic throughout the construction process although this will impact those properties closer to the construction entrance off the R120 rather than any others. The construction phase therefore is considered likely to have a ***slight*** but ***short-term negative impact*** during the 1.5 years construction period on the immediate local population and amenity of the area.

5.44 The Proposed Development will not result in any change to the permanent population of the area during the construction phase.

5.45 There is potential for a resultant increase in the temporary population of the area as a result of the employment of workers from outside the wider Dublin area that may choose to reside in the immediate and wider local area during the construction period. This is likely to amount to only a small percentage of the workforce employed during the construction phase but will result in some additional trade for local accommodation and services.

5.46 It is expected that the majority of the work force will travel from existing places of residence to the construction site rather than reside in the immediate environs of the site. However, some local employment from within the wider local area is expected. The potential for this is decreased due to the only 1.5 year construction process.

5.47 The main construction phases of the Proposed Development will each take approximately c.1.5 years, and will generate construction employment directly on-site. It is expected that the maximum employment will be 250, on average 150 people will be employed during the construction stage.

5.48 Construction will benefit support industries such as building suppliers and local services. There will also be a need to bring in specialist workers on a regular basis that may increase the above estimated working population at times. Specialists are only likely to stay for shorter periods depending on the nature of the work and are more likely to require short-term accommodation and other services. The construction phase will have the potential to have a ***moderate short-term positive impact*** on the economy and employment of the local and wider area.

5.49 There are many potential health and safety risks arising from the construction phase due to the use of large, mobile machinery and heavy equipment and materials. Mitigation measures which will be taken to reduce these risks are described on the following page.

5.50 Local community facilities are likely to be used more regularly as a result of the temporary working population resident in the local area. The impact on such facilities is likely to be ***imperceptible***.

5.51 Human health has the potential to be impacted by the construction process as a result of dust and other air pollutants even on a short-term perspective. This is outlined in more detail within Chapter: 10: Air Quality and Chapter 11: Climate.

5.52 The application of limits on noise and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. In addition, due to the distance between the site and the nearest sensitive locations, vibration impacts generated during construction are expected to be negligible. Therefore, the noise and vibration impact of the construction phase of the Proposed Development is likely to be ***temporary to short-term*** and ***slightly negative*** with respect to human health because of the temporary short-term of such impacts during the construction phase.

Operational phase

5.53 The nature of the proposed land use will facilitate the creation of a more intensive use of these lands that are currently primarily greenfield. The Proposed Development will not result in a decrease in the permanent population of the area.

5.54 The Proposed Development (post-construction) will help to sustain c. 100 jobs that will be spread across the three shift operating times of the development with the majority working during the two day shifts of the data centre's office space and ancillary elements.

5.55 It is estimated that c. 100 people will be employed on 3 shifts (with an estimated attendee level of 80 during the two day shifts and 20 during the night shift (12am – 8am); with other support staff coming in now and again as necessary. Some of the staff may move into the local area to be closer to their place of employment and therefore increasing the demand for housing within the wider local area. The facility will also attract a significant level of additional support services and therefore employers and employees into the area. In this regard, the development has the potential to generate some local employment through support services.

5.56 Mitigation design measures will ensure that the Proposed Development has been designed to the highest standard with safety as a key priority so there will be little risk of fires or other related events that may impact upon human health.

5.57 There are a range of local amenities in the area that include the Newcastle Golf Centre, Grange Castle Golf Course as well as other golfing facilities. The Grand Canal Way that is used for boating, fishing and walking as well as being an important ecological resource and habitat is immediately adjoining the wider site to the north.

5.58 The Proposed Development has the potential to have a long-term and negative impact on the amenity of the residential dwellings adjoining the subject site as well as the amenity of the Grand Canal. The increased planting and the separation distances to existing adjoining residential dwellings and green infrastructure, particularly to the north of the site, as well as noise attenuation and overall master planning of the site, will ensure that the development will not be detrimental to human health.

5.59 The 2014 EIA Directive, 2018 EIA Regulations and associated EPA EIA Report Guidelines 2022 require that the vulnerability of the project to major accidents and/or natural disasters (such as earthquakes, landslides, flooding, sea level rise etc.) is considered in the EIA Report. The site has been assessed in relation to the following external natural disasters; landslides, seismic activity, volcanic activity and sea level rise/flooding as outlined below. The potential for major accidents to occur at the facility has also been considered with reference to Seveso/Control of Major Accident Hazards (COMAH) Regulations. There is a negligible risk of landslides occurring at the site 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 site. There are no active volcanoes in Ireland so there is no risk of volcanic activity.

5.60 The potential risk of flooding on the site was also assessed. A Stage 1 Flood Risk Assessment was carried out and it was concluded that the development is not at risk of flooding. Furthermore, the Proposed Development design has adequate attenuation etc. to ensure there is no potential impact on flood risk for other neighbouring properties, nor is the site at risk from sea level rise.

5.61 The Proposed Development 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. There is a potential impact on the receiving environment as a result of minor accidents/leaks of fuel/oils during the construction and operational phases. However, the implementation of the mitigation measures set out in Chapter 7 (Land, Soils, Geology and Hydrogeology) and Chapter 8 (Hydrology) of the EIA Report will ensure the risk of a minor/accident is low and that the residual effect on the environment is imperceptible.

5.62 The Proposed Development will require additional electrical power supply in the short-term from the already permitted Power Plants and in the medium / long term from the national grid and the requirements for this supply have been detailed in Chapter 2 and Chapter 15 (Material Assets). The implementation of mitigation measures outlined in Chapter 15, and compliance with current Eirgris

and CRU policy will ensure there will be no impact on power supply to local residential or business users.

5.63 As detailed in Chapter 9, noise modelling was undertaken to assess the impact of the Proposed Development with reference to noise limits typically applied by SDCC, ABP and the EPA. As demonstrated by the modelling results, the predicted noise emissions associated with the Proposed Development of the site during the operational phases are compliant with the adopted noise limit values which are based with due consideration of the effect on human health. Furthermore, any change in noise levels associated with additional vehicles at road junctions in the vicinity of the Proposed Development is expected to be imperceptible. In essence, the noise levels that are encountered at the nearest noise sensitive locations are predicted to be within relevant noise criteria that have been adopted here for the operation of the proposed data centre and associated infrastructure. These criteria have been selected with due consideration to human health, therefore, will not result in a significant impact on human health. The Proposed Development will not generate any perceptible levels of vibration during operation and therefore there will be no impact from vibrations on human health.

Remedial and mitigation measures

Construction phase

5.64 The Proposed Development does not have the potential to result in any significant negative impacts on population and community during the course of construction. Any perceived negative impacts on the immediate local population will be short-term and temporary in nature due to the worst case 1.5 year construction process for the Proposed Development. No remedial or reductive measures are therefore required beyond normal landscaping, noise and construction mitigation that are outlined elsewhere within this EIA Report and should form a condition of permission.

5.65 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.

5.66 Traffic mitigation measures proposed to reduce the impact of additional traffic movements to and from the development are set out under Chapter 12 of the EIA Report. Mitigation measures proposed to minimise the potential impacts on human health in terms of noise and vibration are discussed in Chapter 9 of the EIA Report.

5.67 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 ***short to medium term and imperceptible*** with respect to human health.

5.68 ***No adverse impacts*** relating to employment are predicted during the construction phase. Impacts on employment will be ***positive if only slight*** within the immediate local area. Therefore no remedial or reductive measures are considered necessary.

Operational phase

5.69 No remedial or mitigation measures are considered necessary, beyond the already perlandscaping proposed and detailed in Chapter 11 of this EIA Report; as well as Traffic, Air Quality and noise mitigation, as the Proposed Development will not give rise to any adverse impacts on population, and amenity nor human health during the operational phase of the Proposed Development. The development will result in the creation of a significant number of new jobs especially in service activities and creation of some local jobs. This is considered a ***slight permanent positive impact*** of the Proposed Development. No remedial or reductive measures are therefore required.

Residual impacts

Construction phase

5.70 The construction phase of the Proposed Development will result in the creation of a large construction site that will have a short-term and slight negative impact on the immediate local environment and the amenity of existing residents as a result of noise and disturbance during construction. The nearest residential properties at the north-eastern boundary and to the east and south-west of the subject site will have ongoing noise disturbance as a result of construction activity and traffic, in relation to the properties along the R120, throughout the construction process.

5.71 The construction phase of the development therefore is considered likely to have a ***slight*** but ***short term negative impact*** on the local community, human health and population.

5.72 The Proposed Development will not result in any material change to the permanent population of the area during the construction phase. There will be an increase in the temporary population of the area as a result of the employment of workers from outside the wider Dublin area that may need to reside in the immediate local area during the construction process. This will amount to only a small percentage of the workforce employed during the construction phases of the scheme but will result in some additional trade for local accommodation and services.

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

5.74 The total on-site construction phase of the development will be approximately 3.5 years. During the phased development of the construction of the proposed data centre facilities and Power Plant elements, it is expected that an average of 150 people will be employed during this main phase of construction. This is likely to benefit suitably qualified members of the local community, as well as others. The development will also support job creation in associated sectors such as building supply and local services.

5.75 Community facilities will be used more regularly as a result of the temporary working population resident in the local area. The construction phase therefore is predicted to have a ***slight short-term positive impact*** on the economy and employment of the area but a ***short-term slight negative impact*** on the local community and amenity of the area.

Operational phase

5.76 The operation of the proposed facility will be carried out in strict accordance with all Irish and European regulations governing safety in the work place with specific regard to the regulations implemented under the Safety, Health & Welfare at Work Act, 2005.

5.77 The Proposed Development will facilitate the creation of a more intensive use for the lands that are located to the west of the original Grange Castle Business Park, and to the north-east of the western expansion of the business park. The Proposed Development will upon completion sustain in the region of c.100 workers. Based on the social class profile of the local community, a small number of the local population in the hinterland of the Proposed Development site are predicted to benefit from the new employment, which will be created. This is a ***slight and long-term positive impact***. Some additional employment will also be created in support services including building maintenance, cleaning and catering services. The impact on the amenity of the Grand Canal is viewed as being neutral given the mitigation proposed.

Cumulative effects

5.78 As the permitted data centres and Power Plants have the potential to be built at the same time as the proposed data centres, the cumulative effect in terms of employment will be moderate, short-term but positive in nature. There is no significant cumulative effect associated with the Proposed Development, the permitted development and future cabling works, on human health.

5.79 The Proposed Development will create up to 100 jobs once in operation. These with other jobs being created by the permitted data centre developments already granted on site, as well as the permitted Power Plants, will have a ***slight, long-term positive*** impact on employment in the area.

5.80 As demonstrated by the noise modelling results presented in Chapter 9 - Noise and Vibration, the predicted cumulative noise emissions associated with the Proposed Development and Permitted Development during the operational phases are compliant with the adopted day and night time noise limit values that are set out in Chapter 9 – Noise and Vibration that have taken due consideration of the effect on human health.

5.81 Furthermore, any change in noise levels associated with additional vehicles during the Operational Phase at road junctions in the vicinity of the Proposed Development will be imperceptible due to the low level of traffic the Proposed Development in combination with other projects will generate. In essence, the noise levels that are encountered at the nearest noise sensitive locations will be within relevant noise criteria as set out in Chapter 9.

5.82 The cumulative effect of the Proposed Development; and the permitted development have been described in Chapter 10 - Air Quality and Chapter 11 - Climate. Air dispersion modelling was undertaken to assess the cumulative effect with reference to EU ambient air quality standards which are based on the protection of human health.

5.83 As demonstrated by the air dispersion modelling results, emissions from the Proposed Development; and the Permitted Developments as already granted on site, assuming scheduled testing as well as emergency operation of the diesel back-up generators and the more permanent gas based Power Plant generators as outlined in Chapter 10, will be compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant effect on human health.

5.84 There is no predicted significant cumulative effect on population and human health associated with the construction or operational phase of the Proposed Development when it is considered with the Permitted Developments already granted on site and future cabling works and other plans or projects, once appropriate mitigation measures as set out under this Chapter of the EIA Report are put in place for the development. As the Proposed Development will have a positive effect on the immediate hinterland and the Dublin Region resulting from increased employment and the associated economic and social benefits, it is concluded that once appropriate mitigation measures are put in place any cumulative effects on population and human health will be ***positive*** and ***long-term*** and ranging from ***imperceptible*** to ***slight***.

6. BIODIVERSITY

6.1 This Biodiversity Chapter for the Environmental Impact Assessment Report (EIAR) was authored by Scott Cawley Ltd. This chapter provides an assessment of the potential impacts of the proposed development on the local ecology. The site is located on a greenfield site just west of the existing EdgeConneX data centre site, Newcastle Road, in the townlands of Ballymakaily and Adamstown in west Co. Dublin (refer to Figure 6.1 for the location of the proposed development site). The proposed development consists of a data centre development, with associated landscaping, lighting and drainage. A detailed description of the proposed development is included in Chapter 2 of this EIAR.

6.2 The subject lands are located west of Dublin city, just south of the Grand Canal which flows eastwards along the northern margin of the larger EdgeConnex masterplan site. The lands comprise of unmanaged grassland, recolonising bare ground and hedgerows. The adjacent lands to the east, and wider environs of Dublin city and suburbs, are largely urban in nature consisting of residential and commercial areas to the north and east. The areas to the south and west, beyond existing commercial developments, are agricultural in nature.

6.3 The proposed data centre development will be built on unmanaged grassland, recolonising bare ground and hedgerow habitat. The location of the proposed development site in relation to the surrounding environment is presented below in Figure 6..

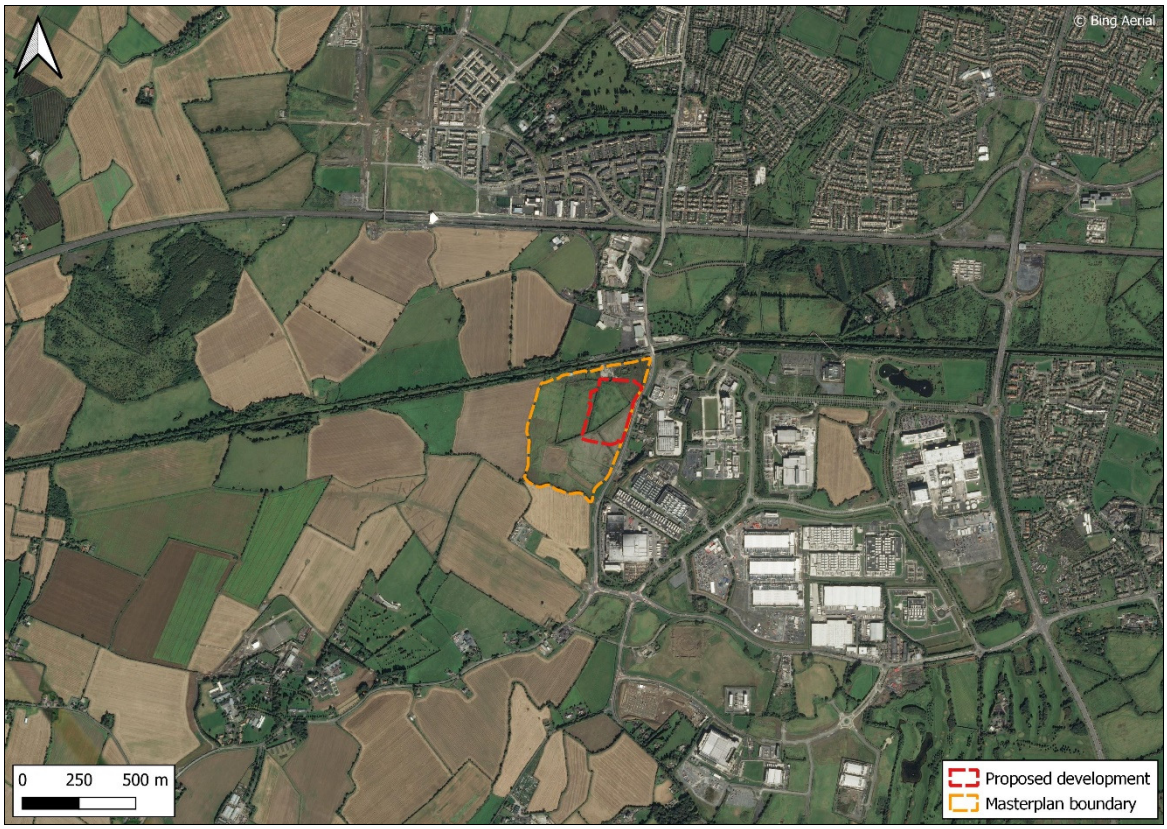

Figure 6.1 Proposed development site in the context of the surrounding environment.

Aims

6.4 The purpose of this chapter is to:

- Establish and evaluate the baseline ecological environment, as relevant to the Proposed Development
- Identify, describe, and assess all potentially significant ecological impacts associated with the Proposed Development
- Set out the mitigation measures required to address any potentially significant ecological impacts and ensure compliance with relevant nature conservation legislation
- Provide an assessment of the significance of any residual ecological impacts

- Identify any appropriate compensation, enhancement, or post-construction monitoring requirements

6.5 A separate standalone Appropriate Assessment (AA) screening (Scott Cawley Ltd., 2022) was prepared and was submitted as part of the original planning application documentation. An updated note on this screening accompanies this AI response. The AA Screening report contains information relevant to the competent authority's assessment of potential impacts that may arise from the Proposed Development on any European site.

Planning, Policy and Legislation

6.6 The collation of ecological baseline data and the preparation of this assessment has had regard to the following legislation and policy documents. This is not an exhaustive list but the most relevant legislative and policy basis for the purposes of preparing this biodiversity chapter. The following international legislation is relevant to the Proposed Development:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter, referred to as the 'Habitats Directive'. The Habitats Directive is the legislation under which the Natura 2000 network[1] was established and special areas of conservation (SACs) are designated for the protection of natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of that directive.
- Directive 2009/147/EEC; hereafter, referred to as the 'Birds Directive'. The Birds Directive is the legislation under which special protection areas are designated for the protection of endangered species of wild birds listed in Annex I of that directive.
- Directive 2000/60/EC; hereafter, referred to as the 'Water Framework Directive'. The Water Framework Directive is a piece of legislation adopted with the aim of attaining good ecological status in all water bodies (rivers, lakes, groundwater and transitional (estuarine) and coastal waters) that are of lesser status at present and retaining good status or better where such status exists at present, throughout the EU by 2015 or at the latest by 2027. As part of this aim, the legislation requires the establishment of two primary monitoring programmes for water bodies: the Surveillance Monitoring (SM) and the Operational Monitoring (OM) networks for surface waters and groundwater.

6.7 The following national legislation is relevant to the Proposed Development:

- Wildlife Acts 1976 to 2021; hereafter collectively referred to as the 'Wildlife Acts'. The Wildlife Acts are the principal pieces of legislation at national level for the protection of wildlife and for the control of activities that may harm wildlife. All bird species, 22 other animal species or groups of species, and 86 species of flora are protected under this legislation.
- Planning and Development Acts 2000 to 2021; hereafter collectively referred to as the 'Planning and Development Acts'. This piece of legislation is the basis for Irish planning. Under the legislation, development plans (usually implemented at local authority level) must include mandatory objectives for the conservation of natural heritage and for the conservation of European Sites. It also sets out the requirements in relation to environmental assessment with respect to planning matters, including transposition of the Habitats and Birds Directive into Irish law.
- European Communities (EC) (Birds and Natural Habitats) Regulations 2011 to 2021; hereafter the 'Birds and Habitats Regulations'. This legislation transposes the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the regulations).
- Flora (Protection) Order, 2022. This lists species of plant protected under Section 21 of the Wildlife Acts.

[1] The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special conservation areas are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special protection areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.
In Ireland these sites are designed as European sites - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

6.8 The following plans and policies are relevant to the Proposed Development:

- All-Ireland Pollinator Plan 2021-2025 (National Biodiversity Data Centre, 2021)
- South Dublin County Development Plan 2022-2028 (South Dublin County Council, 2022)
- National Biodiversity Action Plan 2017-2021 (Department of Culture Heritage and the Gaeltacht, 2017)
- Draft Biodiversity Action Plan for South Dublin County 2020-2026 (South Dublin County Council, 2020). This lists South Dublin County's objectives and actions in relation to biodiversity within the county boundary and how they align with those listed in National Biodiversity Action Plan 2017-2021 (National Parks and Wildlife Service (NPWS), 2017).

Methodology

Scope of the Assessment

6.9 The study area is defined by the Zone of Influence (ZoI) of the Proposed Development with respect to the ecological receptors that could potentially be affected. The ZoI, or distance over which potentially significant effects may occur, will differ across the Key Ecological Receptors (KERs), depending on the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken has established the habitats and species present within, and in the vicinity of, the Proposed Development site. The ZoI and study area was then informed and defined by the sensitivities of each of the KERs present, in conjunction with the nature and potential impacts associated with the Proposed Development.

6.10 The ZoI of habitat loss impacts is confined to within the Proposed Development boundary. The ZoI of potential impacts on surface water quality in the receiving environment extends downstream to freshwater, estuarine and coastal ecosystems associated with waterbodies that are hydrologically connected to the Proposed Development via the Pitchfordstown stream, which is located along the north-western boundary.

6.11 The ZoI of air quality effects related to dust deposition is likely to be located within and/or adjacent to the Proposed Development site boundary. The ZoI of general construction activities (*i.e.* risk of spreading/introducing non-native invasive species, dust deposition and disturbance due to increased noise, vibration, human presence and lighting) is not likely to extend more than several hundred metres from the Proposed Development.

Desk Study

6.12 A desk study was undertaken on the 27th June 2022, to collate any available information on the local ecological environment. The following resources assisted in the production of this report, in addition to those listed in the Reference section of this report:

- Data on European sites, Natural Heritage Areas (NHAs) or proposed Natural Heritage Areas (pNHAs) as held by the National Parks and Wildlife Service (NPWS) from https://www.npws.ie/protected-sites and https://www.npws.ie/maps-and-data – refer to Appendix 6.1 and Figure 6. and Figure 6. for descriptions and locations of protected sites in the vicinity of the Proposed Development
- Records of rare and protected species, as held by the National Biodiversity Data Centre www.biodiversityireland.ie within *c.* 2km of the Proposed Development site – refer to Appendix 6.2 for all desk study flora and fauna records
- Information on the conservation status of birds in Ireland from Birds of Conservation Concern in Ireland (Gilbert *et al.,* 2021)
- Publicly available information on inland feeding sites for light-bellied Brent geese in the Dublin area contained within Benson (2009), Scott Cawley (2017) and Enviroguide (2019).
- Spatial information relevant to the planning process including land zoning and planning applications from Department of Housing Planning, Community and Local Government web map portal. Available from https://myplan.ie/
- Ordnance Survey Ireland mapping and aerial photography from www.osi.ie;
- Data on waterbodies, available for download from the Environmental Protection Agency (EPA) web map service. Available from https://gis.epa.ie/EPAMaps/

- Information on soils, geology and hydrogeology in the area available from the Geological Survey Ireland (GSI) online Spatial Resources service. Available from https://www.gsi.ie/en-ie/data-and-maps/Pages/Groundwater.aspx;
- Information on local biodiversity policies and objectives within the *South Dublin County Development Plan 2022-2028* (South Dublin County Council, 2022);
- Information on the location, nature and design of the Proposed Development supplied by the applicant's design team;
- *Environmental Impact Assessment Report for EdgeConneX Ireland Ltd., Data Centre (Phase 4)*, Newcastle Road, Grange Castle (Marston Planning Consultancy, 2018);
- *Environmental Impact Assessment Report for DUB05 EdgeConnex Data Centre Development* (Marston Planning Consultancy, 2021);
- *AA Screening report for DUB06 EdgeConnex Data Centre Development, Ballymakaily, Co. Dublin* (Scott Cawley Ltd., 2022).

Consultation

6.13 A consultation letter was submitted by email to the Development Applications Unit (DAU) of the Department of Culture, Heritage and the Gaeltacht (DAU Ref: G Pre 00014/2021) on the 25th January 2021 in respect of DUB05 site which includes the current Proposed Development site. The letter included an outline description of the proposed development and a request for any comments on the proposal. No response was received by Scott Cawley Ltd. prior to submission of the planning application for the proposed development. In the absence of a response to the previous consultation, a second consultation letter was submitted to the DAU of the Department of Culture, Heritage and the Gaeltacht (DAU Ref: G Pre 00156/2022) on the 24th June 2022. No response was received by Scott Cawley Ltd. prior to submission of the planning application for the proposed development.

6.14 Inland Fisheries Ireland (IFI) were also contacted on the 25th January 2020 to request additional data on species which may use the Griffeen River and for any comments they may have on the proposal in respect of DUB05 site which includes the current Proposed Development. No response was received by Scott Cawley Ltd. prior to submission of the planning application for the Proposed Development.

Field Survey Methodology

6.15 Surveys for habitats, protected, rare and invasive flora, terrestrial mammals (including bats) and amphibians and reptiles, as well as ground-level assessments of trees and structures with respect to their suitability for roosting bats, as well as nesting birds, were undertaken on the 26th January 2021 by Alexis FitzGerald B.A. (Hons) MSc and Síofra Quigley BSc (Hons) MSc, and on the 10th June 2022 by Shane Brien BSc (Hons) MSc ACIEEM of Scott Cawley Ltd.

6.16 Breeding bird surveys were carried out during May and June 2022 and bat activity surveys during August and September 2019, and again during May and June 2022. A summary of all surveys undertaken on site is shown in Table 6. below.

Table 6.1 Summary of ecology field surveys undertaken on the site.

Survey Type	Date	Surveyors
Habitat and rare and invasive flora surveys	26th January 2021 / 10th June 2022	Alexis FitzGerald and Siofra Quigley / Shane Brien
Terrestrial fauna (excl. bats) surveys	26th January 2021 / 10th June 2022	Alexis FitzGerald and Siofra Quigley / Shane Brien
Breeding bird surveys	24th May 2022 / 10th June 2022	Lorna Gill / Shane Brien
Bat surveys		
Preliminary ground-level assessment	26th January 2021 / 10th June 2022	Alexis FitzGerald and Siofra Quigley / Shane Brien
Bat activity surveys	24th May 2022 (dusk survey) / 14th June 2022 (dawn survey)	Eoin Cussen and Sorcha Shanley / Shane Brien and Eamonn O'Brien

Habitats and Flora Survey

6.17 A habitat survey was undertaken at the Proposed Development site following the methodology described in *Best Practice Guidance for Habitat Survey and Mapping*[2]. All habitat types were classified using the *Guide to Habitats in Ireland*[3], recording the indicator species and abundance using the DAFOR scale[4] and recording any species of conservation interest. Vascular and bryophyte plant nomenclature generally follow that of the National Vegetation Database[5], having regard to more recent taxonomic changes to species names after the *New Flora of the British Isles*[6] and the British Bryological Society's *Mosses and Liverworts of Britain and Ireland: A Field Guide*[7].

Fauna Surveys

Terrestrial Mammals (Excluding Bats)

6.18 The presence and absence of terrestrial fauna species were surveyed through the detection of field signs such as tracks, markings, feeding signs, and droppings, as well as by direct observation. The habitats on site were assessed for signs of usage by protected and red-listed fauna species, and their potential to support these species. Surveys included checks for the presence of badger setts and/or otter holts within the subject lands, and to record any evidence of use.

Bats

6.19 A ground-level assessment of all trees and structures within the subject lands, to examine their suitability to support roosting bats and potential to act as important landscape features for commuting and foraging bats, was completed. The assessment of structures included external inspections, as well as internal inspections where it was deemed safe and the buildings were unoccupied, in line with general and Covid-19 safety guidelines. The assessment was based on guidelines (see Table 6.) in *Bat Surveys for Professional Ecologists: Good Practice Guidance*[8] and included inspections of trees and structures for potential roost features (PRFs), and for signs of bats (staining at roost entrances, droppings, carcasses, insect remains).

Table 6.2 Guidelines for assessing the potential suitability of Proposed Development sites for bats, based on the presence of habitat features within the landscape, applied according to professional judgement (Taken from Collins (2016)[11]).

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitats. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens.

[2] Smith, G.F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011) *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council Church Lane, Kilkenny, Ireland.
[3] Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny.
[4] The DAFOR scale is an ordinal or semi-quantitative scale for recording the relative abundance of plant species. The name DAFOR is an acronym for the abundance levels recorded: Dominant (D), Abundant (A), Frequent (F), Occasional (O) and Rare (R).
[5] Weekes, L.C. & FitzPatrick, Ú. (2010) *The National Vegetation Database: Guidelines and Standards for the Collection and Storage of Vegetation Data in Irelan*d. Version 1.0. Irish Wildlife Manuals, No. 49. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
[6] Stace, C. (2019) *New Flora of the British Isles*. 4th Edition. C&M Floristics.
[7] Atherton, I., Bosanquet, S. & Lawley, M. (2010) *Mosses and Liverworts of Britain and Ireland: A Field Guide*. Latimer Trend & Co., Plymouth.

Suitability	Description Roosting habitats	Commuting and foraging habitats
	roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.

6.20 Two separate bat activity surveys were undertaken within the lands by surveyors who are experienced in bat transect surveys. The surveys were designed with reference to methodologies in *Bat Surveys for Professional Ecologists: Good Practice Guidelines*[8]. For the bat roost presence/absence survey of the two, surveyors were posted at vantage points around the two buildings located north of the proposed development. The dusk emergence survey commenced 15 minutes before sunset and finished approximately one and a half hours after sunset. The dawn re-entry survey commenced one and a half hours before sunrise and finished 15 minutes after sunrise. The bat roost presence/absence surveys were followed (at dusk) or preceded (at dawn) by a walked bat activity transect which covered the entire proposed development site in order to record any foraging and/or commuting bats. Bat calls were recorded using a handheld bat detector (Elekon Batlogger-M). Recordings collected in the field were analysed using specialist sound analysis software (Elekon BatExplorer) to aid in the identification of bat species by their calls, (where this was possible), using professional judgement and with reference to *British Bat Calls: A Guide to Species Identification*[9]. Recordings which exhibited characteristics of both common pipistrelle bat *Pipistrellus pipistrellus* and soprano pipistrelle bat *Pipistrellus pygmaeus*, were not assigned to species level, and instead were assigned as unknown pipistrelle bat species *Pipistrellus* sp. Details of bat surveys are presented in Table 6. below.

Table 6.3 Details of bat surveys undertaken within the Proposed Development site.

Date	Survey Time (Sunset/Sunrise)	Survey Conditions
24/05/2022	21:18-23:30 (21:33)	Mild, partially overcast weather with temperatures around 13℃. Gentle breeze. No rain.
14/06/2022	03:15—05:10 (04:57)	Mild, overcast weather with temperatures around 13℃. No wind or rain.

Amphibians and Reptiles

6.21 An assessment of habitat suitability for amphibians and reptiles was completed. Suitable habitat for amphibians, such as ponds and wet ditches, and for reptiles, such as stone walls, rocks or logs suitable for basking, were recorded and mapped, as well as any direct observations of individuals.

Breeding Bird

6.22 The breeding bird surveys were undertaken using a methodology adapted from the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species*[10]. The study area covered the lands within the red line boundary and a buffer of 50m. Lands within the study area were slowly walked in a manner allowing the surveyor to come within 50m of all habitat features. Birds were identified by

[8] Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.
[9] Russ, J. (2012) *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter, United Kingdom. ISBN 978-1-907807-25-1.
[10] Gilbert, G., Gibbons, D.W. & Evans, J. (1998) *Bird Monitoring Methods - A Manual of Techniques for Key UK Species*. RSPB: Sandy.

sight and song, and general location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes. The survey details are provided in Table 6.4.

Table 6.4 Details of breeding bird surveys undertaken within the Proposed Development site.

Date	Survey Time	Survey Conditions
24/05/2022	06:15-08:40	Mild, partially overcast weather with temperatures around 10°C. Gentle breeze. No rain.
10/06/2022	06:00-07:00	Mild, clear weather with temperatures around 14°C. Moderate breeze. No rain.

Ecological Evaluation and Impact Assessment

Ecological Evaluation

6.23 Ecological receptors (including identified sites of ecological importance) are valued with regard to the ecological valuation examples set out in *Guidelines for Assessment of Ecological Impacts of National Roads Schemes: Revision 2*[11] and the guidance provided in *Guidelines for Ecological Impact Assessment in the UK and Ireland* [12] – refer to Appendix 6.3 for examples of how ecological importance is assigned. In accordance with these guidelines, important ecological features within what is referred to as the Zone of Influence (ZoI) of the Proposed Development which are "both of sufficient value to be material in decision making and likely to be affected significantly" are deemed to be 'Key Ecological Receptors' (KERs). These are the ecological receptors which may be subject to significant effects from the Proposed Development, either directly or indirectly. KERs are those biodiversity receptors with an ecological value of local importance (higher value) or greater.

Impact Assessment

6.24 Ecological impact assessment is conducted following a standard source-pathway-receptor model, where, in order for an impact to be established all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potentially significant effect would not occur.

- Source(s) – e.g. pollutant run-off from proposed works
- Pathway(s) – e.g. groundwater connecting to nearby qualifying wetland habitats
- Receptor(s) – e.g. wetland habitats and the fauna and flora species they support

Characterising and Describing the Impacts

6.25 The parameters considered in characterising and describing the potential impacts of the Proposed Development are per the EPA's *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*[13] and CIEEM's *Guidelines for Ecological Impact Assessment in the UK and Ireland*: whether the effect is positive, neutral or negative; the significance of the effects; the extent and context of the effect; the probability, duration and frequency of effects; and cumulative effects.

6.26 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. The following development types are included in considering cumulative effects:

- Existing projects (under construction or operational)
- Projects which have been granted consent but not yet started
- Projects for which consent has been applied for which are awaiting a decision, including those under appeal
- Projects proposed at a plan level, if relevant (e.g. future strategic infrastructure such as roads or greenways)

[11] NRA (2009) *Guidelines for Assessment of Ecological Impacts of National Roads Schemes: Revision 2*. National Roads Authority.
[12] CIEEM (2022) *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Version 1.2. Updated April 2022. Chartered Institute of Ecology and Environmental Management, Winchester, UK.
[13] Environmental Protection Agency. (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports*. April 2022. (refer to Table 3.3)

6.27 The likelihood of an impact occurring, and the predicted effects, is an important consideration in characterising impacts. In some cases, it may not be possible to definitively conclude that an impact will not occur. In these cases, the evaluation of significant effects is based on the best available scientific evidence but where reasonable doubt remains, then the precautionary principle is applied, and it may need to be assumed that significant effects may occur. Professional judgement is used in considering the contribution of all relevant criteria in determining the overall magnitude of an impact.

Significant Effects

6.28 In determining whether potential impacts will result in significant effects, the CIEEM guidelines were followed. The approach considers that significant effects will occur when there are impacts on either:

- the structure and function (or integrity) of defined sites, habitats or ecosystems; or
- the conservation status of habitats and species (including extent, abundance and distribution).

Integrity

6.29 The term "*integrity*" may be regarded as the coherence of ecological structure and function, across the entirety of a site that enables it to sustain all of the biodiversity or ecological resources for which it has been valued (National Roads Authority (NRA), 2009).

6.30 The term "*integrity*" is most often used when determining impact significance in relation to designated areas for nature conservation (*e.g.* Special Areas of Conservation (SACs)s, Special Protection Areas (SPAs) or proposed Natural Heritage Areas (pNHAs) / Natural Heritage Areas (NHAs)) but can also be the most appropriate method to use for non-designated areas of biodiversity value where the component habitats and/or species exist with a defined ecosystem at a given geographic scale.

6.31 An impact on the integrity of an ecological site or ecosystem is considered to be significant if it moves the condition of the ecosystem away from a favourable condition: removing or changing the processes that support the sites' habitats and/or species; affect the nature, extent, structure and functioning of component habitats; and/or, affect the population size and viability of component species.

Conservation Status

6.32 Similar definitions for conservation status given in the EU Habitats Directive 92/43/EEC, in relation to habitats and species, are also used in the CIEEM (2022) and NRA (2009) guidance which are summarised as follows:

- For natural habitats, conservation status means the sum of the influences acting on the natural habitat and its typical species, that may affect its extent, structure and functions as well as its distribution, or the long-term survival of its typical species, at the appropriate geographical scale; and
- For species, conservation status means the sum of influences acting on the species concerned that may affect the abundance of its populations, as well as its distribution, at the appropriate geographical scale.

6.33 An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status, having regard to the definitions of favourable conservation status provided in the EU Habitats Directive 92/43/EEC – *i.e.* into the future, the range, area and quality of habitats are likely to be maintained or increased and species populations are likely to be maintained or increased.

6.34 According to the CIEEM methodology (CIEEM, 2022), if it is determined that the integrity and/or conservation status of an ecological receptor will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (*i.e.* local, county, national, international). In some cases, an impact may not be significant at the geographic scale at which the ecological feature has been valued but may be significant at a lower geographical level. For example, a particular impact may not be considered likely to have a negative effect on the overall

conservation status of a species which is considered to be internationally important. However, an impact may occur at a local level on this internationally important species. In this case, the impact on an internationally important species is considered to be significant at only a local, rather than an international level.

Receiving environment

Designated Areas

European sites

6.35 Special Areas of Conservation (SACs) are designated under the EC Habitats Directive (92/43/EEC), which is transposed into Irish law through a variety of legislation including the Birds and Habitats Regulations and the Planning and Development Acts. The legislation enables the protection of certain habitats (listed on Annex I of the Directive) and/ or species (listed on Annex II). Special Protection Areas (SPAs) are designated under the Birds Directive (2009/147/EC). This allows for the protection of bird species on Annex I of the Directive, regularly occurring populations of migratory species (such as ducks, geese or waders), and important wetland habitats for birds.

6.36 The subject lands are not located within or adjacent to any European sites (see Figure 6.). The closest European site is the Rye Water Valley/Carton SAC (001398), located *c.*4.1km north-west. It is designated, for the priority Annex I habitat petrifying springs, and two Annex II snails, namely: Desmoulin's whorl snail *Vertigo moulinsiana* and narrow-mouthed whorl snail *Vertigo angustior*.

6.37 There are no major waterbodies within the Proposed Development site, however, a network of drainage ditches connects the site to the Lucan Stream to the west, and the Griffeen River to the east. The nearest waterbody to the Proposed Development site is the Ballymakaily Stream, *c.* 150m, east of the Proposed Development. It joins the Griffeen River, *c*. 330m, east from its origin. The Griffeen River (into which river the site primarily drains) flows *c*. 180m east of the Proposed Development and has the potential to hydrologically connect the Proposed Development site to European sites located downstream in Dublin Bay (see Figure 6.). As it flows north it is joined by the Adamstown stream, *c.* 1km downstream, the Laraghcon stream, *c.* 3.4km downstream, and the Moat stream, *c.* 3.5km downstream of the Proposed Development site, before it flows into the River Liffey, *c.* 4km downstream of the Proposed Development site. Kilmahuddrick stream, not shown on the EPA maps, starts at the southern edge of the Griffeen Valley Park, before joining the Griffeen River, *c*. 330m north-west of its starting point in the park. The Griffeen River and the adjoining streams all have a '*Good*' WFD status and are listed as '*At risk*' waterbodies by the EPA.

6.38 The River Liffey has a 'Moderate' WFD status, but changes to 'Good' WFD status before joining the Upper and Lower Liffey Estuary transitional waterbodies, *c.* 15.5km downstream and east of the proposed development site. Both of these waterbodies have a '*Good*' WFD status and are listed as being '*At risk*' by the EPA.

6.39 The Grand Canal is located *c*. 46m north of the Proposed Development boundary. It has a '*Good*' WFD status and is listed as being '*At Risk*' by the EPA. The Grand Canal joins the Lower Liffey Estuary c.16km downstream of the Proposed Development site, before flowing into Dublin Bay *c.*19km downstream from the Proposed Development site. Dublin Bay is considered to be '*Unpolluted*' with a '*Good*' WFD status and is considered to be '*Not at risk*'.

6.40 The Groundwater Body (GWB) underlying the site is the Dublin GWB, which is currently classified by the EPA as having '*Good Status*' and '*Not at risk'*. The Dublin GWB overlaps with only one European site that is designated for groundwater dependent terrestrial habitats and fauna species that are dependent on groundwater dependent terrestrial habitats, *i.e.* Rye Water Valley/Carton SAC, which is located *c.* 4.1km north-west of the Proposed Development site.

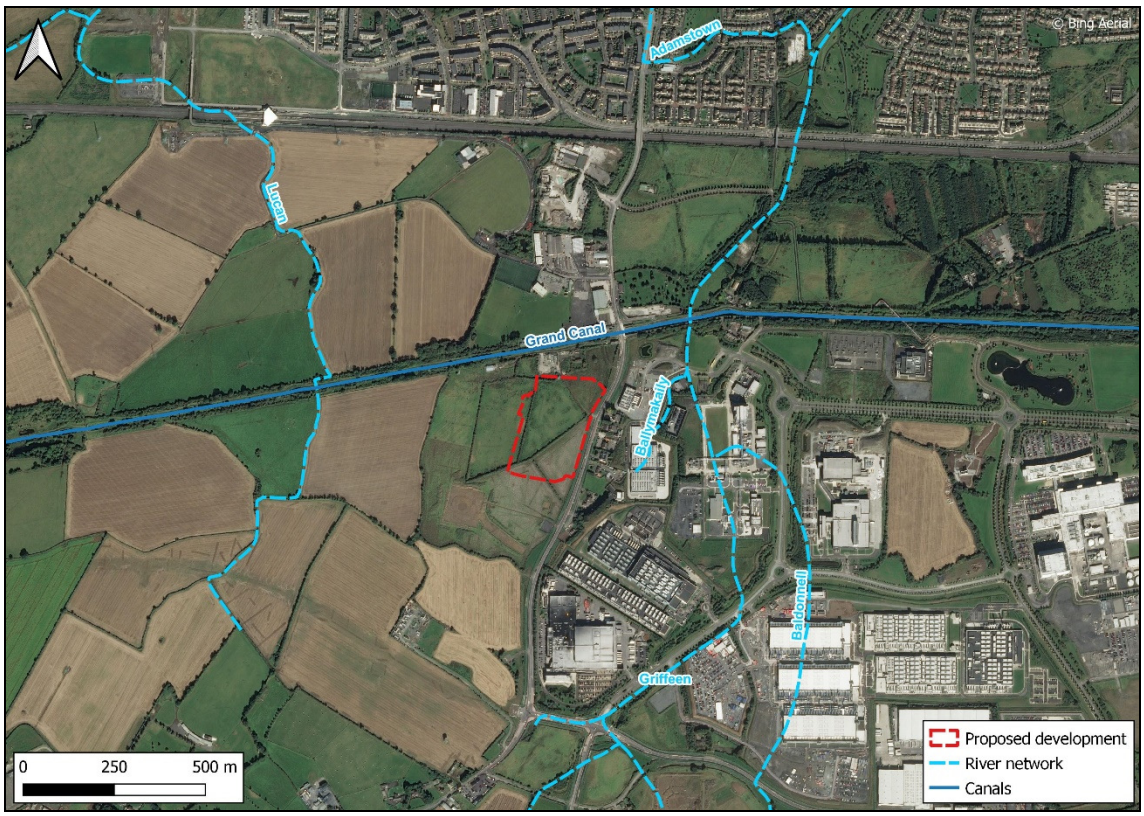

Figure 6.2 Waterbodies in the vicinity of the Proposed Development.

6.41 There are six SACs and three SPAs within the vicinity of the Proposed Development and /or downstream in Dublin Bay as follows (see Figure 6.):

- Rye Water Valley/Carton SAC (001398), located *c.*4.1km to the north-west, and designated for petrifying springs, Desmoulin's whorl snail and narrow-mouthed whorl snail.
- Glenasmole Valley SAC (001209), located *c.*9.8km to the south-east, and designated for grassland habitats and petrifying springs.
- Wicklow Mountains SAC (002122), located *c.*11.4km to the south, and designated for a range of freshwater and upland habitats and otter *Lutra lutra*.
- North Dublin Bay SAC (000206), which is *c.*18.8km east of the Proposed Development site and designated for a range of coastal habitats, and populations of petalwort *Petalophyllum ralfsii*.
- Red Bog, Kildare SAC (000397), located *c.*15km south of the Proposed Development site and designated for its transition mire and quaking bog habitat.
- North Bull Island SPA (004006), which is *c.*15.7km east of the Proposed Development site and designated for a range of wintering wetland bird species.
- Wicklow Mountains SPA (004040), which is *c.*14.6km to the southeast, and designated for merlin *Falco columbarius* and peregrine *Falco peregrinus*.
- South Dublin Bay SAC (000210), which is c.16.4km east of the Proposed Development site and designated for dune and tidal habitats.
- South Dublin Bay and River Tolka Estuary SPA (004024), which is c.16.4km east of the Proposed Development site and designated for a range of wintering wetland bird species.

6.42 Full lists of the Qualifying Interests (QI) and Special Conservation Interest (SCI) species of these European sites are presented in Appendix 6.1.

6.43 Based on the results of the desk study and the site walkover surveys, the subject lands contain very limited habitat for Qualifying Interest or Special Conservation Interest species for which any European sites have been designated. The Griffeen River, into which river the lands drain, may be potentially used by qualifying interest species, Atlantic salmon, otter and white-clawed crayfish, however the local populations of these three species are not QI populations of SACs as the Proposed Development site is not hydrologically connected to European sites designated for the species (*i.e.* the Griffeen River is not located within the same river sub-catchment that supports any SAC population of Atlantic salmon, otter and/or white-clawed crayfish).

6.44 The subject lands may be potentially used by SCIs as the Proposed Development is within the normal foraging range of some SCI species of North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA, as well as due to the mobile nature of SCI species. However this is unlikely due to lack of suitable foraging and/or roosting habitat. The SCI species lapwing *Vanellus vanellus* was recorded foraging adjacent to the Proposed Development during previous surveys in the area in 2018, however, the habitat that the species was using in 2018 (tilled land (BC3)) is now changed within the site to unmanaged dry meadows and grassy verges (GS2) and recolonising bare ground (ED3) habitats. Furthermore there is a considerable distance (*c.* 43.9km north) to the nearest European site designated for lapwing, namely the Boyne Estuary SPA, and therefore the local populations are not connected with any SPA populations as the Proposed Development is too distant from European sites designated for them.

6.45 With regard to SCI species of the North Bull Island SPA and the South Dublin Bay and River Tolka Estuary SPA, none have been recorded using the Proposed Development site for foraging and/or roosting. Indeed, the nearest recorded inland feeding site for light-bellied Brent geese *Branta bernicla hrota* is at Le Fanu Park, *c* .6.5km north-east of the Proposed Development, so the lands are significantly further inland than the farthest known inland feeding site for this species (Enviroguide Consulting, 2019). Furthermore, the habitats within the Proposed Development are deemed not suitable as an inland feeding habitat for light-bellied Brent goose, which utilise open grassland pitches and fields with a short sward height, as well as wetland habitats, as foraging and/or roosting habitat.

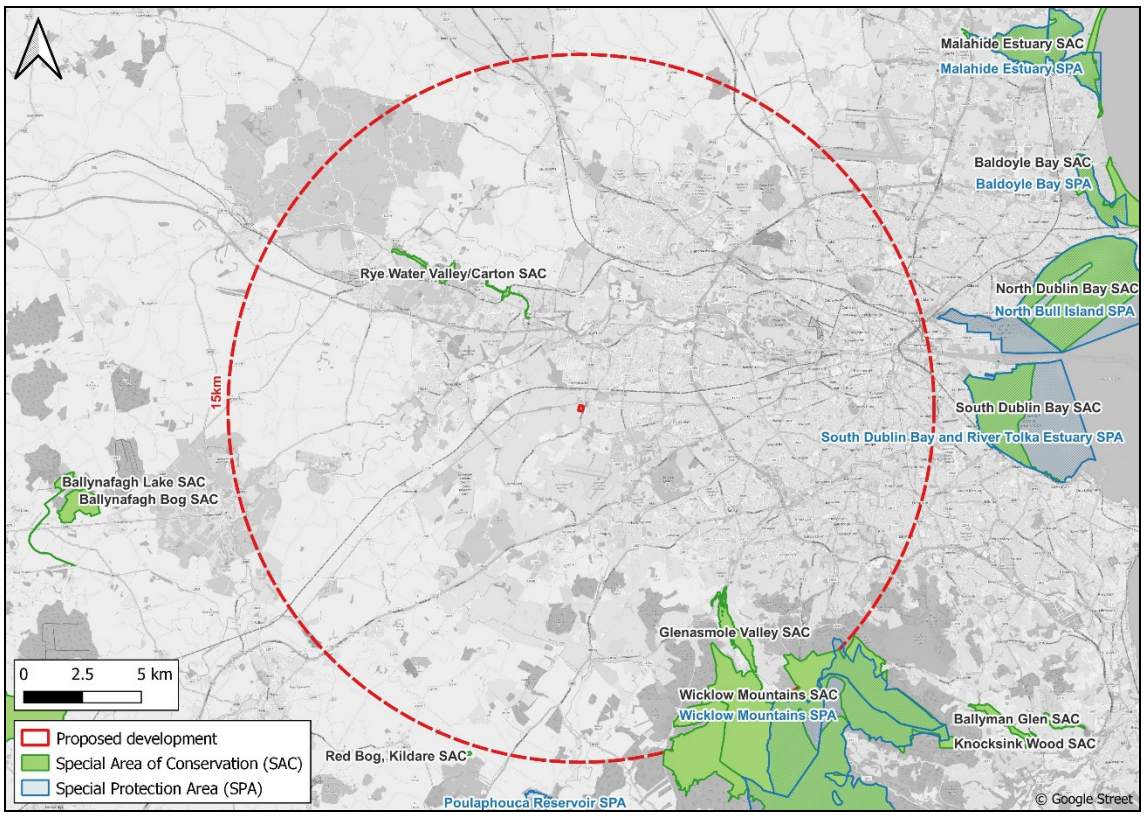

Figure 6.3 European sites in the vicinity of the Proposed Development site.

Nationally Designated Sites

6.46 Natural Heritage Areas (NHAs) are designations under the Wildlife Acts in order to protect habitats, species or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with European sites. Although many NHA designations are not yet fully in force under this legislation and are referred to as '*proposed NHAs*' or pNHAs, they are offered protection in the meantime under planning legislation which requires that planning authorities give recognition to their ecological value[14]. Proposed NHAs are offered protection under some county development plans, as is the case for the *South Dublin County Development Plan 2022-2028* through 'Policy NCBH4: Proposed Natural Heritage Areas - NCBH4 Objective 1' which sets an objective to "To ensure that any

[14] NPWS (2022). Natural Heritage Areas Webpage. Available online at www.npws.ie/protected-sites/nha. Accessed 27th June 2022.

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" (South Dublin County Council, 2022).

6.47 There are 13 nationally designated sites located within *c.* 15km of the Proposed Development, of which all are pNHAs (see Figure 6.4). The Proposed Development site does not overlap with any NHA or pNHA. The Proposed Development drains into the Griffeen River, which is not hydrologically connected to the Grand Canal. The Griffeen River runs culverted beneath the Grand Canal and flows northwards.

6.48 There are pNHAs hydrologically connected via surface water network to the Proposed Development which are located downstream in Dublin Bay, and are designated for similar reasons as their overlapping European sites.

6.49 The pNHAs within the vicinity of the Proposed Development are as follows:

- Grand Canal pNHA, located *c.* 46m north of the Proposed Development. The site has been designated for its habitats and biodiversity.
- Liffey Valley pNHA, located *c.* 2.8km north of the Proposed Development site. The site is designated for its diversity of habitat and for rare flora.
- Rye Water Valley/Carton pNHA, located *c.* 4.2km north-west of the Proposed Development site. There is no published information available for this designated site from the NPWS. It overlaps with the Rye Water Valley/Carton SAC and is likely to be designated for the same reasons, i.e. the priority Annex I habitat petrifying springs with tufa formation (*Cratoneurion*), and populations of the Annex II narrow-mouthed whorl snail and Desmoulin's whorl snail.
- Royal Canal pNHA, located *c.* 4.5km north of the Proposed Development site. The site is designated for its habitats and biodiversity.
- Lugmore Glen pNHA, located *c.* 7km south of the Proposed Development site. The site is designated for its wooded glen and woodland flora.
- Dodder Valley pNHA, located *c.* 8.8km south-east of the Proposed Development site. The site is designated for its riparian vegetation.
- Slade of Saggart and Crooksling Glen pNHA, located *c.*6.7km south of the Proposed Development site. The site is designated for its wooded river valley and wetland system.
- Glenasmole Valley pNHA, located *c.* 9.5km south-east of the Proposed Development. There is no published information available for this designated site from the NPWS. It overlaps with the Glenasmole Valley SAC and is likely to be designated for the same reasons, e.g. grassland habitats and petrifying springs.
- Kilteel Wood pNHA, located *c.* 10.8km south-west of the Proposed Development site. The site is designated for its deciduous woodland.
- Red Bog, Kildare pNHA, located *c.* 15km south of the Proposed Development site There is no published information available for this designated site from the NPWS. It overlaps with the Red Bog, Kildare SAC and is likely to be designated for the same reasons, e.g. transition mire and quaking bog habitat.
- North Dublin Bay pNHA, located *c.* 15km east of the Proposed Development site. There is no published information available for this designated site from the NPWS. It overlaps with the North Dublin Bay SAC and North Bull Island SPA and is likely to be designated for the same reasons, e.g. dune and tidal habitats and wintering bird populations.
- South Dublin Bay pNHA, located *c.* 16km east of the Proposed Development site. There is no published information available for this designated site from the NPWS. It overlaps with the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA and is likely to be designated for the same reasons, e.g. dune and tidal habitats and wintering bird populations.
- Booterstown Marsh pNHA, located *c.* 17.1km east of the Proposed Development site, which is designated for its tidal habitats, rare flora and wintering bird populations.
- Dolphins, Dublin Docks pNHA, located *c.* 17.2km east of the Proposed Development site. There is no published information available for this designated site from the NPWS. It overlaps with the South Dublin Bay and River Tolka Estuary SPA and is likely to be designated for the same reasons, i.e. primarily the Arctic and common tern populations it supports.

6.50 Further descriptions of the Features of Interest of the pNHA sites in the vicinity of the Proposed Development are presented in Appendix 6.1.

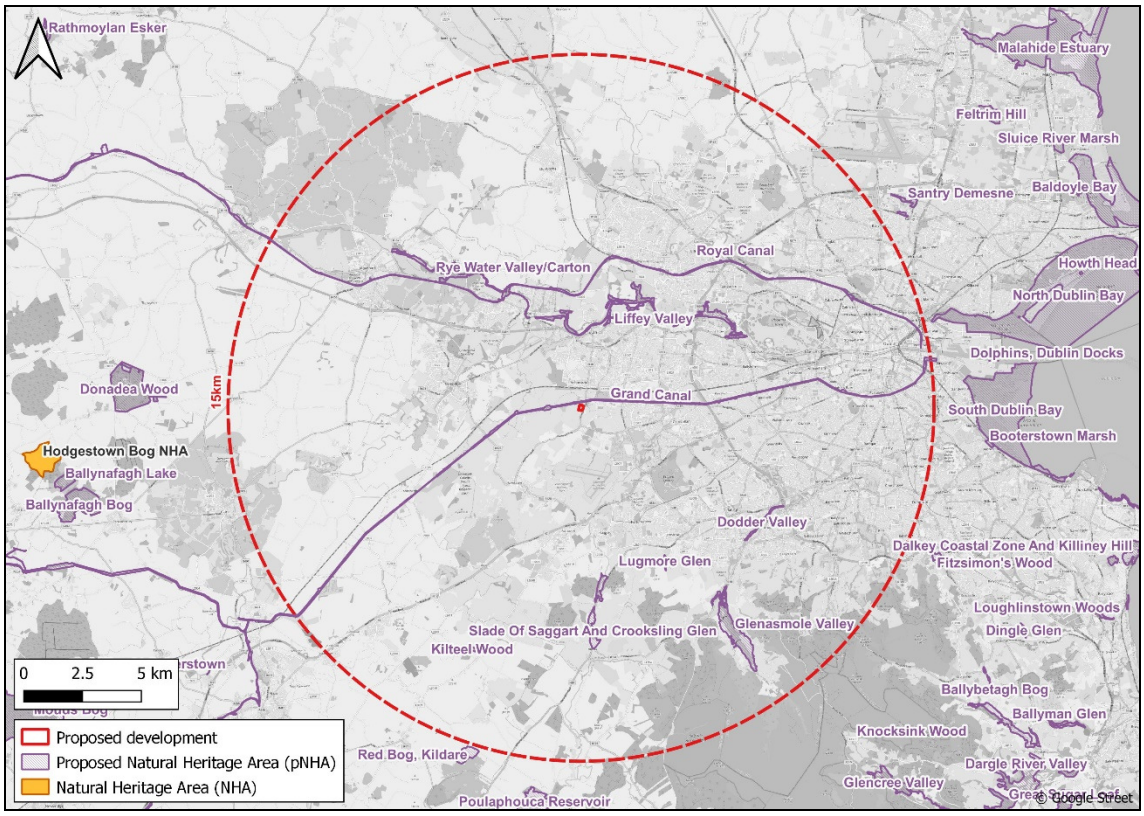

Figure 6.4 Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) within the vicinity of the Proposed Development site.

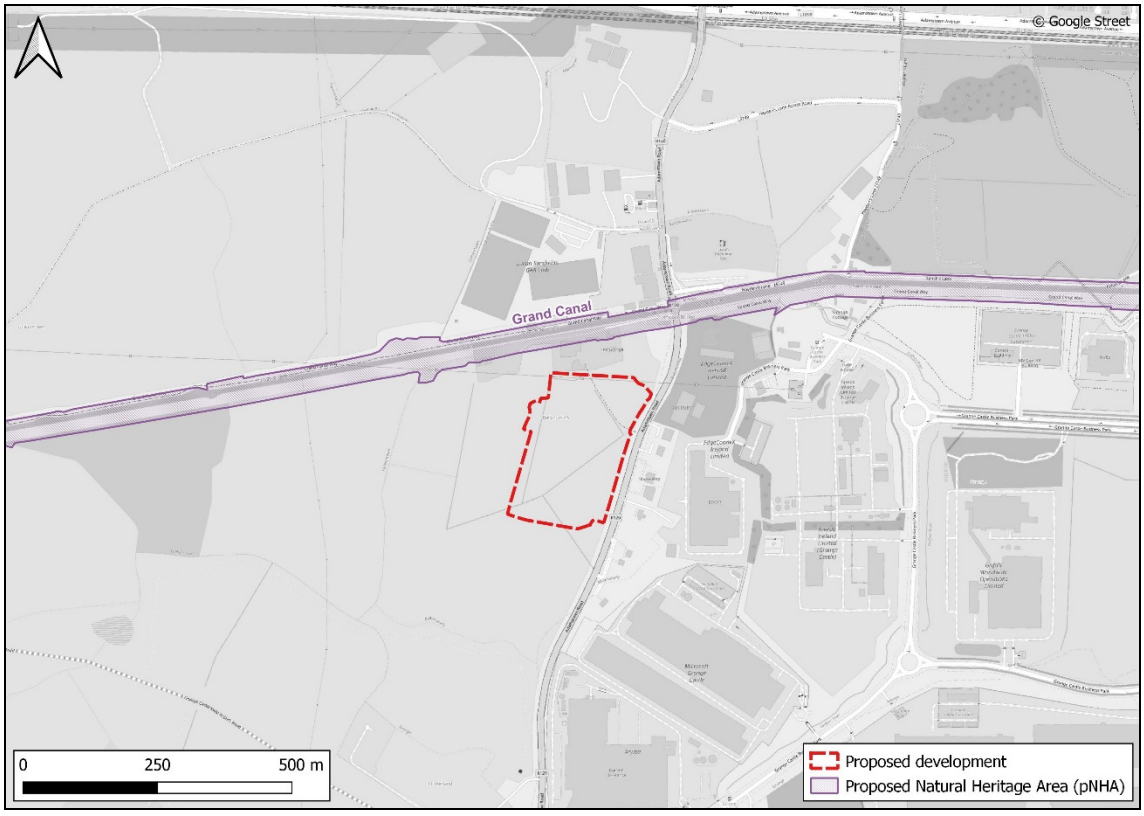

Figure 6.5 Location of the Proposed Development site in relation to the Grand Canal pNHA.

Habitats and Flora

Rare and Protected Flora

6.51 A search of the National Biodiversity Data Centre (NBDC) database for records of rare and/or protected species within *c.* 2km of the Proposed Development site returned no records of Red-listed species or Flora Protection Order vascular plant/bryophyte species. However, the NPWS database holds records for the Flora (Protection) Order, 2022, species *Betonica officinalis, Clinopodium acinos, , Galeopsis angustifolia, Hordeum secalinum, Hypericum hirsutum, Groenlandia densa, Scrophularia umbrosa, Viola hirta* within the same 10km grid square, O03, in which the Proposed Development is located in. No protected and/or rare flora were recorded within the Proposed Development site during the surveys. There is no suitable habitat for *G. densa* or *S. umbrosa* within the Proposed Development. *G. densa* is associated with shallow, clear, base-rich water of e.g. streams, canals and lakes, whereas *S. umbrosa* is generally associated with e.g. damp woodland or banks of streams or rivers. The remaining species can be found associated with for example grasslands (e.g. old pastures and meadows – *B. officinalis*, *C. acinos* and *H. secalinum*), arable land (*C. acinos* and *G. angustifolia*), and woodlands (*B. officinalis*, *H. hirsutum* and *V. hirta)*_(Streeter *et al*., 2009). Although suitable habitat for six of these rare and protected flora species exist within the Proposed Development site, none were recorded during the surveys carried out during their optimal flowering season in June 2022.

Non-native Invasive Flora

6.52 With regards to records for non-native invasive species within *c.* 2km of the Proposed Development, the NBDC database search returned records for the following non-native invasive flora: *Elodea nuttallii* and *Ribes nigrum*, the former being listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 as amended. Nuttall's waterweed *Elodea nuttallii* was recorded within the Grand Canal *c*. 1km west of the Proposed Development in 2020.

6.53 One stand of *Reynoutria japonica* was also recorded along Kishoge Road in Clonburris Strategic Development Zone (SDZ), *c.* 1.4km north-east of the Proposed Development (Stephen Little & Associates, 2020). Japanese knotweed *Reynoutria Japonica* is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).

6.54 No Third schedule, or other, non-native invasive species were recorded within the Proposed Development site during field surveys in 2022.

Habitats

6.55 The lands contain a range of habitats which are typical to the surrounding landscape (see Figure 6.). A full list of species recorded within each habitat is included in Appendix 6.4.

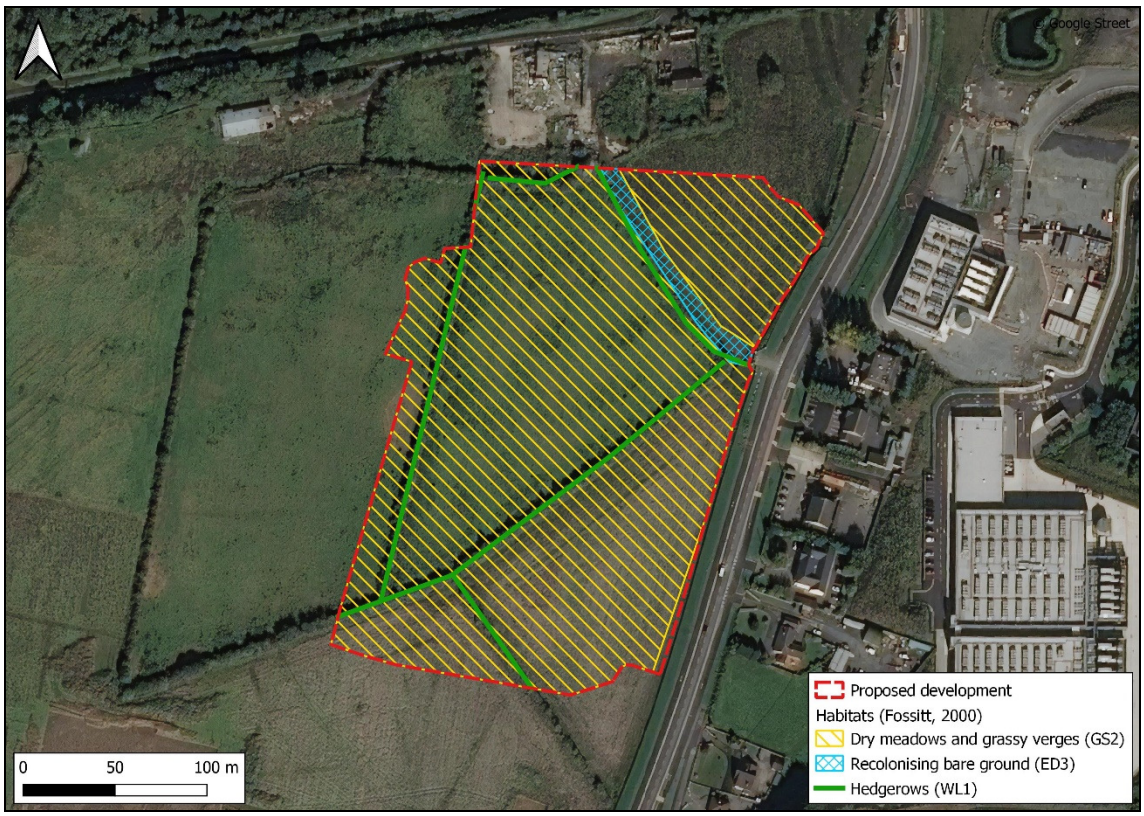

Figure 6.6 Habitats recorded within the Proposed Development site boundary.

Dry meadows and grassy verges (GS2)

6.56 Dry meadow and grassy verges (GS2) habitat type is the most common habitat within the Proposed Development site totalling at c. 5ha (see Figure 6.). Typical grass species in this unmanaged habitat within the site include abundant *Arrhenatherum elatius* and *Dactylis glomerata,* along with *Agrostis stolonifera.* The broadleaved community comprises of species such as *Plantago lanceolata*, *Ranunculus repens*, *Rumex obtusifolius* and *Vicia sepium.*

6.57 This habitat is considered to be of local importance (lower value) due to its relatively low species diversity deriving from its varied origins and considering it does not correspond with the Annex I habitat 'semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometea*) (6210)' by virtue of its regular management or species composition.

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Figure 6.7 Dry meadow and grassy verges (GS2) grassland, with hedgerows (WL1) in the background.

Recolonising bare ground (ED3)

6.58 A small area (c. 0.12ha) of recolonising bare ground (ED3) can be found in the north-eastern corner of the Proposed Development site. Species recorded include species that typically occur in disturbed open ground such as *Holcus lanatus*, *Sisymbrium officinale*, *Sonchus arvensis*. *Trifolium dubium* and *T. pratense*.

6.59 This habitat is considered to be of local importance (lower value) due to its relatively low species diversity and anthropogenic origin., although over time and if undeveloped/unmanaged, the diversity of the flora might increase.

Hedgerows (WL1)

6.60 Hedgerows (WL1) comprise many of the field boundaries within or on the boundary the Proposed Development site and are c. 730m length in total (see Figure 6.). Hedgerow height ranges from *c.* 2.5m to 5m in height and *c.* 2m to 4m in width. Common hedgerow species recorded were *Crataegus monogyna, Hedera helix, Rubus fruticosus* agg., *Sambucus nigra* and *Prunus spinosa*, with *Rosa canina* agg. occurring occasionally. The understory is typical of hedgerow habitat and included *Brachypodium sylvaticum, Galium aparine* and *Vicia sativa* (see Plate 6.3).

6.61 This habitat is considered to be of local importance (higher value) due to that fact that it forms part of the wider linear network through the local landscape.

Fauna

Badger

6.62 Badger *Meles meles*, and their breeding and resting places, are protected under the Wildlife Acts. Due to their stable Irish populations, they are considered to be of "Least concern" in terms of conservation (Nelson *et al.*, 2019). The NBDC data search returned no records for badger within *c.* 2km of the site, however the NPWS database search included six records for badger within the same 10km grid square, O03, in which the Proposed Development site is located in. The most recent and closest high resolution NPWS record (dated 1992) is located *c.* 2.5km south-west of the Proposed Development site at Peamount, Newcastle. Desk study records also include records of a disused badger sett which was identified north-east of the Proposed Development, in the south-western end of Kischoge Road near the Clonburris Strategic Development Zone (Scott Cawley Ltd., 2020). This subsidiary or outlying sett of three holes had no recent signs of use, e.g. spoil heaps outside entrances, snuffle holes, tracks or latrines nearby.

6.63 No badger setts or signs of badger activity were recorded within the Proposed Development site, however the habitats found within the Proposed Development site provide suitable foraging and commuting habitat for badgers.

6.64 The subject lands are considered to be of local importance (higher value) for badgers, as there is suitable habitat within the Proposed Development site and the wider environs which is likely to support local badger populations. However, the absence of recent signs of badger may indicate that the surroundings are unlikely to support significant badger populations.

Otter

6.65 Otter *Lutra lutra*, and their breeding and resting places, are protected under the Wildlife Acts. Otter are also listed on Annex II and Annex IV of the EU Habitats Directive and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended). They are listed as of "Least concern" in terms of conservation (Nelson *et al.*, 2019). The NBDC database search returned one record for otter within *c.* 2km of the Proposed Development. This record is located *c.* 215m north-east along the Grand Canal and is from the 1980's. The NPWS database holds five records for otter within the same 10km grid square, O03, in which the proposed development is located in. The most recent and closest NPWS record for otter (dated 1982) is from *c.* 2.2km west of the Proposed Development site, by the Grand Canal.

6.66 There were no signs of otter present within the Proposed Development. The most recent observation of otter by Scott Cawley ecologists along the Grand Canal and near the Proposed Development is

from the 1st February 2021. They have also previously observed otter in the Baldonnell stream that lies upstream of the Griffeen, and are aware that artificial otter holts were installed along the Griffeen River when it was realigned as part of the Grangecastle area development (L. Higgins, pers. comm. 1st February 2021). Otters are also known to use the River Liffey and the Camac River (Macklin *et al.,* 2019) and have been recorded on the Grand Canal. Therefore, the usage of the site by otters that may be commuting through cannot be ruled out.

6.67 The Grand Canal and the Griffeen River, as well as the Camac River, are located in a separate sub-catchment to any European site designated for otter, and therefore local otter populations do not form part of any SAC populations. Due to the aforementioned facts and the presence of suitable habitat directly adjacent to the Proposed Development site, the otter populations upstream and downstream and along the canal are considered to be of county importance.

Small Mammals

6.68 Small mammals, hedgehog *Erinaceus europaeus*, Irish hare *Lepus timidus hibernicus*, Irish stoat *Mustela erminea hibernica*, pine marten *Martes martes*, pygmy shrew *Sorex minutus* and red squirrel *Sciurus vulgaris* are protected under the Wildlife Acts. All of these species are listed as of "Least concern" in terms of conservation (Nelson *et al.*, 2019). The NBDC database search returned one record for pine marten and pygmy shrew each *c.* 2km of the Proposed Development site. The record for pine marten is located *c.* 1km east of the Proposed Development at Grange Castle, from 2020, whereas the record for pygmy shrew is located *c.* 650m north-east within the Clonburris SDZ lands, from 2012.

6.69 No signs of protected mammal fauna were noted within the DUB06 lands. The grasslands and hedgerows within the study area offer suitable foraging and breeding habitat for hedgehogs, Irish hare, Irish stoat and pygmy shrews.

6.70 Considering there is suitable habitat for small mammals such as hedgehogs and pygmy shrews within the Proposed Development site, the local small mammal populations are considered to be of local importance (higher value).

Bats

6.71 Bats, and their breeding and resting places, are protected under the Wildlife Acts. All bat species are also listed on Annex IV of the EU Habitats Directive (with the lesser horseshoe bat also listed on Annex II) and are afforded strict protection under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations, 2011. All Irish bat species are listed as of "Least concern" in terms of conservation (Nelson *et al.*, 2019). The NBDC and the NPWS hold records for the following five bat species in the vicinity of the Proposed Development site:

- Brown long-eared *Plecotus auritus*, six records, with the most recent record located *c.* 150m east of the Proposed Development site from 2008;
- Common pipistrelle, 11 records, with the most recent record located *c.* 150m east of the Proposed Development site from 2008;
- Daubenton's bat *Myotis daubentonii*, 31 records, with the most recent record located along the Grand Canal at the north-eastern corner of the Proposed Development site from 2012; and,
- Leisler's bat *Nyctalus leisleri*, 11 records, with the most recent record located *c.* 150m east of the Proposed Development site from 2008.

6.72 Based on the survey and assessment of the Proposed Development site, there are no buildings or trees with suitability for roosting bats within the Proposed Development site.

6.73 The habitat within the lands provides good commuting and foraging routes for bats using the wider environs, particularly near and along the Grand Canal, and its level of suitability is valued high as per the Bat Conservation Trust (BCT) guidelines (Collins, 2016). The hedgerows located along field boundaries form part of a wider ecological corridor network which connects the site to the surrounding area within the masterplan area and beyond. The lands within the Proposed Development are largely unlit with the exception of light spill originating from the adjacent main roads, and therefore are highly suitable for commuting and/or foraging bats.

6.74 During the bat activity surveys five bat species were recorded foraging and commuting within, or immediately adjacent to, the Proposed Development site: brown long-eared bat, common pipistrelle, Leisler's bat, *Myotis* species and soprano pipistrelle. The activity was mainly focused along the eastern hedgerows and the Grand Canal (see Figure 6.).

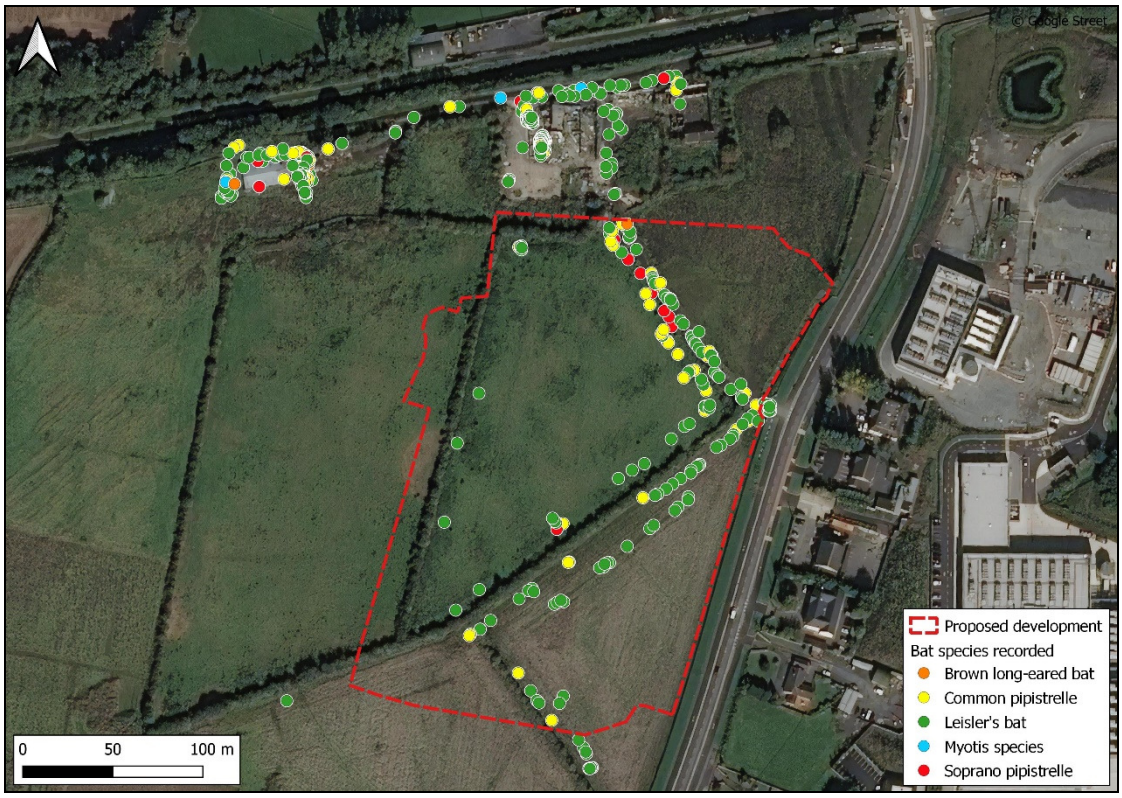


Figure 6.8 Location of bats observed within the study area during bat surveys.

6.75 No bats were seen emerging or re-entering the two buildings located to the north of (and outside) of the Proposed Development site along the Grand Canal. However all the species recorded during the activity surveys were also recorded in their vicinity during the bat roost presence/absence surveys.

6.76 The local bat populations using the Proposed Development site and the surroundings as foraging and commuting habitat are valued as being of local importance (higher value).

Birds

6.77 All wild birds, and their nests and eggs, are protected under the Wildlife Acts. Some bird species are also listed on Annex I of the EU Birds Directive. The NBDC database holds records for 11 bird species which are known to occur within c.2km of the Proposed Development site. Species listed under the Birds Directive or in the *Birds of Conservation Concern in Ireland 4: 2020-2026*[15] are presented in Table 4 in Appendix 6.2. The table also includes records for wintering birds from the Clonburris SDZ returned from the desk study.

Breeding birds

6.78 A range of common bird species were recorded on the Proposed Development site during the breeding bird surveys undertaken in May and June 2022 (see Figure 6.). These include blackbird *Turdus merula*, blackcap *Sylvia atricapilla*, blue tit *Cyanistes caeruleus*, chaffinch *Fringilla coelebs*, coal tit, dunnock *Prunella modularis*, goldfinch *Carduelis carduelis*, great tit *Parus major*, greenfinch *Chloris chloris*, hooded crow *Corvus cornix*, house sparrow *Passer domesticus*,, jackdaw *Corvus monedula*, linnet *Carduelis cannabina*, magpie *Pica pica,* mistle thrush *Turdus viscivorus*, pheasant *Phasianus colchicus*, reed bunting *Emberiza schoeniclus*, robin *Erithacus rubecula*, rook, skylark *Alauda arvensis*, song thrush *Turdus philomelos*, starling *Sturnus vulgaris*, common whitethroat *Sylvia communis*, willow warbler *Phylloscopus trochilus*, woodpigeon *Columba palumbus* and wren

[15] Gilbert, G., Stanbury, A. & Lewis, L. (2021) *Birds of Conservation Concern in Ireland 4: 2020-2026*. Irish Birds 43: 1-22 (2021).

Troglodytes troglodytes. In addition, herring gull *Larus argentatus*, kestrel *Falco tinnunculus*, lesser black-backed gull *Larus fuscus*, swallow *Hirundo rustica* and swift *Apus apus* were observed flying over the Proposed Development site.

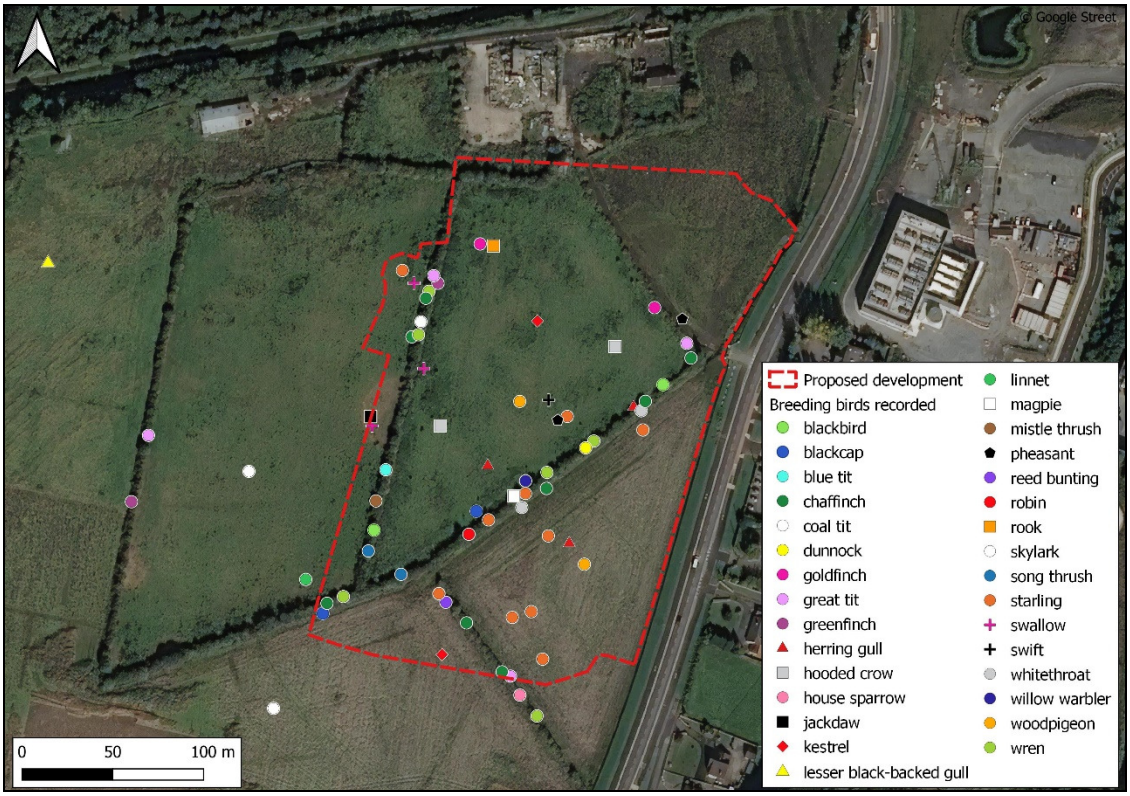


Figure 6.9 Location of birds observed within the study area during breeding bird surveys.

6.79 Many of these birds are considered common for the surrounding landscape. Of these species, nine (greenfinch, herring gull, house sparrow, lesser black-backed gull, linnet, skylark, starling, swallow and willow warbler) are Amber-listed and are therefore considered to be of Moderate Conservation Concern in Gilbert *et al*. (2021). Two of these species (kestrel and swift) are Red-listed and are considered to be of High Conservation Concern in Gilbert *et al*. (2021). The hedgerows recorded within the Proposed Development site provide suitable potential nesting habitat for greenfinch, house sparrow, linnet, starling and willow warbler. Skylark nest in grassland habitat, such as the GS2 grassland which occurs on site. There is no suitable nesting habitat for the gulls (coastal habitats or buildings[16]), kestrel (buildings, cliffs, trees[16]), or swallow and swift (buildings). Considering the presence of several bird species with potential territories within the Proposed Development site, it is likely to be used for breeding by various species. No nests were observed within the Proposed Development site, however, they are typically camouflaged and therefore well hidden.

6.80 Due to the aforementioned facts and the presence of suitable habitat within and directly adjacent to the Proposed Development site, the local breeding bird populations are considered to be of local importance (higher value).

Wintering birds

6.81 The desk study records from the NBDC included no records for wintering bird species within *c.* 2km of the Proposed Development site. However, Scott Cawley Ltd. ecologist recorded 11 wintering bird species within the Clonburris SDZ lands during winter 2020/21 (Scott Cawley Ltd., 2021). These records are present in Table 4 of Appendix 6.2. In addition to these records, previous surveys on the Proposed Development and lands immediately adjacent to it recorded lapwing *Vanellus vanellus* and snipe *Gallinago gallinago* in November 2018. A flock of *c.* 300 lapwing were recorded in the arable/stubble field (BC1) located south of the Proposed Development. This arable field habitat no longer occurs to the south of the Proposed Development site as all arable farming has been

[16] BTO (2011) *A Field Guide for Monitoring Nests*. British Trust for Ornithology.

abandoned here. Three individual snipes were flushed from arable fields (which no longer occur on site) during the field visit in November 2018.

6.82 Lapwing is an SCI species of any European site. The nearest European site for lapwing is the Boyne Estuary SPA, located *c.*43.9km north of the Proposed Development.

6.83 The Proposed Development is within the normal foraging range of *c.* 15-20km[17] of SCI species of North Bull Island SPA and South Dublin Bay and River Tolka Estuary SPA, however, it comprises of no suitable foraging habitat due to grasslands being unmanaged or grazed, and enclosed by hedgerows.

6.84 Although lapwing was recorded in the past during the other surveys, the arable field habitat which they were recorded using, no longer exists to the south of the site and has been entirely replaced by unmanaged grassland, since they were seen there in 2018. Furthermore, the habitats within and adjacent to the Proposed Development site are generally considered sub-optimal habitat, *i.e.* habitats were not open amenity grassland or wetlands, for wintering SCI waterfowl and waders. Lapwing generally prefer open pastureland and arable fields (i.e. tillage) which are largely now absent in the Proposed Development site, therefore making it sub-optimal for the species. Considering that the nearest designated site for lapwing is *c.* 39km north of the Proposed Development site, the local populations do not form part of SPA populations.

6.85 The wintering SCI bird populations are considered to be of local importance (higher value), however considering there is no suitable habitat for wintering SCI bird species, they are not considered to be a key ecological receptor. The habitats within the Proposed Development site offer suitable foraging habitat and shelter for smaller overwintering species such as passerines (e.g. redwing *Turdus iliacus*) and other wintering non-SCI bird species, and their wintering populations are assessed to be of local importance (higher value).

Amphibians and Reptiles

6.86 The Wildlife Acts provide protection to Ireland's only reptile species, common lizard*, Zootoca vivipara* and two amphibian species, common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris.* All of these species are listed as of "Least concern" in terms of conservation (Nelson *et al.*, 2019).

Common frog

6.87 The NBDC database holds no records for common frog within *c.* 2km of the Proposed Development, however, the NPWS database returned 54 records for the species within and the same 10km grid square, O03, in which the Proposed Development site is located. The species is widely distributed throughout the country and is associated with standing water.

6.88 There are no areas of standing water suitable for breeding common frog within the Proposed Development site. Although no individuals were observed during the surveys, their presence on site cannot be ruled out based on availability of suitable foraging and commuting habitat (grassland) within the subject lands and their wide distribution across the country.

6.89 Considering the presence of suitable foraging and commuting habitat for common frog in the Proposed Development site and its immediate vicinity and records of common frog in the area, the local common frog populations are valued to be of local importance (higher value).

Smooth newt

6.90 The NBDC database search returned three records and the NPWS database five records for smooth newt from within the same 10km grid square, O03, in which the Proposed Development site is located in. The most recent record is from 2018.

[17] Scottish Natural Heritage (2016). *Guidance: Assessing connectivity with Special Protection Areas (SPAs)*. Version 3

6.91 There is no suitable habitat (e.g. ponds) for smooth newt within the Proposed Development. No individuals were observed at the time of the survey, and it is considered unlikely that smooth newts are present within the Proposed Development site due to lack of suitable habitat. Smooth newts are typically associated with waterbodies of standing water such as permanent ponds which are absent from the site, although low lying ground associated with the Grand Canal for example could supply suitable territory.

6.92 Local smooth newt populations are of local importance (higher value), however, they are not considered to be a key ecological receptor due to lack of suitable habitat, provided that there will be no indirect off-site effects.

Common lizard

6.93 There are no records of common lizard located within *c.* 2km of the Proposed Development site in the NBDC database, however, the NPWS holds one record for the species within the same 10km grid square, O03, in which the Proposed Development site is located in, from 1970.

6.94 Although there are no suitable basking spots (e.g. rocks or logs) within the Proposed Development and no individuals were observed during the surveys, their presence on site cannot be ruled out based on availability of suitable foraging and commuting habitat within the subject lands and their wide distribution across the country. This species is widely distributed in Ireland and is found in a variety of habitats[18], including grassland, scrub and hedgerows, of which grassland and hedgerow habitats occur on site and in the wider environs.

6.95 Considering the presence of suitable foraging and commuting habitat for common lizard in the Proposed Development, the local common lizard populations are considered to be of local importance (higher value).

Fish

6.96 There are no records of fish species within *c.* 2km of the Proposed Development site on the NBDC database, however, the *Water Framework Directive Fish Stock Survey of Rivers in the Eastern River Basin District* (Kelly *et al*., 2012) contains records of four species (brown trout *Salmo trutta*, European eel *Anquilla anquilla*, roach *Rutilus rutilus* and three-spined stickleback *Gasterosteus aculeatus*) in the Griffeen River. According to Inland Fisheries Ireland (Scott Cawley Ltd., 2020), the Griffeen River also holds populations of Atlantic salmon *Salmo salar* and sea trout *Salmo trutta trutta*.

6.97 Of the above species, only two are of conservation concern: Atlantic salmon and European eel. These two species are listed as “Vulnerable” and “Critically Endangered”, respectively (Nelson *et al.,* 2019). In addition, Atlantic salmon is listed in Annex II and Annex V of the EU Habitats Directives. The nearest European site for Atlantic salmon is the River Boyne and River Blackwater SAC, *c.* 30.9km north-west of the proposed development

6.98 Fish are present in a wide range of waterbodies with varying water quality throughout Ireland. Considering that the waterbodies hydrologically connected to the Proposed Development site contain protected and/or rare fish species (i.e. Atlantic salmon and European eel) these fish populations are considered to be of county importance, whereas fish populations of species of no conservation concern (e.g. stickleback and roach) are valued as local importance (lower value).

Invertebrates

Freshwater white-clawed crayfish

6.99 Freshwater white-clawed crayfish *Austropotamobius pallipes* is protected under the Wildlife Acts andis also listed on Annex II and Annex V of the EU Habitats Directive. It is afforded strict protection under the Habitats Directive and the *European Communities (Birds and Natural Habitats) Regulations, 2011.* There are no records for freshwater white-clawed crayfish *c*. 2km of the Proposed Development site in the NBDC database.

[18] The Herpetological Society of Ireland (2020). *Common Lizard*. Available online at www.thehsi.org Accessed: 29 June 2022.

6.100 South Dublin County Council carried out a white-clawed crayfish survey in the Camac River in 2018 and found that the river holds good populations of the species (Scott Cawley Ltd, 2020). As the Camac River is connected to the Griffeen River via the River Liffey and holds good populations of white-clawed crayfish, Inland Fisheries Ireland have recommended to assume that the species is present within the Griffeen River as well (Scott Cawley Ltd., 2020).

6.101 The surveys carried out in the Griffeen River and the Grand Canal by Forest, Environmental Research and Services (FERS) Ltd. in 2018, did not record any white-clawed crayfish, although the species has been recorded in the Grand Canal in the past. However, the surveys did record three individual white-clawed crayfish in the Cappagh feeder stream, which is located to the north-east of the Proposed Development site.

6.102 There are no designated sites for freshwater white-clawed crayfish within the same river catchment as the Proposed Development. The nearest designated site for the species is the Lough Lene SAC, *c.* 60.8km north-west of the Proposed Development site. Freshwater white-clawed crayfish populations present in the Camac River, the Griffeen River, the Cappagh feeder stream, the Grand Canal or the River Liffey downstream are not connected to, or support, any SPA populations.

6.103 Freshwater white-clawed crayfish is found in rivers, streams and lakes, and considering that the Camac River supports their populations and that there is a hydrological link between the Camac River and the Griffeen River, it is possible that the species can be found in the Griffeen River also (into which the Proposed Development site drains). Although there is no suitable habitat for freshwater white-clawed crayfish within the Proposed Development site, suitable waterbodies which are connected to the Proposed Development site are found in the wider environs. Considering this, local freshwater white-clawed crayfish populations are considered to be of county importance.

Other Protected and/or Rare Invertebrates

6.104 The NBDC database search returned one record for iridescent pea mussel *Pisidium pulchellum* from within *c.* 2km of the Proposed Development. The record is located *c.* 500m north-east from along the Grand Canal and is from 2003. Iridescent pea mussel is listed as 'Endangered' on the *Red List No.2: Non-marine Molluscs* (Byrne *et al.*, 2009). There is no suitable habitat (calcareous lakes, drains, streams or canals[19]) for the species within the Proposed Development site.

6.105 The NBDC database did not return records for any other protected and/or rare terrestrial and/or aquatic invertebrates, such as bare-saddled colletes bee *Colletes similis*, marsh fritillary *Euphydryas aurinia*, moss beetle *Ochthebius bicolon* and moss chrysalis snail *Pupilla muscorum*, however invertebrates are a less frequently recorded group due to their small size and specialism required in their identification. There is suitable habitat for a variety of invertebrate species within the Proposed Development, as well as in the downstream habitats in the Griffeen River and beyond. Considering this, the local invertebrate populations are valued to be of local importance (higher value).

Non-native Invasive Fauna

6.106 With regards to records for non-native invasive fauna within *c.* 2km of the Proposed Development, the NBDC database search returned no records for species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011.

6.107 No Third Schedule non-native invasive fauna were recorded within the site during the surveys.

Summary of Ecological Evaluation

6.108 Table 6. and Table 6. below summarises the ecological evaluation of all receptors taking into consideration legal protection, conservation status and local abundance, and identifies the Key Ecological Receptors (KERs). Species, habitats and features not qualifying as KERs are not subjected to impact assessment in line with current best practice of assessing the impacts on what are determined to be important ecological or biodiversity features: CIEEM and TII guidelines (CIEEM, 2022 and National Roads Authority, 2009).

[19] Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) *Ireland Red List No. 2 – Non-marine Molluscs.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Table 6.5 Summary of the ecological evaluation of designated sites.

Ecological Receptor	Ecological Valuation	KER?
Designated Sites		
North Bull Island SPA	International	**Yes**
South Dublin Bay SAC	International	**Yes**
South Dublin Bay and River Tolka Estuary SPA	International	**Yes**
North Dublin Bay SAC	International	**Yes**
All other European sites	International	No
Grand Canal pNHA	National	**Yes**
Dolphins, Dublin Docks pNHA	National	**Yes**
South Dublin Bay pNHA	National	**Yes**
Booterstown Marsh pNHA	National	**Yes**
North Dublin Bay pNHA	National	**Yes**
All other nationally designated sites	National	No

Table 6.6 Summary of the ecological evaluation of habitats and fauna.

Ecological Receptor	Ecological Valuation	KER?
Habitats		
Dry meadows and grassy verges (GS2)	Local importance (lower value)	No
Recolonising bare ground (ED3)	Local importance (lower value)	No
Hedgerows (WL1)	Local importance (higher value)	**Yes**
Fauna Species		
Badger	Local importance (higher value)	**Yes**
Otter	County importance	**Yes**
Small mammals	Local importance (higher value)	**Yes**
Bats	Local importance (higher value)	**Yes**
Breeding birds	Local importance (higher value)	**Yes**
Wintering birds (SCI species)	Local importance (higher value)	No
Wintering birds (non-SCI species)	Local importance (higher value)	**Yes**
Common frog	Local importance (higher value)	**Yes**
Smooth newt	Local importance (higher value)	No
Common lizard	Local importance (higher value)	**Yes**
Fish (species of no conservation concern)	Local importance (lower value)	No
Fish (species of conservation concern)	County importance	**Yes**
Invertebrates - freshwater white-clawed crayfish	County importance	**Yes**
Other Protected and/or Rare Invertebrates	Local importance (higher value)	**Yes**

Characteristics of the Proposed Development

6.109 The proposed development is to be located to the west of Grange Castle Business Park, within the EdgeConneX development masterplan area. The site is located within the townland of Ballymakaily to the west of the Newcastle Road (R120), Lucan, Co. Dublin. The Grand Canal runs c. 46m to the north of the Proposed Development. A full detailed description of the Proposed Development is set out within Chapter 2 of the EIA Report.

6.110 The proposed development will consist of the construction of two no. adjoined single storey data centres with associated office and service areas with an overall gross floor area of 15,274sqm that will comprise of the following:

- Construction of 2 no. adjoined single storey data centres with a gross floor area of 12,859sqm that will include a single storey goods receiving area / store and single storey office area (2,415sqm) with PV panels above, located to the east of the data centres as well as associated water tower, sprinkler tank, pump house and other services;
- The data centres will also include plant at roof level; with 24 no. standby diesel generators with associated flues (each 25m high) that will be located within a generator yard to the west of the data centres;
- New internal access road and security gates to serve the proposed development that will provide access to 36 no. new car parking spaces (including 4 no. electric and 2 no. disabled spaces) and sheltered bicycle parking to serve the new data centres;
- New attenuation ponds to the north of the proposed data centres; and

- Green walls are proposed to the south and east that will enclose the water tower and pump house compound.

6.111 The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042. The site will remain enclosed by landscaping to all boundaries with a new hedgerow proposed to the west and south of the proposed development under the AI response. The development will be accessed off the R120 via the permitted access granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and SD21A/0042.

6.112 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.

6.113 Stormwater will discharge through an adequately sized attenuation pond at the northern end of the site ultimately discharging to the existing storm sewer to the north-east of the site. The outflow from the attenuation pond, will be restricted by way of a Hydrobrake facility, which will limit the discharge to 9.60l/s, which is the calculated QBAR greenfield run-off rate. A connection to the existing off site Irish Water foul sewer and potable water network will be established.

6.114 The proposed development will result in an increased demand for water of c. 7.4 m3/day (average). A confirmation by Irish Water that this resource is available within the existing network is required.

6.115 With regard to foul water, the proposed development is proposed to discharge foul water from the proposed development, via a 225mm diamater gravity foul sewer outfall and discharge into the existing 450mm diameter connection. It is proposed that all foul condensate effluent from the proposed new data halls, will be connected into head manholes adjacent to the data halls. The peak wastewater flow will not be in excess of c. 0.54l/s. A confirmation by Irish Water that this discharge on the existing network is feasible is required.

6.116 There will be no blasting or other works required for the proposed development that may impact groundwater.

6.117 The construction programme is expected to last up to 24 months.

Potential impacts of the Proposed Development

Construction Phase

Potential Impacts on Designated Sites during Construction

European Sites

6.118 The assessment presented in the Appropriate Assessment Screening Report (Scott Cawley Ltd., 2022) concluded that the potential impacts associated with the Proposed Development do not have the potential to affect the receiving environment and, consequently, do not have the potential to affect the conservation objectives supporting the qualifying interests or special conservation interests of any European sites; either alone or in combination with any other plans or projects:

6.119 As the Proposed Development does not traverse any European sites there is no potential for habitat fragmentation to occur.

6.120 The Proposed Development site does not support populations of any fauna species linked with the QI/SCI populations of any European site(s).

6.121 Chapter 8 of this EIAR submitted with this application deals with the hydrology of the Proposed Development site. The chapter assesses the hydrological and hydrogeological risks associated with the Proposed Development. The assessment noted that based on the potential sources of pollution from the Proposed Development during construction and operation phases and distance of c. 20km

downstream, there is no potential for impacts to occur on European sites in Dublin Bay. This conclusion is based on a good understanding of the hydrological and hydrogeological environment, plausible sources of impact and knowledge of receptor requirements. This allows possible source-pathway-receptor linkages to be identified. Potential sources of impacts during construction and operation were considered in Chapter 8 and all potential sources of contamination were considered in relation to European sites without taking account of any measures intended to avoid or reduce harmful effects of the Proposed Development (mitigation measures) i.e. a worst-case scenario.

6.122 The results of Chapter 8 (Hydrology) carried out by AWN Consulting Ltd. indicate that surface run-off from the Proposed Development, during both construction and operational phases respectively, will not result in any perceptible impact on water quality in downstream receiving waters in Dublin Bay (and thus in the European sites therein). This is in light of expected hazard loading, dilution and attenuation within the Griffeen River, and considerable distance between the Proposed Development site and Dublin Bay.

6.123 In line with good practice effective mitigation measures have been included in the construction design, management of construction programme and during the operational phase of the Proposed Development. However, it must be noted that these are included in the design, not for the purposes of avoiding or reducing any potential harmful effects to any European sites but are required for new developments under the under the objectives of the Greater Dublin Strategic Drainage Study (GDSDS, 2005) and South Dublin County Development Plan and in line with good construction practice.

6.124 It is an recommendation of the Greater Dublin Strategic Drainage Study, and requirement of the South Dublin County Development Plan 2022-2028, to incorporate Sustainable Urban Drainage Systems (SuDS) within new developments. The SuDS features associated with the Proposed Development are not included within the design to avoid or reduce any potential harmful effects to any European sites.

6.125 Therefore, there is no possibility of the Proposed Development undermining the conservation objectives of any of the qualifying interests or special conservation interests of the European sites in, or associated with, Dublin Bay as a result of surface water run-off or discharges.

6.126 Construction-related disturbance and displacement of fauna species could potentially occur within the vicinity of the Proposed Development. For mammal species such as otter, disturbance effects would not be expected to extend beyond 150m[20]. For birds, disturbance effects would not be expected to extend beyond a distance of *c.* 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance[21]. There are no European sites within the disturbance ZoI; the next nearest European site to the Proposed Development is c. 4.1km away.

6.127 There are no habitat areas within the disturbance ZoI of the Proposed Development that support populations of qualifying interest species of nearby SACs or SPAs[22]:

- The nearest SAC designated for otter is the Wicklow Mountains SAC, *c.* 14.3km south-west of the Proposed Development. The Griffeen River is a small order stream located in a different sub-catchment than the Wicklow Mountains SAC. Considering the size of otter territories (estimated

20 This is consistent with Transport Infrastructure Ireland (TII) guidance (*Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* (2006) and *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes(2005)*) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by surrounding vegetation and buildings, with the actual ZoI of construction related disturbance likely to be much less in reality.
21 The disturbance zone of influence for waterbirds is based on the relationship between the noise levels generated by general construction traffic/works (BS 5228:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise) and the proximity of those noise levels to birds – as assessed in Cutts, N. Phelps, A. & Burdon, D. (2009) *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance*, and Wright, M., Goodman, P & Cameron, T. (2010*) Exploring Behavioural Responses of Shorebirds to Impulsive Noise*. Wildfowl (2010) 60: 150–167. At 300m, noise levels are below 60dB or, in most cases, are approaching the 50dB threshold below which no disturbance or displacement effects would arise.
22 There is a need to consider use of habitat areas outside of an SPA by SCI bird species where they support the SCI populations and the site's conservation objectives. These habitat areas can comprise alternative roosting sites, foraging areas, staging grounds or migration routes and can, but not necessarily exclusively, be situated within the immediate hinterland of the SPA, or in areas ecologically connected to it.

as 7.5 ± 1.5km in length for females, and 13.2 ± 5.3km in length for males) in Ireland[23], and its location relative to the Wicklow Mountains SAC, any otters potentially using the Griffeen River do not form part of, or support, any SAC population.

- The nearest designated site for Atlantic salmon is the River Boyne and River Blackwater SAC, *c.* 30.9km north-west of the Proposed Development. Considering that the Griffeen River and the Camac river are located in a different catchment than the River Boyne and River Blackwater SAC and its location relative to the Proposed Development site, Atlantic salmon populations found in these rivers do not form part of, or support, any SAC population.
- The nearest designated site for freshwater white-clawed crayfish is the Lough Lene SAC, *c.* 60.8km north-west of the Proposed Development site. Considering that the Griffeen River and the Camac river are located in a different catchment than the Lough Lene SAC and its location relative to the Proposed Development site, freshwater white-clawed crayfish populations found in these rivers do not form part of, or support, any SAC population.
- The nearest SPA to the Proposed Development site designated for wintering Special Conservation Interest species is the North Bull Island SPA, located *c.*15.7km east of the Proposed Development. The Proposed Development is within the normal foraging range of some SCI species of this European site, such as black-headed gull *Chroicocephalus ridibundus*, however, none of these species were recorded within the Proposed Development site. The site is also beyond the normal range of other SCI species such as light-bellied Brent goose *Branta bernicla hrota*. Indeed, the nearest recorded inland feeding site for light-bellied Brent geese is at Le Fanu Park, *c.* 6.3km east of the Proposed Development, so the lands are significantly further inland than the farthest known inland feeding site for this species from Dublin Bay (Enviroguide Consulting, 2019). Furthermore, the habitats within the Proposed Development are deemed not suitable as an inland feeding habitat for light-bellied Brent goose, which utilise wetlands, as well as open grassland pitches and fields with a short sward height as foraging and/or roosting habitat. A relatively large flock of lapwing, a SCI species, was recorded using the fields south of the Proposed Development site during wintering bird surveys carried out in 2018, however, the nearest designated site for lapwing is the Boyne Estuary SPA, *c.* 43.9km north of the Proposed Development site, and considering its location and distance to the Proposed Development site, it is considered that lapwing recorded adjacent to the Proposed Development site do not form part of any SPA population.

6.128 Therefore, as the Proposed Development will not result in the disturbance or displacement of the Qualifying or Special Conservation Interest species of any European site, there is no potential for any in combination effects to occur in that regard.

Nationally Designated Sites

6.129 The Proposed Development boundary does not overlap with any pNHA or NHA boundary, however it is located *c.* 46m south of the Grand Canal pNHA boundary (see Figure 6.). There are no other nationally designated sites in the immediate vicinity of the Proposed Development site. The Proposed Development does not have the potential to affect the receiving environment and, consequently, does not have the potential to affect the integrity of any nationally designated site; either alone or in combination with any other plans or projects.

6.130 The Proposed Development is not hydrologically connected to the Grand Canal pNHA; however, it is connected to nationally designated sites (Dolphins, Dublin Docks pNHA, Sout Dublin Bay pNHA, Booterstown Marsh pNHA and North Dublin Bay pnHA) in Dublin Bay via the Griffeen River. As there are no hydrological or hydrogeological risks associated with the Proposed Development (see Chapter 8 Hydrology), therefore there are no nationally designated sites at risk of habitat degradation.

6.131 Construction-related disturbance and displacement of fauna species could potentially occur within the vicinity of the Proposed Development site. For mammal species such as otter, disturbance effects would not be expected to extend beyond 150m[20]. For birds, disturbance effects would not be expected to extend beyond a distance of *c.*300m, as noise levels associated with general

23 Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) *National Otter Survey of Ireland 2010/12*. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

construction activities would attenuate to close to background levels at that distance[25]. The Grand Canal pNHA is within the disturbance ZoI.

6.132 The Grand Canal pNHA is designated for its canal-side habitats and the diversity of species they support, including the Flora Protection Order species *Groenlandia densa*, while South Dublin Bay pNHA, North Dublin Bay pNHA, Booterstown Marsh pNHA and Dolphins, Dublin Docks pNHA are designated for the presence of coastal and estuarine habitats and usage of these sites by species of interest, including wintering birds, These sites have been subsumed into overlapping European sites (South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA) which in some cases have been designated for similar reasons. Therefore, these nationally designated sites would be subjected to the same potential impacts, or lack of described above with respect to potential impacts on European sites. In absence of mitigation, such potential impacts may result in a likely significant effect at the national geographic scale.

6.133 The Proposed Development has the potential to generate dust during construction works which could potentially affect the Grand Canal (and the vegetation of habitats within) *c.* 46m north of the Proposed Development, and thus result in a significant negative effect ranging from local to national level. However, this is unlikely due to the presence of vegetation (*i.e.* hedgerows and treelines) within the buffer zone between the hardstanding development and the canal, as well as the vegetation along the banks of the canal itself, which will all provide a buffer from dust deposition between the Grand Canal pNHA and the Proposed Development.

6.134 Nationally designated sites are offered protection under county development plans. The *South Dublin County Development Plan 2022-2028* (South Dublin County Council, 2022) have policies and objectives for the protection of the nationally designated sites. Two such objectives, 'NCBH4 Objective 1' and 'NCBH4 Objective 2' which sets objectives to "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" and "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", respectively. In addition, 'GI2 Objective 2' sets to "reduce fragmentation and enhance South Dublin County's Green Infrastructure (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."

Potential Impacts on Habitats and Flora

Habitat loss

6.135 Hedgerows are afforded protection in the South Dublin County Development Plan 2022-2028 policies and objectives, such as the 'GI2 Objective 1': "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", and 'GI2 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. Other relevant policies and objectives of South Dublin County Development Plan 2022-2028 can be found in Appendix 6.5.

6.136 Construction of the Proposed Development will result in the loss of habitat area; totalling *c.* 3.71ha in area – characterised by GS2 grassland sward and *c.* 730m in linear hedgerow habitats. None of the

habitats directly affected by the Proposed Development are considered to be any greater than of local importance (higher value).

6.137 The majority of the habitats within the Proposed Development boundary are of local importance (lower value) and are predominantly comprised of dry meadows and grassy verges (*c.* 3.69ha in total area) and recolonising bare ground (*c.* 0.02ha in total area). The loss or modification of habitats of local importance (lower value) will not result in a likely significant effect on biodiversity.

6.138 There is one habitat type within the Proposed Development boundary which is of local importance (higher value), hedgerows (WL1) – *c.* 730m, which will be removed to accommodate the Proposed Development.

6.139 The dry meadows and grassy verges (GS2), recolonising bare ground (ED3) and hedgerows (WL1) will all be lost due to the Proposed Development. Although the area of these habitats removed to facilitate the construction phase of the Proposed Development is relatively large, the loss of these habitat types is significant albeit at the local scale only.

Potential Impacts on Fauna

Potential Impacts Arising from Vegetation Clearance and Habitat Loss

Badger

6.140 No evidence of badger was recorded within the Proposed Development site. However, considering the presence of suitable breeding, foraging and commuting habitat for badgers within the site and historical records in the wider environment, the Proposed Development site has the potential to be utilised by badger. The construction of the Proposed Development will reduce the amount of semi-natural habitat available to local badger populations and potentially fragment habitat corridors used by badger. Considering the absence of evidence of badger use of the Proposed Development site, the overall abundance of suitable habitat in the environs and particularly to the west of the site, the construction phase of the Proposed Development will not result in a significant impact on badgers at any geographical scale.

Otter

6.141 No evidence of otter was recorded within the Proposed Development site. Considering that the Grand Canal, located *c.* 46m north of the Proposed Development, is known to be used by otter and the abundance of semi-natural habitats on site, there is the possibility of individual otters occasionally wandering through the Proposed Development site as they commute across the landscape from one waterbody to another. However, there are no waterbodies, and therefore no vegetated banks suitable for establishing holts along them, for foraging or breeding otter. Therefore, the Proposed Development site has the potential to be utilised by occasional commuting otters only. The construction of the Proposed Development will reduce the amount of semi-natural habitat available to local otter populations and potentially fragment habitat corridors used by them. Considering the absence of evidence of otter use of the Proposed Development site, the lack of waterbodies within the Proposed Development, as well as the distance to the nearest suitable waterbody (*c.* 46m to the Grand Canal), the construction phase of the Proposed Development will not result in a significant impact on otters at any geographical scale.

Small mammals

6.142 The Proposed Development site contains suitable foraging, commuting and breeding habitat for hedgehogs and pygmy shrews, and commuting opportunities for other small mammals. The construction of a development will disconnect habitat corridors and reduce the amount of semi-natural habitat available to local small mammal populations; however, the overall area of habitat loss is small, especially when considered in the context of the abundance of available suitable habitat in the surrounding environment and particularly in the lands to the west. Therefore, the construction phase of the Proposed Development will not result in a significant impact on small mammals at any geographical scale.

Bats

6.143 Bats, and their breeding and resting places, are strictly protected under the Birds and Habitats Regulations, and under the Wildlife Acts, and it is an offence under that legislation to kill or injure bats or to interfere with or destroy their breeding or resting places. There are no structures or trees within the Proposed Development site and as such there is no potential for direct impacts on roosting bats to occur as a consequence of vegetation removal and/or works associated with the construction chase of the Proposed Development.

6.144 The bat activity surveys recorded five bat species (brown long-eared bat, common pipistrelle, Leisler's bat, *Myotis* species and soprano pipistrelle) foraging and commuting within the Proposed Development site, but at relatively low levels, concentrated along the hedgerows and grasslands, as well as along the Grand Canal. All of the recorded species are common bat species and are of "Least concern" (Nelson *et al*., 2019). Considering that the majority of bat activity is generally concentrated in unlit areas, there is potential for direct impacts on foraging and commuting bats from increased light levels during the construction phase for example along the hedgerows. However, the impact is considered to be insignificant on the local bat populations due to working hours being restricted to day-time when there is no requirement for lighting in the summer, and due to bats hibernating during winter months when there is a more significant requirement for lighting during construction.

6.145 The clearance of vegetation will result in a loss of bat foraging habitat, however considering that the extent of this loss is limited to *c.* 3.71ha in area and *c.* 730m in linear habitats and considering the amount of suitable foraging/commuting habitat located in the wider environs and particularly to the west of the site, the habitat loss will not result in a significant negative effect on the populations of bat species at any geographic scale.

Breeding Birds

6.146 Under the Wildlife Acts, it is an offence to disturb birds while on their nests, or to wilfully take, remove, destroy, injure or mutilate their eggs or nests. In the absence of mitigation to protect birds and their nests, there is potential for direct impacts on breeding birds due to loss of suitable breeding bird habitat and/or the risk of direct mortality and injury to birds, which may arise from the clearance of vegetation within the Proposed Development site during its construction phase. This potential impact would be most likely to arise if clearance works are undertaken during the time of year when birds are likely to be nesting (*i.e.* 1st March to 31st August, inclusive).

6.147 The bird species recorded at the Proposed Development site during surveys include those that are commonly found in suburban and urban habitats (*e.g.* blackbird, hooded crow, robin and wren). These habitats include hedgerows and grasslands, which can be found in the wider surrounding area. A total of 20 of the 31 species recorded were BoCCI Green-listed species and are considered to be of least conservation concern (Gilbert *et al*., 2021). Seven of the BoCCI Amber-and Red-listed species (greenfinch, kestrel, linnet, skylark, starling, swallow, swift and willow warbler) recorded within the Proposed Development site are also likely to occur in these commonly found habitats.

6.148 The clearance of vegetation will result in a loss of breeding bird habitat, however considering that the extent of this loss is limited to *c.* 3.7ha in area and *c.* 730m in linear habitats and considering the amount of suitable foraging habitat located within the wider environs, the habitat loss will not result in a significant negative effect on the populations of bird species at any geographic scale. Mitigation measures have been provided to ensure adherence to the Wildlife Acts.

Wintering Birds (Non-SCI)

6.149 The clearance of vegetation will result in a permanent loss of foraging and/or roosting habitat (e.g. dry meadows and grassy verges (GS2) and recolonising bare ground (ED3)) of wintering non-SCI bird species such as redwing or snipe, however considering that the extent of this loss is limited to *c.* 3.7ha in area and *c.* 730m in linear habitats and considering the amount of suitable foraging habitat located within the wider environs, the habitat loss will not result in a significant negative effect on the populations of bird species at any geographic scale.

Common Frog

6.150 Common frog is protected under the Wildlife Acts and it is an offence to hunt, take or kill them, or wilfully to interfere with or destroy their breeding places. There is potential for direct impacts on individual common frogs due to the loss of suitable foraging and commuting habitat through the risk of direct mortality and injury, which may arise from the clearance of vegetation within the Proposed Development site, however, these impacts will not affect local populations at any significant geographic level. The Proposed Development will result in the permanent loss of suitable common frog habitat (e.g. grassland); however, there is suitable breeding and foraging habitat located in the wider environs. In consideration of this and the fact that the habitat loss does not include any loss of suitable breeding habitat (e.g. standing waterbodies), the potential loss of habitat will not result in a significant negative effect on common frog populations at any geographic scale. Mitigation measures have been provided to ensure adherence to the Wildlife Acts.

Common lizard

6.151 The Wildlife Acts provide protection to Ireland's only reptile species, common lizard. It is an offence to hunt, take or kill them, or wilfully to interfere with or destroy their breeding places. In the absence of mitigation to protect common lizards during Construction Phase, there is potential for direct impacts on common lizards due to the loss of suitable habitat within the Proposed Development footprint, and/or the risk of direct mortality and injury to common lizards, which may arise from the site clearance of suitable habitats within the Proposed Development site. Due to common lizard being a mobile species, and the amount of suitable habitat in the wider environs, the risk of disturbance and mortality is not considered significant at any geographic level.

Fish

6.152 There is no potential for direct impacts on individual fish due to loss of suitable habitat and/or the risk of direct mortality and injury. Therefore, the risk of disturbance and mortality is not considered to significantly affect local fish populations at any geographic level.

White-clawed crayfish

6.153 There is no potential for direct impacts on individual white-clawed crayfish due to loss of suitable habitat and/or the risk of direct mortality and injury. Therefore, the risk of disturbance and mortality is not considered to significantly affect local populations at any geographic level.

Other Rare and/or Protected Invertebrates

6.154 There is potential for direct impacts on a variety of terrestrial invertebrate species due to the loss of suitable habitat and/or the risk of direct mortality and injury, which may arise from the clearance of vegetation within the Proposed Development site, however, these impacts will not affect local populations at any significant geographic level. The Proposed Development will result in the permanent loss of suitable terrestrial invertebrate habitat (e.g. grassland); however, there is suitable breeding and foraging habitat located in the wider area within the wider environs. In consideration of this, the potential loss of habitat will not result in a significant negative effect on terrestrial invertebrate populations at any geographic scale

Potential Impacts Arising from Disturbance or Displacement

6.155 Construction-related disturbance and displacement of fauna species could potentially occur within the vicinity of the Proposed Development. For mammal species such as otter, disturbance effects would not be expected to extend beyond *c.* 150m[24]. For birds, disturbance effects would not be

[24] This is consistent with Transport Infrastructure Ireland (TII) guidance (*Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* (2006) and *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (2005)*) documents. This is a precautionary distance, and likely to be moderated by the screening effect provided by surrounding vegetation and buildings, with the actual ZoI of construction related disturbance likely to be much less in reality.

expected to extend beyond a distance of *c.* 300m, as noise levels associated with general construction activities would attenuate to close to background levels at that distance[25].

Badger

6.156 While the Proposed Development will result in increased human presence on site, the potential effects on badgers in the environs from construction works are not significant in this instance. This is because the proposed works will be largely confined to daylight hours, when badgers are least likely to forage within the Proposed Development site. Even in the event that the Construction Phase of the proposal coincides with construction of other projects in the immediate vicinity, there will be no significant disturbance or displacement effects on badgers, as there are large areas of suitable habitat in the wider environs towards the west of the Proposed Development site. Badgers are widespread in Ireland and found in close proximity to human settlements, including in Dublin City, and therefore are likely to adapt to the temporary changes in human activity levels in the Proposed Development site and surrounding area. Disturbance or displacement during construction is therefore unlikely to result in a significant negative effect, at any geographic scale. Mitigation measures have been provided to ensure adherence to the Wildlife Acts.

Otter

6.157 The Grand Canal, the Griffeen River, the Camac River, the River Liffey and adjacent waterbodies are likely to form a part of the territories of local otter populations based on desktop records of otter and recent observations from Scott Cawley Ltd. ecologists. The nearest waterbody to the Proposed Development is the Griffeen River, located *c.* 330m of the Proposed Development and it is likely to be used by commuting and/or foraging otters. Considering the river is beyond the 150m distance after which disturbance effects on mammals are not expected to occur, the potential effects on otters in terms of disturbance from the Proposed Development are not significant in this instance. In addition, the proposed construction works are limited in terms of scale and duration (up to 24 months) and works will largely be confined to daylight hours, when otters are least likely to forage along the river and the canal corridors. The Griffeen River runs through some already built up environment, and it is anticipated that the local population of otters will be habituated to a certain level of human disturbance. Disturbance/displacement during construction therefore is unlikely to result in a significant negative effect, at any geographic scale.

Small mammals

6.158 In conjunction with any displacement effects associated with habitat loss, increased human presence and/or noise and vibration associated with construction works, has the potential to displace small mammals from both breeding and resting places and from foraging habitat. However, given the limited potential for the majority of the site to support any locally significant small mammal populations, and disturbance will be short-term (up to 24 months), it is extremely unlikely to result in any long-term effects on the local small mammal populations or their conservation status. Disturbance or displacement during construction therefore is unlikely to result in a significant negative effect, at any geographic scale.

Bats

6.159 Temporary artificial lighting associated with the construction works will further illuminate the site and its immediate environs. In absence of mitigation, this could potentially displace bats foraging and/or commuting bats from the lands within the Proposed Development site and in the locality. In consideration of the nature of the surrounding environment (*i.e.* semi-urban) and the fact that any artificial lighting during construction would be temporary and the site is partially lit by the Adamstown Road (R120) to the east of the site, it is considered that the Proposed Development will not result in

[25] The disturbance zone of influence for waterbirds is based on the relationship between the noise levels generated by general construction traffic/works (BS 5228:2009 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise*) and the proximity of those noise levels to birds – as assessed in Cutts, N. Phelps, A. & Burdon, D. (2009*) Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance*, and Wright, M., Goodman, P & Cameron, T. (2010) *Exploring Behavioural Responses of Shorebirds to Impulsive Noise*. Wildfowl (2010) 60: 150–167. At 300m, noise levels are below 60dB or, in most cases, are approaching the 50dB threshold below which no disturbance or displacement effects would arise.

a significant negative effect on local bat populations at any geographical scale. Lighting mitigation has been provided to minimise any effect on individual bats during construction on a precautionary basis.

Breeding Birds

6.160 The construction of the Proposed Development will result in a short-term increase in construction-related noise and vibration and human disturbance over a construction period of up to 24 months. This could potentially result in a short-term reduction in the breeding success of birds that utilise suitable breeding habitat in the locality of the Proposed Development site, such as Amber-listed skylark, whose breeding populations have seen national short-term range decline of more than 35%[15]. Skylarks use rough grasslands for breeding and will be one of the most impacted species in terms of areas of suitable breeding habitat (*c.* 3.69ha) being disturbed and lost.

6.161 The other Amber-listed species (greenfinch, herring gull, house sparrow, lesser black-backed gull, linnet, starling, swallow and willow warbler) recorded within the Proposed Development site, have similarly seen short-term declines in their populations, although not to the same extent as those on the Red-list. The Red-listed species (kestrel and swift) recorded within the Proposed Development have seen declines of more than 75% in terms of range decline[15]. The smaller passerines rely on hedgerows such as those found on the Proposed Development site for breeding, whereas there is no suitable nesting habitat for the gulls (coastal habitats or buildings[16]), kestrel (buildings, cliffs, trees[16]), or swallow and swift (buildings). Given the existing background noise in the surrounding urban environment and similar habitats found in the surroundings within the wider environs, it will not result in a significant negative effect on the local populations of breeding bird species at any geographic scale.

Wintering Birds (Non-SCI)

6.162 The impacts of construction of the Proposed Development will result in similar impacts associated with increase in construction-related noise and vibration and human disturbance over a construction period of up to 24 months on wintering non-SCI birds. This could potentially result in a short-term displacement of foraging and/or roosting wintering non-SCI birds within the Proposed Development site, and birds utilising similar foraging habitat in the surrounding areas up to *c.* 300m of the Proposed Development. However, considering mostly small numbers of wintering birds using the Proposed Development site due to its relatively small size and given the existing background noise in the surrounding semi-urban and agricultural environment, it will not result in a significant negative effect on the local populations of wintering non-SCI bird species at any geographic scale.

Common Frog

6.163 Displacement effects associated with habitat loss, increased human presence and/or noise and vibration associated with construction works, has the potential to displace individual common frog from the Proposed Development site. However, given that disturbance will be short-term (up to 24 months), it is unlikely that disturbance related impacts as a consequence of the Proposed Development will result in any long-term effects on local common frog populations or their conservation status. Disturbance or displacement during construction is unlikely to result in a significant negative effect, at any geographic scale.

Common Lizard

6.164 Displacement effects associated with habitat loss, increased human presence and/or noise and vibration associated with construction works, has the potential to displace individual common lizards from the Proposed Development site. However, given that the disturbance will be short-term (up to 24 months), it is extremely unlikely that disturbance related impacts as a consequence of the Proposed Development will result in any long-term effects on their local populations or their conservation status. Disturbance or displacement during construction is unlikely to result in a significant negative effect, at any geographic scale.

Potential Impacts of Surface Water Pollutants on Prey Availability

Otter

6.165 In the absence of any mitigation, there is potential for a pollution event during the Construction Phase of the Proposed Development to result in a fish kill, and therefore affect prey availability in waterbodies located in the immediate environs (*i.e.* the Griffeen River). The effects on prey availability could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on otter would be significant, likely at the local geographic level only.

Potential impacts of surface water pollutants

Fish

6.166 In the absence of any mitigation, there is potential for a pollutant event during the Construction Phase of the Proposed Development to result in a fish kill within the waterbodies located in the immediate environs (*i.e.* the Griffeen River). The effects on fish could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on fish would be significant, likely at the local geographic level only.

Freshwater White-clawed Crayfish

6.167 In the absence of any mitigation, there is potential for a pollutant event during the Construction Phase of the Proposed Development to result in mortality of freshwater white-clawed crayfish in the waterbodies located in the immediate environs (e.g. the Griffeen River and any waterbodies downstream of it). The effects of mortality on freshwater white-clawed crayfish could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on freshwater white-clawed crayfish would be significant, likely at the local geographic level only.

Other Rare and/or Protected Invertebrates – Aquatic Species

6.168 In the absence of any mitigation, there is potential for a pollutant event during the Construction Phase of the Proposed Development to result in mortality of aquatic invertebrates in the waterbodies located in the immediate environs (*i.e.* the Griffeen River). The effects of mortality on aquatic invertebrates could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on aquatic invertebrates would be significant, likely at the local geographic level only.

Operational phase

Potential Impacts on Designated Sites

European Sites

6.169 The assessment presented in the Appropriate Assessment Screening Report concluded that in view of the best scientific knowledge, and applying the precautionary principle, that the possibility of any significant effects on any European sites, whether arising from the project alone or in combination with other plans and projects, can be excluded. As such, the potential impacts associated with the Proposed Development do not have the potential to affect the receiving environment and, consequently, do not have the potential to affect the conservation objectives supporting the Qualifying Interests or Special Conservation Interests of any European sites.

Surface Water

6.170 Chapter 8 of this EIAR submitted with this application deals with the hydrology of the Proposed Development site. The chapter assesses the hydrological and hydrogeological risks associated with the Proposed Development. The assessment noted that based on the potential sources of pollution from the Proposed Development during construction and operation phases and distance of *c.* 20km

downstream, there is no potential for impacts to occur on European sites in Dublin Bay. This conclusion is based on a good understanding of the hydrological and hydrogeological environment, plausible sources of impact and knowledge of receptor requirements. This allows possible source-pathway-receptor linkages to be identified. Potential sources of impacts during construction and operation were considered in Chapter 8 and all potential sources of contamination were considered in relation to European sites without taking account of any measures intended to avoid or reduce harmful effects of the Proposed Development (mitigation measures) i.e. a worst-case scenario.

6.171 The results of Chapter 8 carried out by AWN Consulting Ltd. indicate that surface run-off from the Proposed Development, during both construction and operational phases respectively, will not result in any impact on water quality in downstream receiving waters in Dublin Bay (and thus in the European sites therein). This is in light of expected hazard loading, dilution and attenuation within the Griffeen River, and considerable distance between the Proposed Development site and Dublin Bay.

6.172 In line with good practice effective mitigation measures have been included in the construction design, management of construction programme and during the operational phase of the Proposed Development. However, it must be noted that these are included in the design, not for the purposes of avoiding or reducing any potential harmful effects to any European sites but are required for new developments under the under the objectives of the Greater Dublin Strategic Drainage Study and South Dublin County Development Plan and in line with good construction practice.

6.173 It is a recommendation of the Greater Dublin Strategic Drainage Study, and a requirement of the South Dublin County Development Plan 2022-2028, to incorporate Sustainable Urban Drainage Systems (SuDS) within new developments. The SuDS features associated with the Proposed Development are not included within the design to avoid or reduce any potential harmful effects to any European sites.

6.174 Therefore, there is no possibility of the Proposed Development undermining the conservation objectives of any of the qualifying interests or special conservation interests of the European sites in, or associated with, Dublin Bay as a result of surface water run-off or discharges.

Foul Water

6.175 Foul water, comprising sewage and industrial effluent (and some surface water run-off), from the Dublin area has historically been, and will continue to be, treated at Ringsend WWTP prior to discharge to Dublin Bay. The most recent information from Irish Water indicates that the plant is operating above its capacity of 1.64 million P.E.[26], with a current operational loading of *c.* 2.2 million P.E. Ringsend WWTP operates under a discharge licence from the EPA (D0034-01) and must comply with the licence conditions.

6.176 Despite the capacity issues associated with the Ringsend WWTP, the Liffey Estuary Lower and Dublin Bay are currently classified by the EPA as being of "Unpolluted" water quality status[27]. The Tolka Estuary is currently classified by the EPA as being "Potentially Eutrophic". The pollutant content of future foul water discharges to Dublin Bay is considered likely to decrease in the long-term for the following reasons:

- Irish Water are currently undertaking a major upgrade of the Ringsend WwTP to increase the plant's wastewater treatment capacity to a population equivalent of 2.4 million, which is programmed for completion in 2025[28]; and,
- There is a commitment in the National Development Plan 2021-2030[29] to invest in and progress the Greater Dublin Drainage Project which includes the development of a new regional wastewater treatment facility and associated infrastructure to serve Dublin and parts of the surrounding counties of Kildare and Meath. The project will involve the provision of a new

[26] Irish Water (2017) *Annual Environmental Report*. Accessed from http://www.epa.ie/licences/lic_eDMS/090151b280672a63.pdf
[27] Transitional and Coastal Surface Water Quality data (2010-2012) accessed from the EPA Envision Mapviewer www.gis.epa.ie/Envision (Accessed on: 27 June 2022)
[28] Details on Irish Water Ringsend WwTP upgrade. Available at: https://www.water.ie/projects/local-projects/ringsend/ Accessed on: 27 June 2022.
[29] Government of Ireland (2021) *Project Ireland 2040, National Development Plan 2021-2030*.

regional wastewater treatment plant at a site in the northern part of the Greater Dublin Area and the provision of a new Orbital Drainage Sewer linking the new plant to the existing regional sewer network, which will enable future connections for identified areas of development within the catchment area. The provision of the Greater Dublin Drainage Project will augment the wastewater treatment capacity currently provided by Ringsend WwTP across the Greater Dublin Area and alleviate pressure within the existing wider wastewater network and help to ensure that the wastewater generated is treated safely, in compliance with the EU and national wastewater treatment regulations.

6.177 It is also an objective of the Greater Dublin Strategic Drainage Study, and all development plans within the catchment of Ringsend WwTP, to include Sustainable Urban Drainage Systems (SuDS) within new developments. The relevant development plans also have protective policies/objectives in place to protect water quality in the receiving freshwater and marine environments, and to implement the Water Framework Directive in achieving good water quality status for Dublin Bay.

6.178 Considering the above, particularly the current unpolluted status of Dublin Bay, and that foul water discharges from the proposed development would equate to a very small percentage of the overall discharge volumes sent to Ringsend WwTP for treatment, it is concluded that the proposed development will not impact on the overall water quality status of Dublin Bay.

6.179 Therefore, there is no possibility of the proposed development undermining the conservation objectives of any of the Qualifying Interests or Special Conservation Interests of the European sites in, or associated with, Dublin Bay as a result of foul water discharges.

Nationally Designated Sites

6.180 Nationally designated sites would be subjected to the same potential impacts from Operational Stage described above with respect to potential impacts on European sites. In absence of mitigation, such potential impacts may result in a likely significant effect at the national geographic scale.

6.181 The Proposed Development has the potential to generate dust during the operational stage from traffic which could potentially affect the Grand Canal pNHA (and the vegetation of habitats within), which is located *c*. 46m from the Proposed Development boundary, and thus result in a significant negative effect at a national level. However, this is unlikely due to the presence of vegetation (*i.e.* hedgerows and treelines) within the buffer zone between the hardstanding development and the canal, as well as the vegetation along the banks of the canal itself, which will all provide a buffer from dust deposition between the Grand Canal pNHA and the Proposed Development.

Potential Impacts on Habitats and Flora

6.182 Refer to "Potential Impacts on Designated Sites" above with regards to potential impacts during Operational Phase on downstream sensitive habitats located within the boundaries of protected designated sites. In consideration of this, the Proposed Development will not result in a significant negative effect on habitats within the Proposed Development site at any geographical scale as a consequence of surface water degradation.

Potential Impacts on Fauna

Potential Impacts of Arising from Increased Levels of Artificial Lighting

Bats

6.183 In absence of mitigation, permanent artificial lighting associated with the Operation stage of the Proposed Development could potentially displace foraging and/or commuting bats from the lands within the Proposed Development site. The wider surrounding lands are urban in nature towards the east and partially urban to the north. A precautionary approach has been adopted and it is considered that, in the absence of mitigation, the potential displacement of bats from the Proposed Development site as a consequence of artificial lighting could potentially have a negative significant effect in the long-term on bat populations at a local geographic scale.

Potential Impacts of Arising from Disturbance or Displacement

Breeding Birds

6.184 The Proposed Development during the Operational Phase will result in a significant increase in levels of noise and human disturbance at the Proposed Development site from those levels currently present at the existing site. However, considering the agricultural to semi-urban nature of the location, the breeding birds using the site are habituated to anthropogenic disturbance to some degree. Considering this, increased disturbance within the Proposed Development site is unlikely to affect the local breeding bird populations at any geographic scale.

Wintering Birds (Non-SCI)

6.185 The Proposed Development during the Operational Phase will result in a significant increase in levels of noise and human disturbance at the Proposed Development site from those levels currently present at the existing site. However, considering the agricultural to semi-urban nature of the location, the wintering non-SCI birds using the site are habituated to anthropogenic disturbance to some degree. Considering this, increased disturbance within the Proposed Development site is unlikely to affect the local breeding bird populations at any geographic scale.

Potential Impacts Arising from Collision Risk/Mortality Risk Associated with Buildings

Bats

6.186 Considering bats frequently navigate between obstacles in the landscape in dark using echolocation, the proposed development is not considered to create a collision risk for bat movements through the site. Therefore, the proposed development is considered to not have a significant negative effect on the bat populations at any geographic scale.

Birds (Breeding Birds and Wintering Non-SCI Birds)

6.187 The Proposed Development may lead to increased mortality risk associated with window strike by low-flying birds. In Dublin, bird species navigate in an urban environment with built structures daily. To put some context on their avoidance capabilities, in a different setting and for use in collision risk modelling for onshore wind turbines, an avoidance rate of 99.5% is applied for large gull species and an avoidance rate of 99.2% is applied for small gull species (Furness, 2019), which essentially this means that 99.5% and 99.2% of gull flights, respectively, will avoid collision with a moving turbine. For light-bellied Brent geese the avoidance rate applied is 99.8% (SNH, 2018). The risk of collision is considered even less with a static, clearly detectable building.

6.188 From the literature, bird collisions with man-made structures are common and well documented (Banks, 1979; Klem, 1990; Erickson *et al.,* 2005, Jenkins *et al.,* 2010; SNH, 2018), with migratory passerine species the most prevalent collision victims (Erickson *et al.,* 2001; Bing *et al.,* 2012). Bird collision with buildings is generally associated with reflective material such as windows or large surfaces of glass which create a mirror and appear to show the continuation of the sky or surrounding landscape, an effect that can be exacerbated by lighting (Sheppard and Phillips, 2015). In the absence of mitigation there could be a low level of mortality attributable to bird collision with windows of the proposed development, however this impact is unlikely to cause any significant impact above the local scale.

Potential Impacts of Surface Water Pollutants on Prey Availability

Otter

6.189 In the absence of any mitigation, there is potential for a pollution event during the Operational Phase of the Proposed Development to result in a fish kill, and therefore affect prey availability within waterbodies located in the immediate environs (*i.e.* the Griffeen River). The effects on prey availability could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on otter would be significant, likely at the local geographic level only.

Potential Impacts of Surface Water Pollutants

Fish

6.190 In the absence of any mitigation, there is potential for a pollutant event during the Operational Phase of the Proposed Development to result in mortality of fish in waterbodies located in the immediate environs (*i.e.* the Griffeen River). The effects on mortality on fish could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on fish would be significant, likely at the local geographic level only.

Freshwater white-clawed crayfish

6.191 In the absence of any mitigation, there is potential for a pollutant event during the operation phase of the Proposed Development to result in mortality of freshwater white-clawed crayfish in waterbodies located in the immediate environs (*i.e.* the Griffeen River). The effects on mortality on freshwater white-clawed crayfish could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on freshwater white-clawed crayfish would be significant, likely at the local geographic level only.

Other Rare and/or Protected Invertebrates – Aquatic Species

6.192 In the absence of any mitigation, there is potential for a pollutant event during the operation phase of the Proposed Development to result in mortality of aquatic invertebrates in waterbodies located in the immediate environs (*i.e.* the Griffeen River). The effects on mortality aquatic invertebrates could be amplified should a pollution episode coincide with a pollution event triggered by other plans, projects, or land use activities in the Liffey sub-catchment. The effects on aquatic invertebrates would be significant, likely at the local geographic level only.

Do-Nothing Impact

6.193 The continuation of the existing management practices at the Proposed Development site in a "do-nothing" scenario, would maintain the current habitats present; however, it is likely that the unmanaged dry meadows and grassy verges (GS2) and recolonising bare ground (ED3) could be overtaken by scrub over time and potentially develop into a woodland over long-term. The Proposed Development site would continue to provide suitable foraging and breeding habitat for bird and mammal species and suitable foraging habitat for common bat species. The downstream waterbodies would continue to sustain fish and aquatic invertebrate (including freshwater white-clawed crayfish) populations and otters feeding on them. The lands are currently zoned under the South Dublin County Development Plan 2016-2022 for '*EE – Enterprise and Employment'* with a small area at the northern end of the site near the Grand Canal zoned as '*RU*', and so the majority of the lands would likely be developed for industrial or enterprise purposes in the future.

Mitigation, Compensation and Enhancement Measures

Construction phase

Habitats and Flora

Water quality

6.194 The following mitigation measures will ensure there are no impacts on water quality in the immediate vicinity of the Proposed Development from release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters control during the construction stage of the Proposed Development and therefore no potential impacts on the downstream receiving water courses, *i.e.* the Griffeen River:

- Specific measures to prevent the release of sediment over baseline conditions to the existing surface water drainage network, during the construction work, which will be implemented as the need arises. These measures include, but are not limited to, the use of silt fences, silt curtains, settlement lagoons and filter materials.

- Provision of exclusion zones and barriers (e.g. silt fences) between earthworks, stockpiles and temporary surfaces to prevent sediment washing into the existing drainage systems and hence the downstream receiving water environment.
- Provision of temporary construction surface drainage and sediment control measures to be in place before earthworks commence.
- Weather conditions will be taken into account when planning construction activities to minimise risk of run-off from the site.
- Prevailing weather and environmental conditions will be taken into account prior to the pouring of cementitious materials for the works adjacent to any surface water drainage features, or drainage features connected to same. Pumped concrete will be monitored to ensure no accidental discharge. Mixer washings and excess concrete will not be discharged to existing surface water drainage systems. Concrete washout areas will be located remote any surface water drainage features, where feasible, to avoid accidental discharge to watercourses. Washing out of any concrete trucks on site will be avoided (dry brush shoots will be used instead).
- Any fuels of chemicals (including hydrocarbons or any polluting chemicals) will be stored in a designated, secure bunded area(s) to prevent any seepage of potential pollutants into the local surface water network. These designated areas will be clearly sign-posted and all personnel on site will be made aware of their locations and associated risks.
- All mobile fuel bowsers shall carry a spill kit and operatives must have spill response training. All fuel containing equipment such as portable generators shall be placed on drip trays. All fuels and chemicals required to be stored on-site will be clearly marked. Care and attention should be taken during refuelling and maintenance operations. Particular attention should be paid to gradient and ground conditions, which could increase risk of discharge to waters.
- A register of all hazardous substances, which will either be used on site or expected to be present (in the form of soil and/or groundwater contamination) will be established and maintained. This register will be available at all times and shall include as a minimum:
  - Valid Safety Data Sheets;
  - Health & Safety, Environmental controls to be implemented when storing, handling,
  - using and in the event of spillage of materials;
  - Emergency response procedures/precautions for each material; and,
  - The Personal Protective Equipment (PPE) required when using the material.
  - Implementation of response measures to potential pollution incidents.
- Robust and appropriate Spill Response Plan and Environmental Emergency Plan will be prepared prior to works commencing and they will be communicated, resourced and implemented for the duration of the works. Emergency procedures/precautions and spillage kits will be available and construction staff will be trained and experienced in emergency procedures in the event of accidental fuel spillages.
- All trucks will have a built-on tarpaulin that will cover excavated material as it is being hauled off-site and wheel wash facilities will be provided at all site egress points.
- Water supplies shall be recycled for use in the wheel wash. All waters shall be drained through appropriate filter material prior to discharge from the construction sites.
- The removal of any made ground material, which may be contaminated, from the construction site and transportation to an appropriate licenced facility shall be carried out in accordance with the Waste Management Act, best practice and guidelines for same.
- A discovery procedure for contaminated material will be prepared and adopted by the appointed contractor prior to excavation works commencing on site. These documents will detail how potentially contaminated material will be dealt with during the excavation phase.
- Implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste (most notably wet concrete, pile arisings and asphalt).
- All of the above measures implemented on site will be monitored throughout the duration of construction to ensure that they are working effectively, to implement maintenance measures if required and applicable, and to address any potential issues that may arise.

Vegetation clearance

6.195 The loss of habitat KERs, comprising grassy verges (GS2), recolonising bare ground (ED3) and hedgerows (WL1) will be offset by the creation of the following (refer to Landscape Proposals Landscape Masterplan Drawing No. 0453_101):

- A new native hedgerow along the western boundary of the proposed development site to offset

the loss of an existing largely rank, hedgerow that must be removed to facilitate construction of the proposed development. The full list of tree species proposed for the hedgerows is contained within the *Landscape Report and Outline Landscape Specification* prepared by Kevin Fitzpatrick Landscape Architecture and submitted as part of this planning application (refer to Section 2.8 Planting Schedule). In brief hedgerows will comprise native species including *Corylus avellana*, *Crataegus monogyna*, *Prunus avium*, *Prunus padus*, *Quercus petraea* and *Rosa canina*. The species mix is similar to the mix found within hedgerows in the general vicinity;

- The provision of a visual screening belt (this item has been permitted and is a condition of SDCC Planning reference SD19A/0042) on the eastern boundary of the site fronting the R126 road and along the northern boundary of the site. The shelter belt will comprise a mix of native tree species, comprising a range of deciduous and coniferous (*Pinus sylvestris*) species;
- The provision of new pond and wetland habitats as part of the onsite attenuation process. The new wetlands include 2 no. ponds and 2 no. swales. The swales and pond edges are to be planted with a mix of native species including *Apium nodiflorum*, *Iris pseudacorus*, *Caltha palustris*, *Carex riparia*, and *Sparganium* spp. (refer to drawing No. 0453_104 *Landscape Treatment of Bio Swale and Wetland* for a comprehensive list of species for Native Riparian Planting Mix).
- Areas of wetland wildflower meadow will be provided in the vicinity of ponds and swales, and will be planted with native species including *Cardamine pratensis*, *Primula veris*, *Succisa pratensis*, *Caltha palustris*, *Filipendula ulmaria*, and *Leucanthemum vulgare* (refer to drawing No. 0453_104 *Landscape Treatment of Bio Swale and Wetland* for a comprehensive list of species for wetland).

6.196 All of the above measures implemented on site will be monitored throughout the duration of construction to ensure that they are working effectively, to implement maintenance measures if required and applicable, and to address any potential issues that may arise. landscape plans for the proposed development prepared for the EdgeConneX masterplan site (refer to Chapter 11 of Marston Planning Consultancy, 2021) which includes the current Proposed Development site will implement appropriate measures such as using plants of native origin in planting/meadows and by leaving unmanaged and/or enhanced areas for biodiversity in the wider area of the plan.

6.197 It is acknowledged that the loss of hedgerow habitat will not be offset by an equivalent length of habitat. However, the new habitats will provide the equivalent landscape linkages that are provided by the existing hedgerow network. The existing on-site hedgerow network provides poor connectivity to areas to the south and west of the proposed development site, but provide a link to the Grand Canal ecological corridor to the north. The replacement planting will continue to provide ecological connectivity to this corridor. The existing hedgerows on site are also patchy and in many places rank and dominated by low sections comprising *Rubus fruticosus* agg. with little overstorey woody species. In this context the replacement of relatively poor quality hedgerows by denser, floristically diverse hedgerow and broader areas of immature woodland (e.g. the screening belts) comprising native species represents a neutral effect on hedgerow habitats in the long term e.g. the loss of hedgerow habitat will be offset in the medium to long term (5+ years) by the establishment of areas of higher quality habitat.

6.198 With respect to the loss of the other KER habitats grassy verges (GS2) and recolonising bare ground (ED3), the loss of these habitat types will be offset by the creation of higher value habitats (wet meadow, ponds, and riparian planting). Wetlands are rare in the Dublin context and the provision of new wetland within the development site represents a positive biodiversity enhancement. The planting mix proposed for the wetland areas also includes species that are of high value to pollinators, and represents an improvement in terms of diversity of species for pollinating insects within the proposed development site.

Fauna

Badgers

Habitat loss

6.199 Although no badger setts or signs of badger activity were recorded within the proposed development site, badger could potentially establish new setts within the ZoI of the proposed development. Therefore, a confirmatory pre-construction check of all suitable badger habitat will be completed

within 12 months prior to any construction works commencing by a suitably experienced and qualified ecologist.

6.200 The presence of any new setts or significant badger activity will be treated and/or protected in accordance with the *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes* (NRA, 2005).

6.201 If required, a licence permitting their filming to assess locations of activity and their subsequent removal should be applied for from the NPWS. Any active badger setts located within the development or 30m from the development must be safely closed with the use of one-way badger gates and (infra-red camera) monitoring to ensure that all badgers have left the sett(s) and that it is no longer occupied, prior to sett removal. Any sett closing works shall be undertaken between the months of July to November inclusive (to avoid peak breeding season for this species and therefore avoid risk of disturbance to or mortality of cubs), in advance of site clearance and construction works commencing.

Otter

Water Quality

6.202 Mitigation measures outlined above in "Mitigation Measures – Habitats and Flora" for the protection of water quality in the downstream receiving water courses, *i.e.* Griffeen River, and its immediate environs will mitigate against impacts of water pollution on the prey availability of otter during Construction Phase.

Bats

Lighting

6.203 During construction, any external lighting to be installed, including facilitating night-time working or security lighting, on the site shall be sensitive to the presence of bats in the area, downlighting, and time limited where possible. Lighting of sensitive wildlife areas and primary ecological corridors (*e.g.* Grand Canal and retained hedgerows in the immediate vicinity to the Proposed Development) and light pollution in general should be avoided. Lighting of the site during construction is designed in accordance with the following guidance:

- Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2020)
- Bats & Lighting - Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, December 2010)
- Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2018).

6.204 It will be ensured in liaison with the suitably experienced and qualified ecologist that lighting at the construction compound, and active work areas within and adjacent to the proposed development, will be designed to minimise light spill outside the footprint of the proposed development, and be cognisant of light-spill into previously unlit areas. Any light spill to commuting/foraging habitats of bats may exclude them from using these areas and therefore have a negative impact on them through reduced food resources and/or longer flight routes as they try to avoid flying through the lit-up area by flying around it.

6.205 Mitigation measures to reduce light spill during construction will include the following:

- the use of sensor/timer triggered lighting;
- LED luminaires to be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability;
- column heights to be considered to minimise light spill;
- accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed; and,

- Where night-time works are required the suitably experienced and qualified ecologist will be liaised with to implement measures to mitigate the impact of such works.

Vegetation Removal

6.206 The loss of hedgerows across the proposed development site will not result in significant effects on bats arising from habitat loss, as per the impact assessment above. The provision of new hedgerows, tree shelter belts, attenuation ponds and wet meadows will enhance the suitability of those parts of the proposed development site for foraging bats. The provision of shelter belts and hedgerows is likely to have a neutral effect on common species such as common pipistrelle bat, soprano pipistrelle bat and Leisler's bat, as their installation is not anticipated to result in a change to the number of bats of these species that will use the site for foraging and commuting.

6.207 The provision of 2 no. attenuation ponds within the proposed development site, and associated riparian planting will enhance the site for bat species associated with waterways and open water, specifically Daubenton's bat *Myotis daubentonii*. Upon their establishment, which is likely to take 2-3 years following construction, the ponds will provide stepping stone sites for this species, which uses the adjacent Grand Canal ecological corridor for foraging. The effects of enhancement of the proposed development site for this species is likely to be significant at the local scale, e.g. the proposed development site will contain high quality habitat for this species that was not present prior to its development.

Birds (Breeding Birds and Wintering Birds (Non-SCI))

6.208 The following mitigation measures are proposed to comply with the legal protection afforded to breeding birds and their nests under the Wildlife Acts:

- In order to avoid disturbance or harm to breeding birds, their nests, eggs and/or their unflown young, all works involving the removal of trees, hedgerows or grasslands will be undertaken outside of the nesting season (i.e. 1 March to 31 August inclusive);

  or where this seasonal restriction cannot be observed then:

- A breeding bird survey will be undertaken by a suitably experienced ecologist in order to assess whether birds are nesting within suitable habitat affected by or immediately adjacent to the proposed works. Should nesting birds be encountered during surveys, it may be necessary to delay the removal of trees, hedgerows or grasslands until after the nesting season (i.e. 1 March to 31 August inclusive), or until the chicks have fully fledged.

Common Frog

6.209 No significant effects on common frog are predicted during the Construction Stage of the proposed development, therefore no mitigation is required.

Common lizard

6.210 No significant effects on common lizard are predicted during the Construction Stage of the proposed development, therefore no mitigation is required.

Fish

Water Quality

6.211 Mitigation measures outlined above in "Mitigation Measures – Habitats and Flora" for the protection of water quality in the downstream receiving water courses, *i.e.* Griffeen River, and its immediate environs will mitigate against impacts of water pollution on fish during Construction Phase.

Freshwater White-clawed Crayfish

Water Quality

6.212 Mitigation measures outlined above in "Mitigation Measures – Habitats and Flora" for the protection of water quality in the downstream receiving water courses, *i.e.* Griffeen River, and its immediate

environs will mitigate against impacts of water pollution on freshwater white-clawed crayfish during Construction Phase.

Other Rare and/or Protected Invertebrates – Aquatic Species

Water Quality

6.213 Mitigation measures outlined above in "Mitigation Measures – Habitats and Flora" for the protection of water quality in the downstream receiving water courses, *i.e.* Griffeen River, and its immediate environs will mitigate against impacts of water pollution on aquatic invertebrates during Construction Phase.

Operational phase

Habitats and Flora

6.214 Chapter 8 of this EIAR by AWN Consulting Ltd. and Engineering Planning Report by Pinnacle submitted with this application outline the following operational phase mitigation measures for water quality.

Surface water

6.215 The proposed drainage system for the site has been designed in accordance with Greater Dublin Strategic Design System (GDSDS) specifications. The drainage system will include a Stormtech attenuation system or similar. Roof water will be directed into an onsite reticulation system which will drain, along with road run-off, into the attenuation ponds which are to be located to the north of the site. A Hydrobrake will also be installed at the outflow to reduce the ultimate discharge.

6.216 Pinnacle have identified that the above storm water drainage systems will accommodate a 1:2 year storm frequency. The attenuation system is also designed to accommodate a 1:100 year storm event accounting for a 20% increase with climate change.

6.217 Due to a variety of measures such as the design of the attenuation system with hydrocarbon interceptors, the speed restrictions in place and the fact that no refuelling will be carried out on site (when practicable), the likelihood of any spills entering the water environment from vehicles on site is negligible.

6.218 Run-off from the car park areas and access roads/delivery areas will be drained following these options:

- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers; and,
- A Duraflow (or similar approved), porous asphalt product.

6.219 To minimise any impact from material spillages, all oils, solvents, paints and fuels to be stored onsite will be stored within permanently bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within it (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) will be diverted for collection and safe disposal.

Foul water

6.220 In their Engineering Planning Report Pinnacle, submitted with the original application, have proposed to discharge foul water from the proposed development, via a 225mm diameter gravity foul sewer outfall and discharge into the existing 450mm diameter connection. The increase in flow to the existing public foul sewer is not expected to have a negative effect on the foul drainage system in the area.

Fauna

Badger

6.221 No significant effects on badger are predicted during the Operational Stage of the proposed development, therefore no mitigation is required.

Otter

6.222 Refer to "*Operational Phase – Potential Impacts on Designated Sites*" and "*Operational Phase – Mitigation Measures for Habitats and Flora*".

Small Mammals

6.223 No significant effects on small mammals are predicted during the Operational Phase of the proposed development, therefore no mitigation is required.

Bats

Lighting

6.224 The Lighting design for the site during operation is designed in accordance with the following guidance:

- Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2020)
- Bats & Lighting - Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, December 2010)
- Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2018).

6.225 Adhering with these guidelines ensures sensitive siting and design of the lighting elements and will include careful consideration of light placement on buildings, column heights and luminaire design.

6.226 The following recommendations based on the above guidance have been considered in relation to the detailed construction and operational lighting design, and have been reviewed by a suitably qualified and experienced ecologist:

- All pole mounted columns will be 5m high – located facing away from boundaries to minimise any light spill beyond the area to be illuminated;
- The fittings have a sharp cut off with no upward light spill to minimise any resultant sky glow; and
- All fittings selected will be LED selected with a lighting output spectrum which is appropriate for bat sensitive areas.

6.227 These are in adherence with the guidance presented in relation to bats and lighting previously in this Chapter.

Birds (Breeding Birds and Wintering Non-SCI Birds)

6.228 No significant effects on breeding birds and/or wintering non-SCI birds are predicted during the Operational Phase of the proposed development, therefore no mitigation is required.

Common Frog

6.229 No significant effects on common frog are predicted during the Operational Phase of the proposed development, therefore no mitigation is required.

Common Lizard

6.230 No significant effects on common lizard are predicted during the Operational Stage of the proposed development, therefore no mitigation is required.

Fish

6.231 Refer to "*Operational Phase – Potential Impacts on Designated Sites*" and "*Operational Phase – Mitigation Measures for Habitats and Flora*".

Freshwater White-clawed Crayfish

6.232 Refer to "*Operational Phase – Potential Impacts on Designated Sites*" and "*Operational Phase – Mitigation Measures for Habitats and Flora*".

Other Rare/and/or Protected Invertebrates

6.233 No significant effects on terrestrial invertebrates are predicted during the Operational Stage of the proposed development, therefore no mitigation is required. With regard to aquatic invertebrates, refer to "*Operational Phase – Potential Impacts on Designated Sites*" and "*Operational Phase – Mitigation Measures for Habitats and Flora*".

Residual Impact of the Proposed Development

Construction and Operational phases

6.234 Following the implementation of the mitigation measures outlined in Section above, the Proposed Development will not result in any significant residual effect on its own, or cumulatively with other plans or projects on any Key Ecological Receptors identified (see Table 6.7) with the exception of bats. For bats, there will be a significant positive effect at the local scale for Daubenton's bat arising from the provision of new attenuation pond habitats within the proposed development site, which will provide stepping stone sites from the adjacent Grand Canal ecological corridor.

Table 6.7 Summary of the significant residual ecological effects of the Proposed Development during construction and operational phases.

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation, Compensation or Enhancement Measures	Significance of Residual Effects
North Bull Island SPA	International	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures".	None
South Dublin Bay SAC	International	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures".	None
South Dublin Bay and River Tolka Estuary SPA	International	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
North Dublin Bay SAC	International	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
Grand Canal pNHA	National	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
Dolphins, Dublin Docks pNHA	National	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
South Dublin Bay pNHA	National	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
Booterstown Marsh pNHA	National	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
North Dublin Bay pNHA	National	None	N/A	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and	None

				Measures"..	
Hedgerows (WL1)	Local importance (higher value)	Permanent loss of habitat (*c.* 730m)	Local importance (higher value)	Compensatory measures to offset hedgerows lost with new hedgerows and screening belts of mixed native tree species in	None
Grassy verges (GS2) and Recolonising Bare ground (ED3) habitats	Local importance (higher value)	Permanent loss of habitat	Local importance (higher value)	Compensatory measures to offset habitat lost with areas of higher value habitats (wetlands) in "Mitigation, Compensation and Measures".	Significant positive effect – replacement with higher value habitat
Badger	Local importance (higher value)	None	N/A	Pre-construction checks	None
Otter	County importance	Water quality impacts	County importance	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
Small mammals	Local importance (higher value)	None	N/A	N/A	None
Bats	Local importance (higher value)	Lighting	Local importance (higher value)	Bat sensitive lighting plans included on a precautionary basis Provision of replacement hedgerow and tree shelter belt planting; Provision of 2 new attenuation ponds and riparian habitats.	None for common species such as Common pipistrelle bat, soprano pipistrelle bat and Leisler's bat. The provision of 2 no. attenuation ponds will result in a significant positive effect on Daubenton's bat at the local scale.
Breeding birds	Local importance (higher value)	Vegetation clearance	Local importance (higher value)	Seasonal vegetation clearance Breeding bird surveys prior to vegetation clearance in breeding season These measures are in adherence for Wildlife Acts	None
Wintering non-SCI birds	Local importance (higher value)	None	N/A	N/A	None
Common frog	Local importance (higher value)	None	N/A	Pre-construction checks in adherence with Wildlife Acts	None
Common lizard	Local importance (higher value)	None	N/A	N/A	None
Fish (species of conservation concern)	County importance	Water quality impacts	County importance	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
Invertebrates -freshwater white-clawed crayfish	County importance	Water quality impacts	County importance	Mitigation measures to protect water quality outlined in "Mitigation, Compensation and Measures"..	None
Other rare and/or protected invertebrates	Local importance (higher value)	Water quality impacts (aquatic invertebrates only)	Local importance (higher value)	Mitigation measures to protect water quality outlined in "Mitigation Measures".	None

Cumulative impact

6.235 This section of the Biodiversity chapter presents the assessment carried out to examine whether any other Proposed Developments have the potential to act cumulatively with the Proposed Development to give rise to likely significant effects on biodiversity. As set out in the *South Dublin County Development Plan 2016-2022*, the Proposed Development site is zoned as 'EE – Enterprise and Employment' ("*to provide for enterprise and employment related uses")*. Lands to the south, west and east are similarly zoned for '*EE'*, and area to the north as 'RU – Rural and Agriculture*'* ("*to protect and improve rural amenity and to provide for the development of agriculture*").

Construction and Operation Phases

Surface and Foul Water

6.236 There is potential for cumulative or "in-combination" effects on water quality of downstream waterbodies located in the Liffey sub-catchment and Liffey and Dublin Bay catchment from any other projects carried out within the functional areas of the *South Dublin County Development Plan 2022-2028* (South Dublin County Council, 2022) and any other county level land use plans which can influence conditions in River Liffey: *Dublin City Development Plan 2016-2022* (Dublin City Council, 2016), the *Dún Laoghaire-Rathdown County Development Plan 2022-2028* (Dún Laoghaire-Rathdown County Council, 2022), the *Fingal Development Plan 2017-2023* (Fingal County Council, 2017), or any other county level land use plans which can influence conditions in Dublin Bay via rivers and other surface water features.

6.237 The Proposed Development will not impact on the water quality in Dublin Bay, as concluded by the associated Appropriate Assessment screening report (Scott Cawley Ltd., 2022) and Hydrology chapter of this EIAR. Dublin Bay is currently assessed as unpolluted by the EPA, and the Proposed Development will not result in any measurable change on water quality in Dublin Bay (see Chapter 8 Hydrology). There are also protective policies and objectives in place at a strategic planning level to protect water quality in Dublin Bay (as outlined below and in Appendix 6.5). The pollutant content of future surface water discharges to Dublin Bay following treatment at Ringsend WwTP is considered likely to decrease in the long-term for the following reasons:

- Irish Water are currently undertaking a major upgrade of the Ringsend WwTP to increase the plant's wastewater treatment capacity to a population equivalent of 2.4 million, which is programmed for completion in 2025[30], and
- There is a commitment in the National Development Plan 2021-2030[31] to invest in and progress the Greater Dublin Drainage Project which includes the development of a new regional wastewater treatment facility and associated infrastructure to serve the Greater Dublin region including parts of the surrounding counties of Kildare and Meath. The project will involve the provision of a new regional wastewater treatment plant at a site in the northern part of the Greater Dublin Area and the provision of a new Orbital Drainage Sewer linking the new plant to the existing regional sewer network, which will enable future connections for identified areas of development within the catchment area. The provision of the Greater Dublin Drainage Project, once constructed will augment the wastewater treatment capacity currently provided by Ringsend WwTP across the Greater Dublin Area and alleviate pressure within the existing wider wastewater network and help to ensure that the waste water generated is appropriately treated, in compliance with the EU and national waste water treatment regulations.

6.238 It is also a recommendation of the Greater Dublin Strategic Drainage Study (2005), and a requirement of all development plans within the catchment of Ringsend WwTP, to include Sustainable Urban Drainage Systems (SuDS) within new developments. The relevant development plans also have protective policies/objectives in place to protect water quality in the receiving

[30] Details on Irish Water Ringsend WwTP upgrade. Available at: https://www.water.ie/projects/local-projects/ringsend/ Accessed on: 27 June 2022.

[31] Government of Ireland (2021) *Project Ireland 2040, National Development Plan 2021-2030.*

freshwater and marine environments, and to implement the Water Framework Directive in achieving good water quality status for Dublin Bay.

6.239 Therefore, there is no possibility of any other plans or projects acting in combination with the Proposed Development to undermine the conservation objectives of any of the Qualifying Interests or Special Conservation Interests of European sites or overlapping or separate Natural Heritage Areas or in, or associated with, Dublin Bay as a result of water quality effects.

Habitat Loss and Disturbance and/or Displacement

6.240 In the event that habitat loss of *c.* 454m of hedgerows (WL1) coincided with the loss of similar habitats in the vicinity of the Proposed Development, the geographic scale of the effects could rise from local level only to county level, as these types of habitats are important for the biodiversity value of the locality and for local fauna (*e.g.* bats and breeding birds) in terms of providing foraging and breeding opportunities, and in addition, linear habitats create ecological corridors throughout the wider landscape. The adjacent lands around the Proposed Development are likely to be developed at some point for industrial purposes in the future, however areas to the north-west and north of the Proposed Development site are zoned as 'RU – Rural and Agriculture*'* in the *South Dublin County Development Plan 2022-2028* and are therefore likely to remain in their current use, it is unlikely that potential cumulative effects will occur.

6.241 There are no significant potential impacts on fauna as a result of habitat loss arising from the development. However, there is potential for cumulative impacts on fauna in the area to arise as a result of habitat loss, if further hedgerows in the locality are removed. However, given the agricultural zoning of lands to the immediate west and already developed industrial nature of the remaining surrounding environment, no significant cumulative effects are predicted that would increase the magnitude of the residual impacts associated with the Proposed Development as a result of habitat loss, in conjunction with the Proposed Development.

6.242 There are granted planning permissions for further industrial developments such as data centre developments, etc. in the vicinity of the Proposed Development site, some of which may be in construction at the same time as the Proposed Development. There is potential for cumulative impacts to arise with other local developments that would also result in the increased noise, vibration, human presence and lighting leading to additional or increased disturbance on fauna. Any disturbance effects from other such local developments are likely to be relatively minor in nature, localised and over a similarly short duration, they are not likely to cumulatively affect the bird or bat populations in conjunction with the Proposed Development considering that they have to adhere to the same policies and objectives of the *South Dublin County Development Plan 2022-2028* as the Proposed Development.

Protective Policies and Objectives and Conclusion

6.243 Any long-term effects on biodiversity are likely to be moderated by the requirements of environmental protective policies and objectives of the *South Dublin County Development Plan 2022-2028* and *South Dublin Biodiversity Action Plan 2020-2026* that project must be cognisant of and mitigate for as appropriate, in support of thed planning application.

6.244 There are general overarching policies in the *South Dublin County Development Plan 2022-2028* to ensure that proposals for development integrate the protection and enhancement of biodiversity (Core Strategy, section 3.3.2 and Chapter 4) and to identify and protect sites of local biodiversity importance (Section 4.3). There are also specific objectives to protect European sites and to prevent development that would adversely affect the integrity of any European site(s) (section 3.3.3), protect designated or proposed natural heritage areas (section 3.3.2 and 3.3.3), to ensure that development does not have significantly impact on protected habitats and species (section 4.1) and to control and eradicate invasive species (section 4.3.2 and 12.3.2). The *South Dublin County Development Plan 2022-2028* also has specific policies and objectives relating to the protection of surface water and groundwater resources (section 11.2.1) and the protection of air quality (section 11.7.1).

6.245 Land use plans for the other local authorities (*e.g.* Meath County Council, Kildare County Council, Wicklow County Council and the Dublin local authorities) whose functional areas also include the

Liffey and Dublin Bay catchment or other surface water catchments that drain to Dublin Bay, were examined and analysed and those land use plans also include protective environmental policies to protect biodiversity, designated sites for nature conservation and the receiving surface water, estuarine and marine environments.

6.246 Considering the predicted impacts associated with the Proposed Development, the mitigation, compensation and enhancement measures proposed to protect and enhance the local biodiversity resource and the receiving environment, and the protective policies and objectives on the land-use plans that will direct future development locally, significant cumulative negative effects on biodiversity are not predicted. Positive effects are predicted at the local geographic scale for Daubenton's bat arising from the provision of 2 no. new ponds within the proposed development site which represents high-quality foraging habitat for this species.

Monitoring

6.247 Not immediately applicable. No ecological monitoring is required during the Construction or Operational Phases of development.

Reinstatement

6.248 No reinstatement measures are proposed.

Difficulties Encountered

Survey Limitations

6.249 Wintering bird surveys were not carried out due to the lack of suitable habitat within the Proposed Development site and its immediate vicinity. However, this is not considered to have posed any significant limitations on the ecological assessment of the Proposed Development.

6.250 The surveys did not include a dedicated amphibian presence/absence surveys. This is not considered to pose any significant limitations on the ecological assessment of the subject lands owing to lack of suitable habitat confirmed within the Proposed Development lands for smooth newt and common frog. Notwithstanding this fact, precautionary mitigation recommendations have been included in this assessment for amphibians within the Proposed Development site.

7. LAND, SOIL, GEOLOGY AND HYDROGEOLOGY

7.1 AWN Consulting Ltd (AWN) has prepared this chapter of the Environmental Impact Assessment Report (EIAR) which assesses and evaluates the potential impacts of the development on the land, soil, geological and hydrogeological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

Methodology

Criteria for rating of effects

7.2 This chapter evaluates the effects, if any, which the development has had or will have on Land, Soils, Geology and Hydrogeology as defined in the Environmental Protection Agency (EPA) '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports'* (EPA, 2022). The Draft EPA document entitled *'Advice Notes for Preparing Environmental Impact Statements'* (EPA, 2015) is also followed in this geological and hydrogeological assessment and classification of environmental effects. Due consideration is also given to the guidelines provided by the Institute of Geologists of Ireland (IGI) in the document entitled *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'* (IGI 2013). In addition, the document entitled *'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'* by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate.

7.3 The rating of potential environmental effects on the land, soil, geological and hydrogeological environment is based on the matrix presented in Table 1 in Appendix 7.1 which takes account of the quality, significance, duration and type of effect characteristic identified (in accordance with impact assessment criteria provided in the EPA Guidelines (2022) publication).

7.4 The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium-term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

7.5 The NRA criteria for rating the magnitude and significance of impacts on the geological related attributes and the importance of hydrogeological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Tables 1-5 in Appendix 7.2.

7.6 The principal attributes (and effects) to be assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the subject site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural uses of soil around the site;
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves;
- The extent of topsoil and subsoil cover and the potential use of this material on site as well or requirement to remove it off-site as waste for disposal or recovery;
- High-yielding water supply springs/ wells in the vicinity of the site to within a 2km radius and the potential for increased risk presented by the proposed development;
- Classification (regionally important, locally important etc.) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the proposed development associated with aspects such as for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality;
- Natural hydrogeological/karst features in the area and potential for increased risk presented by the activities at the site; and
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally.

7.7 Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1: 100,000 mapping;
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) – website mapping and database information;
- National Parks and Wildlife Services (NPWS) – Protected Site Register; and
- South Dublin County Council - illegal landfill information.

7.8 Site specific data was derived from the following sources:

- Lands at Ballymakaily – Ground Investigation. Causeway Geotech. August 2018 (Report No. 18-0827, included as Appendix 7.3).
- Groundwater quality monitoring data, December 2020 (Appendix 7.4);
- Various design site plans and drawings; and
- Consultation with site engineers.

Water Framework Directive (WFD) Status

7.9 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy; commonly known as the Water Framework Directive (WFD) establishes a framework for community action in the field of water policy.

7.10 The WFD requires '*Good Water Status*' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. '*Good status*' means both '*Good Ecological Status*' and '*Good Chemical Status*'. In 2009 the first River Basin Management Plan (RBMP) 2009-2015 was published. The second cycle river basin management plan was carried out between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle (2022-2027) is currently being undertaken.

7.11 During the development of this Plan, a prioritisation exercise was undertaken by the local authorities, the EPA and other stakeholders to identify those water bodies that require immediate action within this plan cycle to 2021. During the catchment characterisation, the EPA identified those water bodies either '*At Risk*' of not achieving their objectives or '*Under Review*'. The outcome of this prioritisation process was the selection of 190 Areas for Action across the 5 Local Authority regions. Within these 190 areas, a total of 726 water bodies were selected for initial actions during this RBMP cycle. There are 832 water bodies identified as being '*At Risk*' of not achieving their environmental objectives under this Plan that have not been included in the Areas for Action. For most of these water bodies, targeted actions will be undertaken in the third cycle RBMP from 2022-2027. The draft 3rd cycle RBMP has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the Proposed Development.

7.12 The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended SI No. 77 of 2019)
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 S.I. No. 366 of 2016);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010); and
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011)

- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988;
- Local Government (Water Pollution) Acts 1977-1990;
- SI No. 258 of 1988 Water Quality Standards for Phosphorus Regulations 1998;
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board);
- Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers;
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors;
- CIRIA C648 Control of Water Pollution from Constructional Sites;
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA/TII, 2006).

7.13 AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report that is included with the application documentation. This EIA Chapter in combination with the WFD Screening Report considers potential for increased risk of deterioration of this status due to the activities of the site.

Receiving environment

7.14 The proposed development is to be located on an undeveloped portion of an existing data centre campus within the townland of Ballymakaily to the west of the Newcastle Road (R120), Lucan, Co. Dublin. The site is approximately 5.14ha. and has a slight gradient to the north-east.

7.15 The proposed development site is bounded to the north by the Grand Canal; the eastern boundary of the site is formed by R120 with the current EdgeConnex facility on the opposite side. Greenfield lands bound the site to the west and south.

Topography

7.16 The site is relatively flat, there is a fall of approximately 1.5-2.0m from the south-western boundary of the site north-east towards the canal (from c. 66m AOD to c. 64m AOD). Figure 7.1 presents the topographic nature of the site and the surrounding area.

Drainage

7.17 The site is in the catchment of the Griffeen River and the existing drainage is discussed in Chapter 8 of this EIAR. There is no connectivity with the adjoining canal which is lined.

Land use

7.18 The land surrounding the site is a mixture of agricultural (currently used as pasture land predominantly for livestock grazing to the west of the R120 and to the north of the canal), residential and industrial. According to the EPA website, there are a number of licensed IPPC facilities in the locality (Takeda Pharma Ltd, Grange Back Up Power Ltd. and Pfizer Biotech) and there are no licensed waste facilities in the vicinity of the subject site. Consultation with South Dublin County Council confirmed that there are no known illegal/historic landfills within 500 metres of the site.

Figure 7.1 Site Location and Local Hydrological Environment

Soil and subsoil

7.19 On the GSI soil classification maps, the soil type beneath the eastern part of the site area predominantly comprises BminPD - Surface water Gleys / Ground water Gleys Basic. The western portion of the overall site area is composed predominantly of BMinDW soils-Grey Brown Podzolics/Brown earths basics as presented in Figure 7.2 below.

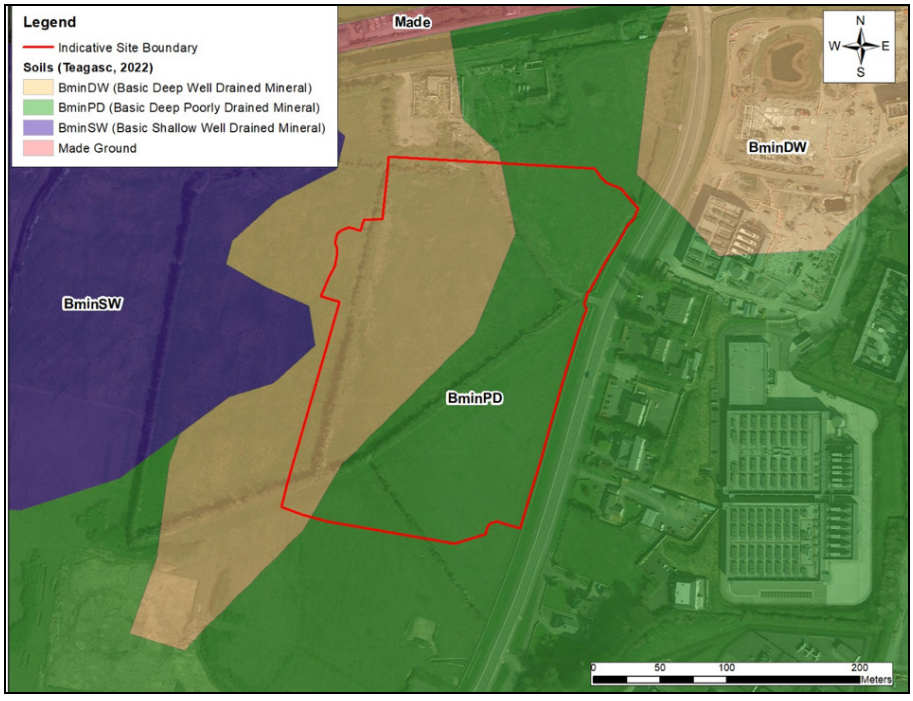


Figure 7.2 Soil Map (Source: GSI/ Teagasc, 2022).

7.20 On the GSI regional mapping the site and overburden geology comprise Quaternary Glacial Till (TLs). The Glacial Till is derived from limestone and is a common soil cover in this region as seen in Figure 7.3 below.

Figure 7.3 Subsoil Map (Source: GSI, 2022).

7.21 The following ground conditions were encountered during the investigation process: 0-0.3 metres below ground level (mbgl) of clayey topsoil is present. Cohesive deposits underlie this top soil until bedrock was encountered (i.e., from 0.3 to 1.1-3.2 mbgl). These deposits comprise a variation of firm to stiff sandy gravelly CLAY (glacial till) and overlie low permeability Calp limestone (see Section 7.54).

Bedrock geology

7.22 Inspection of available GSI data shows that the bedrock geology underlying the site and surrounding area is dominated by rocks of Carboniferous Age. The site and local area is underlain by Dinantian (Upper Impure) Limestones or 'Calp' limestone that is dark grey to black limestone and shale of the Lucan Formation (refer to Figure 7.4 below).

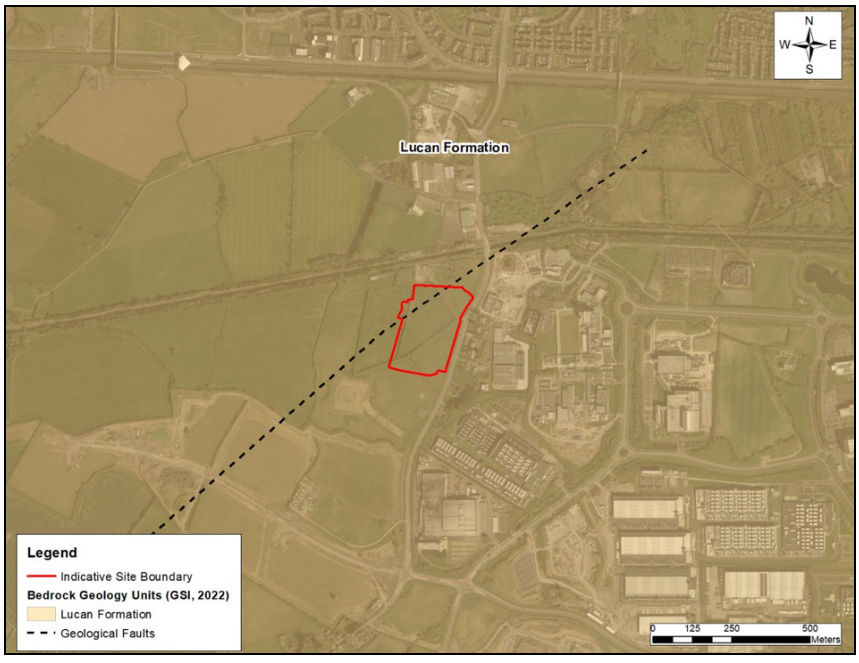


Figure 7.4 Bedrock Geology Map (Source: GSI, 2020).

7.23 Site specific information has been derived from an extensive site investigation involving drilling and trial pitting undertaken at the site in March 2018 by Causeway Geotec (Report No. 18-0827) across the overall site. Fifteen boreholes were drilled, nineteen trial pits were excavated, 19 dynamic probes were conducted adjacent to the trial pits and indirect and CBR tests were undertaken at nineteen locations. Six boreholes were designed as monitoring wells.

7.24 Of these points, 5 no. boreholes (BH03, BH05, BH07, BH08 and BH11) and 6 no. trial pits (TP03, TP04, TP07, TP08, TP11 & TP12) are located within the application site. BH05 and BH11 were designed as monitoring boreholes.

7.25 The depth to bedrock throughout the site was confirmed as 1.1-3.2mbgl. The site investigation also confirms identification of the bedrock as dark grey and black limestone. The report attached (Appendix 7.3) provides borehole and trial pit data for the area proposed for this development.

7.26 No bedrock outcrops were identified during the site investigations. Figure 7.4 above indicates faults running in south-west to north-east direction over the most north-western corner of the site. The GSI database presently lists no karst features in the immediate vicinity of the subject site and significant karstification would not be expected in this type of limestone.

Groundwater Quality

7.27 Presently, the groundwater body in the region of the site (Dublin GWB - IE_EA_G_008) is classified under the WFD Risk Score system (EPA, 2023) as under “Review” meaning the GWB is being reviewed to determine whether or not the GWB has achieved its objectives and has either no significant trends or improving trends. The Dublin GWB was given a classification of “Good” status for the last WFD cycle (2016-2021).

Geological heritage

7.28 The Geological Survey of Ireland (GSI) Public Viewer www.gsi.ie/mapping was reviewed to identify sites of geological heritage for the site and surrounding area. There are no recorded sites on the development site. A full audit has not yet been completed for Dublin; however, there is no evidence of any site which could be considered suitable for protection under this programme or recorded in the South Dublin County Development Plan 2022-2028.

Economic geology

7.29 The Extractive Industry Register (www.epa.ie) and the GSI mineral database was consulted to determine whether there were any mineral sites close to the proposed development. There are no active quarries located in the immediate vicinity with the nearest quarry located approximately 4 km to the southeast which is classified as the Belgard Quarry. The EPA ENVision website also confirmed that there are no mines on or near the site.

Geo-hazards

7.30 There are no expected geohazards at this location. 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. The GSI landslide database was consulted and the nearest landslide to the proposed development was 7.5km to the north, referred to as the Diswellstown event which occurred on 24th December 1999. There have been no recorded landslide events at the site. Due to the local topography and the underlying strata there is a negligible risk of a landslide event occurring at the site.

7.31 In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. However, currently there are five permanent broadband seismic recording stations in Ireland and operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to

the proposed location was in the Irish sea (1.0 – 2.0 Ml magnitude) and ~55 km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to the proposed development site.

Radon

7.32 According to the EPA (now incorporating the Radiological Protection Institute of Ireland) the site location is a Moderate Radon Area where is it estimated that between five and ten percent per cent of the homes in this 10km grid square are estimated to be above the Reference Level. This is the third highest of the five radon categories which are assessed by the EPA.

Rating of importance of geological and soil attributes

7.33 Based on the TII methodology (2009) (See Appendix 7.2), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as low importance with low quality significance or value on a local scale. There are no extractable minerals or areas of geological heritage and the soils are suitable for agricultural use but are typical of surrounding agricultural land.

Groundwater – aquifer classification & vulnerability

7.34 Aquifers are generally classified as rocks or other matrices that contain sufficient void spaces and which are permeable enough to allow water to flow through them in significant quantities.

Aquifer classification

7.35 An inspection of the available GSI records as presented in Figure 7.5 below and confirmed by drilling on site indicates that the bedrock geology of the site and the surrounding area is dominated by Dinantian Limestones (Calp). The GSI has classified this aquifer as Locally Important (Ll) i.e. an aquifer which is moderately productive only in local zones. See Figure 7.5 below.

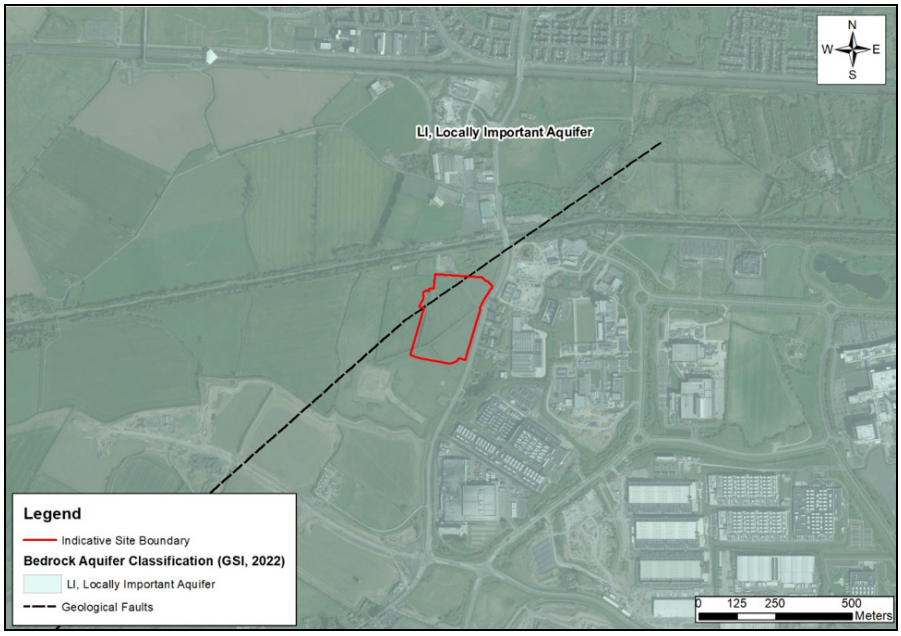


Figure 7.5 Aquifer Clasification (Source: GSI, 2020)

Aquifer vulnerability

7.36 Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures, the main feature that protects groundwater from contamination, and therefore the most important feature in protection of groundwater, is the subsoil (which can consist solely or of mixtures of peat, sand, gravel, glacial till, clays or silts).

7.37 The GSI presently classifies the aquifer in the region of the site as Extreme (E) which indicates an overburden depth of 0-3m is present. This is consistent with site investigation data and the site is considered to have Extreme Vulnerability. The GSI identifies rock is at or near the surface across the

western boundary of the subject site. No bedrock outcrops were identified in the Causeway Geotech site investigation report of September 2018. Refer to Figure 7.6 below.

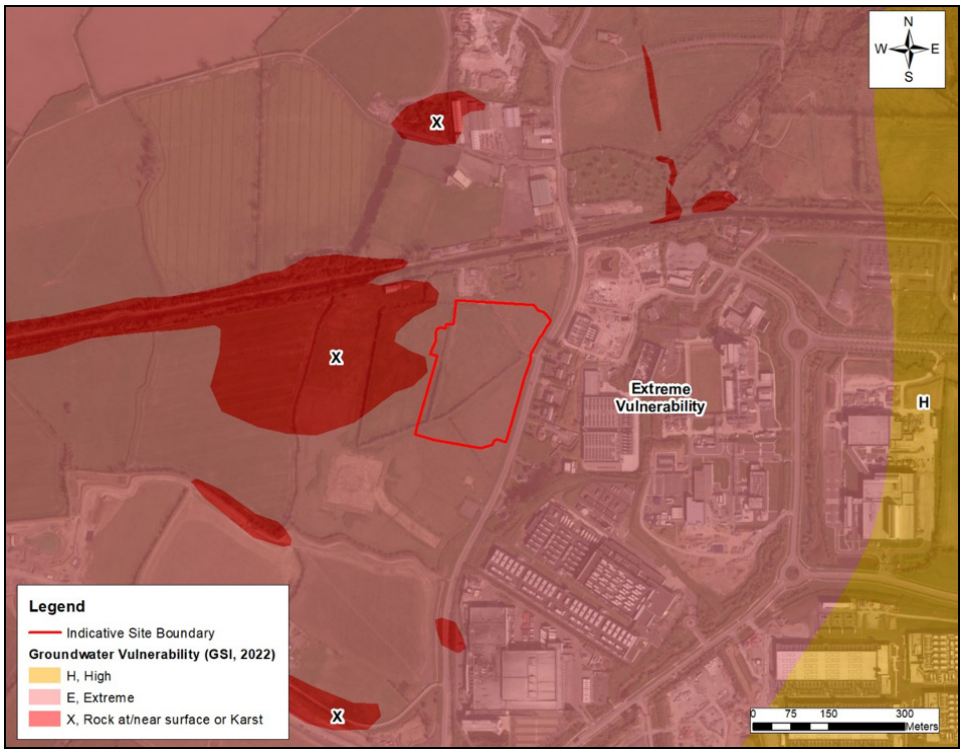


Figure 7.6 Aquifer Vulnerability (Source: GSI, 2020).

Soil quality

7.38 During the site investigation a number of samples taken from a select number of trial pits and boreholes were analysed to identify any possible contamination on site. Samples were analysed for hydrocarbons (mineral oils, BTEX), PAHs, metals and phenols. There are no legislative thresholds for soil in Ireland and therefore results were compared with the Land Quality Management (LQM)/Chartered Institute of Environmental Health (CIEH) Suitable for Use Levels (S4ULs) for Human Health Risk Assessment (Nathanial et al, 2015) which allow assessment based on health risk and use of the site. A review of the representative soil quality analysis results does not indicate any notable contamination across the site. Laboratory results are presented in Appendices 7.3 and 7.4, and are summarised below.

Metals

7.39 A total of 10 metals were assessed in 19 soil samples (from 15 locations) across the overall site. Concentrations of the majority of heavy metals analysed for were found to be in line with natural background levels. All metal parameters are well below the relevant LQM/CIEH S4ULs for commercial developments. Asbestos identification analysis was undertaken all 24 samples and no asbestos was detected in any of the samples.

Organic Hydrocarbons

7.40 Organic hydrocarbons were analysed in all soil samples across the subject site. 17 of the samples showed concentrations of aliphatic, aromatic, polycyclic aromatic hydrocarbon (PAHs) and phenols below their relevant levels of detection. Two locations within the subject site, BH08 & BH11 were over the relevant limit of detection (LOD) for total petroleum hydrocarbons at 41mg/kg and 160 mg/kg respectively. These levels are considerably below the LQM/CIEH S4Uls for commercial land use at 28,000 mg/kg.

Groundwater quality

7.41 As there was no evidence of residual soil contamination based on visual assessment and laboratory analysis it is not likely that there is any resultant groundwater contamination leaching from the soil on

the subject site. However, a monitoring round composed of 4 groundwater samples was carried out in December 2020 (BH05 & BH11 within the site, along with BH10 & BH15) .The samples were submitted to a UKAS accredited laboratory for analysis for COCs comprising suites of metals, speciated PAH, speciated TPH, BTEX, total phenols and inorganics. A summary of results is detailed below. Laboratory report in presented in Appendix 7.4.

Metals

7.42 A total of 10 metals were analysed in all the groundwater samples. Only minor exceedances (marginally exceeding the groundwater regulation (S.I. no 9 of 2010 & S.I. No. 366 of 2016) were found for parameters boron, selenium and zinc. These exceedances in the metals could be related to the natural silts in the groundwater. Sampling in December 2020 did not record concentrations exceeding the abovementioned threshold values.

Organic Hydrocarbons

7.43 A range of aliphatic and aromatic hydrocarbon fractions were analysed for all of the groundwater samples. No exceedance above the Groundwater Regulation threshold value (TV) were recorded within the subject site.

7.44 *BTEX/MTBE Compounds*

All concentrations were recorded below laboratory detection limits in all instances for all groundwater samples.

7.45 *Polycyclic aromatic hydrocarbons*

Concentrations of all compounds recorded were not found to exceed the lab detection limits or the relevant thresholds in all groundwater samples.

Phenols

7.46 Total phenol analysis was carried out in all nine groundwater samples. Concentrations did not exceed the laboratory detection limits in any sample.

Inorganics

7.47 Sulphate, cyanide and pH analysis was carried out on all nine groundwater samples. Concentrations recorded low and below laboratory detection limits in a number of instances. Where concentrations were detected these were less than the assessment criteria. In summary, groundwater sampling and analysis concluded there was no evidence of any significant groundwater contamination evident downgradient of the proposed development site.

Hydrogeological features

7.48 There is no evidence of springs or karstification in this area according to the GSI Karst database (2015).

Areas of conservation

7.49 The lands in which the proposed development is located have no formal designations. The nearest designated land to the site is the Grand Canal pNHA (Site Code: 002104) at c.20m to the north of the northern boundary of the overall site. As the canal is a contained feature (fully lined) there is no potential for a source pathway linkage.

Water supplies

7.50 The GSI Well Card Index is a record of wells drilled in Ireland. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in ROI. This current index does not show any wells drilled and springs at the site or surrounding area with the nearest recorded wells

located over 3km to the west of the site. The area is serviced by public mains therefore it is unlikely that any wells are used for potable supply. The site is not located near any public groundwater supplies or group schemes. There are no groundwater drinking water protection areas within 5km of the site.

Rating of site importance of geological/hydrogeological features

7.51 Based on the TII methodology (2009) (See Appendix 7.2) the importance of the hydrogeological features at this site is rated as *medium importance* based on the assessment that the attribute has a medium quality significance or value on a local scale. The aquifer is a *Locally Important Aquifer* but is not widely used for public water supply or generally for potable use.

Conceptual site model

7.52 Interpretative cross sections have been finalised for the site with views appropriate to the characterisation of the site in terms of the geological (and hydrogeological environment). The inserts below present cross sections for the site and regional area and indicate the following:

- The profile on site comprises thin topsoil overlying sandy gravelly CLAY with cobbles and boulders underlain by (Stiff) Sandy slightly gravelly SILT/CLAY with angular limestone cobbles. The overburden overlays a muddy Limestones (Calp) bedrock.
- Depth to bedrock is shallow across the site and although no outcrops were noted on the site, outcropping bedrock is evident in the surrounding area. The section shows bedrock at c. 0.5-3.0m bgl throughout the site although depth to bedrock was not confirmed for all boreholes within the site area.
- The site is situated on a partially flat developed land with gently undulating greenfield throughout. This topography of the area slopes gently from approximately +68mAOD at the south western boundary to approximately +63.5mAOD at the northern boundary of the site.
- Groundwater was encountered within the overburden in a number of trial pits (TP12, TP14, TP15, TP16), typically as seepage. Groundwater was not noted during drilling of any of the borehole locations. Where water was encountered, this was typically at depths ranging between 1.90m and 2.6m. The Calp limestone is likely to have shallow perched water along the weathered surface, however fracture connectivity will be low, Development of the site is not expected to require any significant dewatering of the bedrock aquifer.
- Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development.
- No evidence of disposal of waste material was identified the location area proposed for excavation. A very localised area of fill was identified to the north of the site however this is not proposed to be excavated. Any excavated material would likely be acceptable at an inert landfill or suitable for re-use as landscaping fill for the final development.

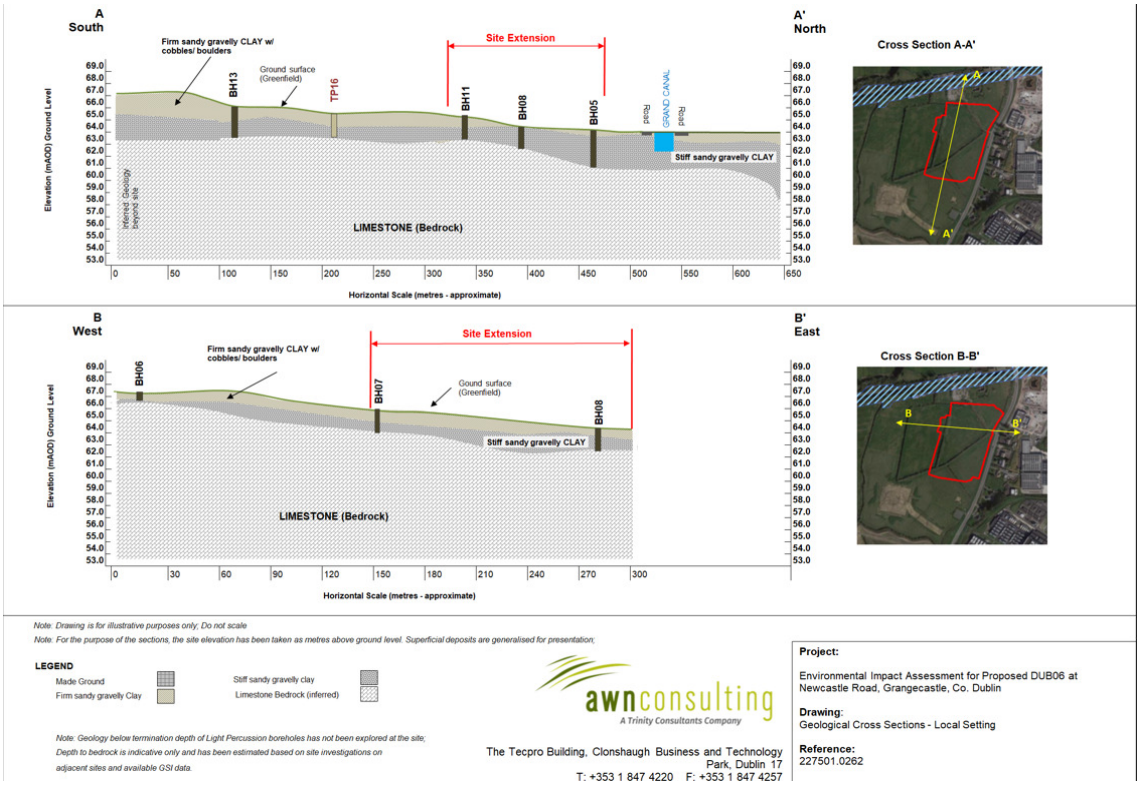


Figure 7.7 Cross-section showing the local site geology

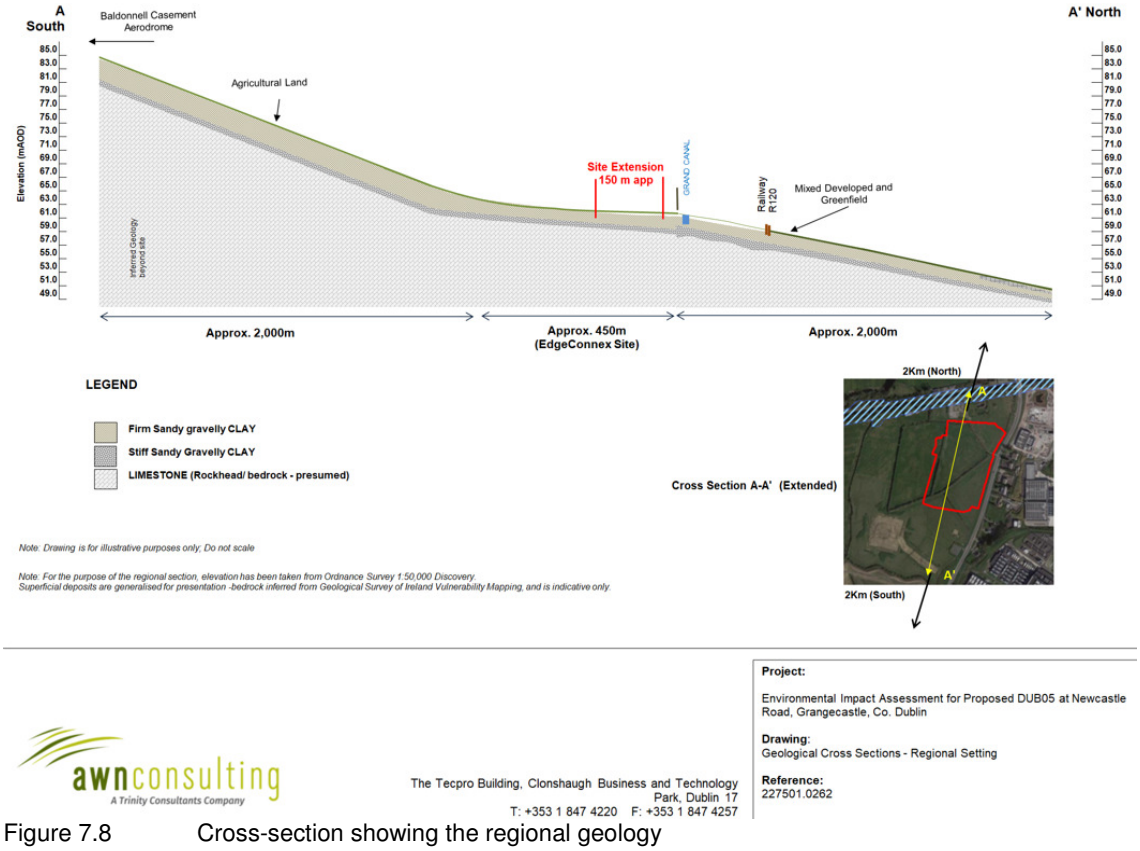


Figure 7.8 Cross-section showing the regional geology

Characteristics of the Proposed Development

7.53 The characteristics of the proposed development with regard to the soil, geological and hydrogeological environment are outlined below. The characteristics relate to both construction and operation activities.

7.54 The proposed development comprises the construction of two no. single storey data centres with associated office and service areas. See Chapter 2 for a comprehensive description of the development.

7.55 The proposed datacentre development will result in a hardstand area of approximately 33,400sqm. 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.

Enabling works for the proposed development

7.56 The following enabling works are proposed as part of this development;

- Removal of localised overburden material will be required during preparation of the platform for the building, but extensive excavations are not required;
- Infilling and landscaping will be undertaken and all soils & subsoils stripped will be reused for infilling, levelling or landscaping;
- Temporary storage of fuel required for on site for construction traffic; and
- No significant dewatering is anticipated to be required for construction as no basement structures are required.

Operational activities

7.57 There will be no direct discharges to ground required for operation of the facility. Water supply will be supplied from public mains and effluent discharge will be to public sewer. Hard standing areas will reduce local recharge to ground. Diesel storage for the backup generators will be required. Each generator will be installed in an externally rated container with a self-contained belly tank (steel double wall type for leak containment and inner tank leak alarm system) with 48 hours diesel fuel storage capacity at full load.

Potential impact of the Proposed Development

7.58 An analysis of the potential impacts of the proposed development on the land, soils, geology and hydrogeological environment during the construction and operation is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water (hydrology) the following impacts discussed will be considered applicable to both chapter 7 and 8 of the EIAR. Waste Management is also considered an interaction.

Construction phase

Excavation and Infilling

7.59 Excavation and infilling within the proposed site will be required as part of the preliminary site enabling works as well the levelling of the site to render it suitable for development. Excavated material will be reused on site for infilling and landscaping works where possible. Import of fill would not be required. Site investigation and laboratory analysis has not identified any existing contamination. However, if contaminated soil/water is encountered, it will be required to be removed by a licensed waste contractor. The volumes of excavation required are as follows:

- Topsoil Cut: 11,300m^3 (@350mm deep); and
- Subsoil Cut: 18,800m^3 (site cut + pond).

7.60 It is currently proposed that all topsoil and subsoil will be reused, where possible, on the site and within the overall campus for berms and other landscaping purposes.

Accidental spills and leaks

7.61 During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Spillage or leakage of temporary oils and fuels stored on site;
- Spillage or leakage of oils and fuels from construction machinery or site vehicles;
- Spillage of oil or fuel from refuelling machinery on site; and
- Run-off from concrete and cement during pad foundation construction.

7.62 Accidental spillages which are not mitigated may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoil's and impact the underlying groundwater. Groundwater vulnerability at the site is currently classified as extreme. Any soil stripping will also further reduce the thickness of subsoil and the natural protection they provide to the underlying aquifer. However, capping of site with impermeable paving and building and associated drainage infrastructure will provide additional protection following construction

Assessment of impact

7.63 Based on the points stated above in relation to the construction phase the potential impact on the soils, geology and hydrogeology during construction (EPA, 2022) is considered to have a short term – imperceptible impact with a neutral impact on quality. i.e. An impact capable of measurement but without noticeable consequences.

Operational phase

Indirect discharges

7.64 There will be no direct discharges of contaminated water to groundwater or soil environment during the operational phase. Apart from diesel fuel, there is no other bulk storage of hazardous liquids at the site which minimises the risk to soils and water. Indirect discharges could occur from the following sources:

- accidental leakages from cars in the car park areas although this will be primarily directed through the surface water drainage through an interceptor;
- accidental leakage from the bunded diesel storage tanks during refuelling;
- overuse of pesticides and herbicides could impact on groundwater quality.

7.65 In addition, the incorporation of hard stand areas will reduce local recharge to ground. An area of 33,400sqm will be covered in hardstand. The overall area of hardstand is small in relation to the area of the entire aquifer and will only have a very local effect on groundwater recharge In the area i.e. no change in the overall groundwater flow regime.

Assessment of impact

7.66 Based on the points above in relation to the operation phase the potential impact on the land, soils, geology and hydrogeology during operation (EPA, 2022) is considered to have a long term– imperceptible impact with a neutral impact on quality. i.e. An impact capable of measurement but without noticeable consequences.

7.67 There will be a local reduction in recharge to the aquifer due to the increase in hardstand on this and surrounding developed lands, however this will not be significant in terms of the overall aquifer hydrogeological profile. There are no significant potential contaminant sources apart from a reserve capacity of diesel stored on the site. Mitigation measures are in place to reduce the potential for and impact on accidental discharges to ground.

'Do-nothing' scenario

7.68 No impact is predicted from the Do-nothing scenario as it will remain in its natural condition.

Remedial and Mitigation Measures

7.69 The design has taken account of the potential impacts of the development on the soils, geology and hydrogeology environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the surrounding soils, geology and hydrogeology. These are described below.

7.70 Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

Construction phase

Soil removal and compaction

7.71 Reuse of excavated soil on site and capping with hardstand will minimise any increase in aquifer vulnerability. Construction works will require local removal of soil cover where levelling of the site is required and its use for re-instatement elsewhere on site. According to the GSI database the bedrock vulnerability is already extreme due to the thin cover of overburden on the site, removal of soil cover will increase the vulnerability of the underlying bedrock. However due to levelling works imported fill will need to be deposited over a sizable proportion of the proposed development area. Overall vulnerability would not alter across the site. It is envisaged that any soil excavated will be retained on site and reused as fill material or landscaping.

7.72 Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

7.73 Although there is no evidence of historical contamination in the proposed development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Fuel and chemical handling

7.74 To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

7.75 Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as “Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors” (CIRIA 532, 2001) will be complied with.

7.76 Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

7.77 In the case of drummed fuel or other chemical which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Construction Environmental Management Plan

7.78 A Construction Environmental Management Plan (CEMP) has been developed by Winthrop Engineering and Contracting Limited and included with the application documentation. This will be refined by the Applicant and the construction contractor prior to commencement of construction. The CEMP will incorporate the mitigation measures outlined above as they relate to the construction phase. The CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. This is an active document which is continuously updated to manage risk during the construction programme. All relevant personnel working on the site will be trained in the implementation of the procedures.

7.79 As a minimum, the CEMP will be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

Operational phase

Fuel and chemical handling

7.80 In order to minimise any impact on the underlying subsurface strata from material spillages, each generator will be installed in an externally rated container with a self-contained belly tank (steel double wall type for leak containment and inner tank leak alarm system) with 48 hours diesel fuel storage capacity at full load.

7.81 Any chemicals, oils, herbicides required for site maintenance will be stored in suitable contained areas. As the site will be paved any accidental emissions from fuel spills or contaminated runoff will be directed through the surface water drainage system through oil interceptors prior to discharge to the proposed attenuation tank onsite rather than infiltrate directly to ground.

Environmental Management Plan

7.82 An environmental management plan will be prepared and followed during the operational phase incorporating mitigation measures and emergency response measures.

Predicted impact of the Proposed Development

7.83 In terms of predicted specific impacts, the following points are of note:

- there is no likely impact on any geological heritage sites, sensitive groundwater receptors or groundwater supplies in the vicinity of the proposed development site;
- the local removal of topsoil and subsoil cover across the development area and additional of clean material where required at the site will not change the overall vulnerability category for the site of “extreme” due to current already thin cover on site. Capping of significant areas of the site by hardstand/building following construction and installation of drainage will minimise the potential for contamination of the underlying locally important aquifer.
- apart from generators tanks there is no other bulk storage of hazardous material at the site.

- there will be a loss of agricultural soil due to redevelopment. However, the area of redevelopment is small in the context of the overall region; and
- the incorporation of a large hardstand area will reduce local recharge to ground. However, as this is localised it is not likely to have any impact in terms of the regional groundwater regime.

7.84 There are no likely significant impacts on the geological or hydrogeological environment associated with the proposed development of the site. It is not anticipated that any impacts will arise following the implementation of the mitigation measures discussed above. As such the impact (EPA, 2022) is considered to have a ***long term-imperceptible*** significance.

7.85 The main vulnerability arising to the soil and geology from the proposed development is the removal of protective topsoil during the construction phase. This removal of topsoil may produce a more direct pathway to the bedrock from any accidental leaks during construction. During operation, capping of the site will provide additional protection to the underlying aquifer from any accidental spillage/leaks on site. The primary contaminant of concern during construction and operation is diesel. If left unmitigated, an accidental leak could lead to localised contamination of the subsoil and groundwater body. The aquifer is not used for a water supply but would require remediation to meet with legal requirements relating to water quality within an aquifer under the Water Pollution Act 1990, Water Framework Directive 2000 and Groundwater Regulations (S.I. No. 9 of 2010 & S.I. No. 366 of 2016).

Cumulative Effects of the Proposed Development

7.86 The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below.

Construction phase

7.87 The potential for impact on land, soils and groundwater during construction primarily arises from localised accidental leaks and spills to ground. The proposed development does not require dewatering and with standard mitigation in place (as outlined in Section 7.65) for management of accidental discharges, the effect due to construction in this area is considered to be a neutral on quality and an imperceptible significance. Contractors for the proposed development will be contractually required to operate in compliance with a CEMP which will include the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality. As a result, there will be no cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be neutral and imperceptible.

Operational phase

7.88 Overall, there will be a local change in recharge pattern due to the increase in hardstand from the proposed development. However, based on the overall size of the underlying aquifer and measures to protect soil and water quality there will be no overall change on the groundwater body status. There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. No. 9 of 2010 and S.I. No. 366 of 2016 amendments. As such there will be no cumulative impact to groundwater quality. As such there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term, imperceptible*** significance with a ***neutral impact*** on soil and water quality.

7.89 There will be a loss of agricultural land, but the overall loss will be minimal therefore, the cumulative impact on the land is considered to be ***long-term, imperceptible*** significance with a ***neutral*** impact.

Monitoring

7.90 No monitoring is required to maintain and protect the conditions of the soil, geology and hydrogeology upon completion of the development.

Reinstatement

7.91 Topsoil will be reinstated to greenfield areas of the site during the landscaping operations to protect the subsoil and geology underlying the site.

8. HYDROLOGY

8.1 AWN Consulting Ltd (AWN) has prepared this chapter of the Environmental Impact Assessment Report (EIAR) which assesses and evaluates the potential impacts of the development on the hydrological aspects of the site and surrounding area. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

Methodology

Criteria for rating impacts

8.2 This chapter evaluates the effects, if any, which the development has had or will have on Hydrology as defined in the Environmental Protection Agency (EPA) in accordance with *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'* (EPA, 2022). The Draft EPA document entitled *'Advice Notes for Preparing Environmental Impact Statements'* (EPA, 2015) is also followed in this hydrology assessment and classification of environmental effects. In addition, the document entitled *'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes'* by the National Roads Authority (NRA, 2009) is referenced where the methodology for assessment of impact is appropriate. These guidelines are referenced where the methodology for assessment of effects is appropriate.

8.3 The rating of potential environmental effects on the water/hydrology environment is based on the matrix presented in Appendix 8.1 which takes account of the quality, significance, duration and type of effect characteristic identified (in accordance with impact assessment criteria provided in the Draft EPA Guidelines (2022) publication).

8.4 The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

8.5 The NRA criteria for rating the magnitude and significance of impacts on the hydrological related attributes and the importance of these hydrological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Appendix 8.2.

8.6 The principal attributes (and effects) to be assessed include the following:

- River and stream water quality in the vicinity of the site (where available);
- Surface watercourses near the site and potential impact on surface water quality arising from proposed development related works including any discharge of surface water run-off;
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

8.7 The following sources of information were consulted:

- Current EPA on-line database -Envision water quality monitoring data for watercourses in the area;
- River Basin Management Plan for Ireland 2018-2021.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW));
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)
- South Dublin City Council (2005), Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council; and
- '*Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors'* (CIRIA 532, 2001).

8.8 Site specific data was derived from the following sources:

- Pinnacle Consulting Engineers – Engineering Planning Report July 2022;
- Pinnacle Consulting Engineers – Flood Risk Assessment – Ballymakaily Data Centre (EDCDUB06). August 2022;
- Various design site plans and drawings; and
- Consultation with site engineers.

Water Framework Directive (WFD) Status

8.9 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy; commonly known as the Water Framework Directive (WFD) establishes a framework for community action in the field of water policy.

8.10 The WFD requires '*Good Water Status*' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. '*Good status*' means both '*Good Ecological Status*' and '*Good Chemical Status*'. In 2009 the first River Basin Management Plan (RBMP) 2009-2015 was published. The second cycle river basin management plan was carried out between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle (2022-2027) is currently being undertaken.

8.11 During the development of this Plan, a prioritisation exercise was undertaken by the local authorities, the EPA and other stakeholders to identify those water bodies that require immediate action within this plan cycle to 2021. During the catchment characterisation, the EPA identified those water bodies either '*At Risk*' of not achieving their objectives or '*Under Review*'. The outcome of this prioritisation process was the selection of 190 Areas for Action across the 5 Local Authority regions. Within these 190 areas, a total of 726 water bodies were selected for initial actions during this RBMP cycle. There are 832 water bodies identified as being '*At Risk*' of not achieving their environmental objectives under this Plan that have not been included in the Areas for Action. For most of these water bodies, targeted actions will be undertaken in the third cycle RBMP from 2022-2027. The draft 3rd cycle RBMP has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the Proposed Development.

8.12 The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended SI No. 77 of 2019)
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 S.I. No. 366 of 2016);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010); and
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011)
- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988;
- Local Government (Water Pollution) Acts 1977-1990;
- SI No. 258 of 1988 Water Quality Standards for Phosphorus Regulations 1998;
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board);
- Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers;
- CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors;
- CIRIA C648 Control of Water Pollution from Constructional Sites;
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (NRA/TII, 2006).

8.13 AWN Consulting have prepared a Water Framework Directive (WFD) Screening Report that is included with the application documentation. This EIA Chapter in combination with the WFD

Screening Report considers potential for increased risk of deterioration of this status due to the activities of the site.

Receiving environment

8.14 The proposed development is to be located on an undeveloped portion of an existing data centre campus within the townland of Ballymakaily to the west of the Newcastle Road (R120), Lucan, Co. Dublin. The site is approximately 5.14ha. and has a slight gradient to the north-east.

8.15 The site in terms of its current use can be described as an open grassland. A former farmhouse and associated barns and similar buildings, permitted to be demolished under SDCC Planning Ref. SD21A/0042, form a small element across the northern part of the wider site to the immediate south of the Grand Canal. The application site itself is open grassland with some field boundaries.

8.16 The proposed development site is bounded by other parts of the overall site and the Grand Canal to the north; the eastern boundary of the site is formed by the R120 with the current EdgeConnex facility on the eastern side of the R120. The application site is bounded by the open grassland on which the permitted developments granted to the applicant within the overall site to the west and south. The site is currently accessed only via an agricultural access point from the east off the R120 and from the north off the access road to the abandoned agricultural buildings.

8.17 The Grand Canal is fully lined therefore there is no potential for hydrological connection between the development site and this water body.

Hydrology

8.18 The proposed development is located within the Ireland River Basin District (previously the Eastern River Basin District (ERBD)) and lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and River Liffey sub-catchment (WFD name: Liffey_SC_090, Id 09_15) (EPA, 2022).

8.19 The River Liffey catchment encompasses an area of approximately 1,370km^2. The river extends from the mountains of Kippure and Tonduff in County Wicklow to the sea at Dublin Bay. The main channel covers approximately 120km and numerous tributaries enter along its course. The Griffeen River is the nearest water course to the site and is a tributary of the River Liffey.

8.20 The Griffeen River (stream) is located c. 330m east of the site. The Griffeen River rises in the townland of Greenoge, approximately 3.5 km south of the proposed site. It flows in a northerly direction where it is culverted beneath the Grand Canal and from there it flows north through Lucan. A section of the Griffeen River was realigned during the construction of the Business Park and associated access roads and it now runs alongside the local access road in a northerly direction to the east of the Takeda facility. The Griffeen River enters the River Liffey just north of Lucan town.

8.21 The Lucan Stream is located c. 310m to the west of the overall site and runs in a northerly direction where it enters the River Liffey north of Lucan Village and to the west of the Griffeen outfall.

8.22 The Grand Canal runs in an east to west direction along the northern boundary of the overall site in which the application is set, and is classified as a proposed National Heritage Area (pNHA). The pNHA is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. There is no hydrologic connectivity between the site and Grand Canal.

8.23 The existing site is a greenfield site where surface water flows via overland drainage ditches and a surface water drain into the Lucan Stream and Griffeen River. There are several drainage ditches that line field boundary hedgerows throughout the development site.

8.24 Dublin Bay is located c. 16km to the east (i.e., downstream) of the site. According to the NPWS (2022) online database, the site would have an indirect hydrological connection, through the Lucan Stream, the Griffeen River and the River Liffey, with the following Natura 2000 European Sites:

- North Dublin Bay Special Area of Conservation (SAC) (Site Code 000206) – c. 19 km east of the site.
- North Bull Island Special Protection Area (SPA) (Site Code 004006) – c. 19 km east of the site.

- South Dublin Bay Special Area of Conservation (SAC) (Site Code 000210) – c. 16 km east of the site.
- South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) (Site Code 004024) – c. 16 km east of the site.

8.25 Refer to Figure 8.1 below for further details in terms of local hydrology.

Figure 8.1 Site location and Local Hydrological Environment

Surface water quality

8.26 The development is located within the former ERBD (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD). It is situated in Hydrometric Area No. 09 of the Irish River Network and is located within the River Liffey Catchment.

8.27 The Griffeen River and the Lucan Stream belong to the Liffey_170 WFD surface waterbody (European Code: IE_EA_09L012100) whose most recent WFD groundwater status (www.epa.ie – River Waterbody WFD Status 2016-2021) is '*Poor*' with a current WFD risk score of '*At risk of not achieving good status'*. This '*Poor*' status is related to its poor biological conditions (Invertebrate Status or Potential).

8.28 The above status for the Griffeen Riven is related to data from 1 no. EPA active water quality station in Lucan Village' (EPA Code RS09G010600), which is located in the Griffeen River c. 3 Km to the north (i.e., downstream) of the subject site, just before its junction with the River Liffey (refer to Figure 8.2 below).

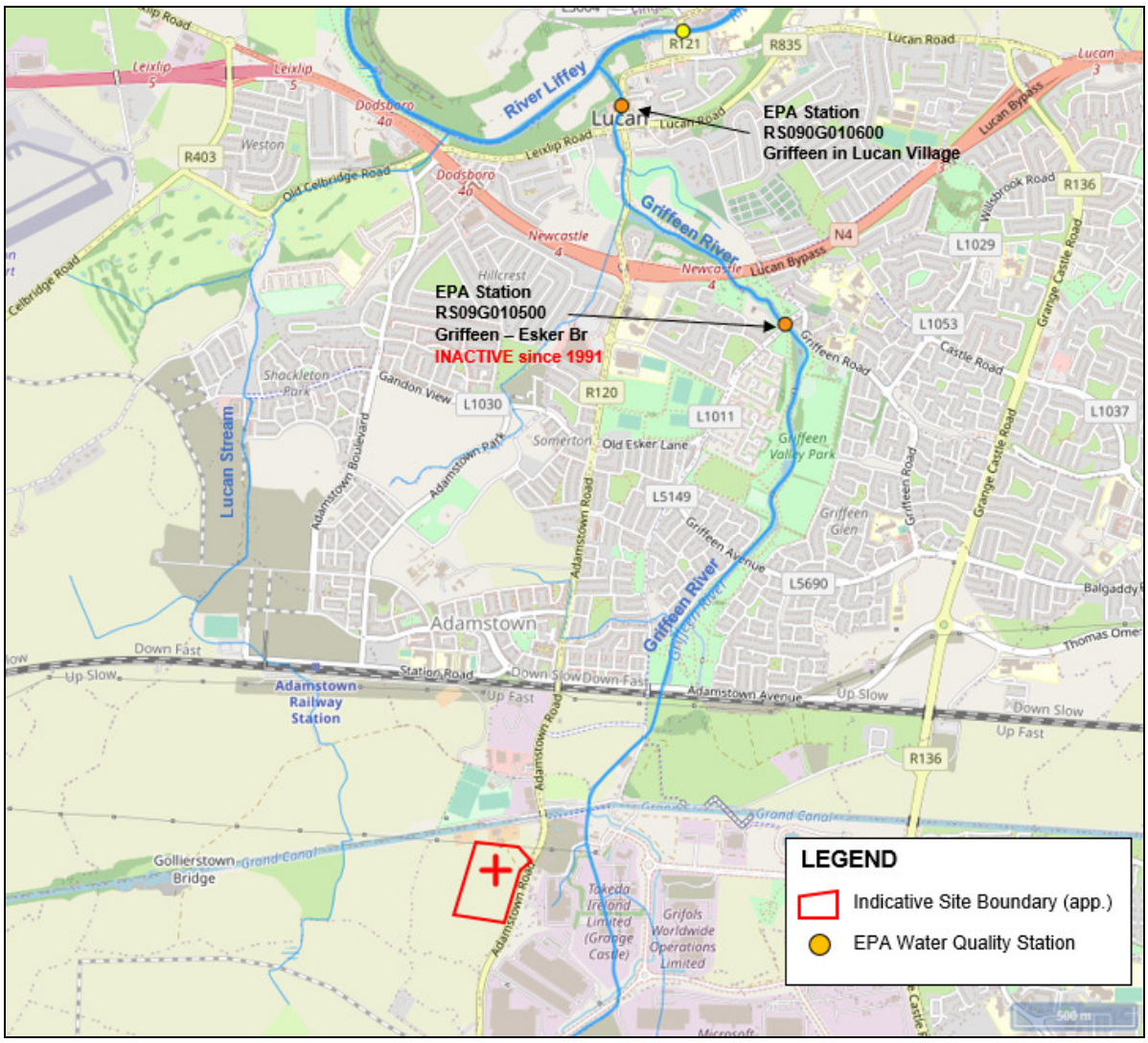


Figure 8.2 EPA Water Quality Stations near of the Subject Site (Source: EPA, 2022)

8.29 Surface water quality is monitored periodically by the EPA at various regional locations along with principal and other smaller watercourses. The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. Q Values are used by the EPA to express biological water quality, based on changes in the macro invertebrate communities of riffle areas brought about by organic pollution. See Table 8.1 for an explanation of the ratings. Q1 indicates a seriously polluted water body; Q5 indicates unpolluted water of high quality. Values for the Griffeen River are shown in Table 8.2 below.

Table 8.1 EPA Biological Q Ratings

Quality ratings (Q)	Status	Water quality
Q5, Q4-5	High	Unpolluted
Q4	Good	Unpolluted
Q3-4	Moderate	Slightly polluted
Q3, Q2-3	Poor	Moderately polluted
Q2, Q1-2, Q1	Bad	Seriously polluted

Table 8.2 Q Ratings for Griffeen River

Station		Q Values			
	1984	1988	1991	2019	2022
GRIFFEEN - In Lucan Village (Gauging Station)	3-4	3	2-3	3	3

8.30 According to the monitoring rounds carried out by the EPA during 2022 at the 'Griffeen in Lucan Village Station', a quality rating of 'Q3' (i.e., '*Slightly Polluted*') has been defined for this station. This rating is based on its recorded nitrogen and nitrate conditions.

Surface water drainage

8.31 The existing site is a greenfield site where surface water flows via overland drainage ditches and a surface water drain into the Lucan Stream and Griffeen River.

8.32 According to the South Dublin County Council information, there is a 900mm diameter road crossing, which was installed as part of the newly constructed R120 (Newcastle Road) upgrade, adjacent to the subject site. This pipe is then connected into a 900mm diameter pipe located along a section of road on the opposite side to the subject site. This gravity sewer then runs in a northerly direction, prior to connecting into a ditch/stream network, which discharges through 3 no. aqueducts / culverts of varying sizes and which are located beneath the Grand Canal to the east. This outfall is then drained via a tributary into the Griffeen River.

8.33 The aforementioned sewer/ culvert has been identified as having capacity to accommodate the proposed discharge from the subject site.

Foul water

8.34 Service and infrastructure have already been installed within the Grange Castle Business Park for foul water and it is proposed to connect foul water services from the proposed development to this.

8.35 According to the South Dublin County Council information, there are 2 no. 450mm diameter spur connections, located along the eastern boundary of the property, within the newly constructed R120 (Newcastle Road) upgrade, adjacent to the subject site. These spur connections were left out to facilitate development of these lands and for the lands further west, known as Grange Castle West. This 450mm diameter sewer then connects into the existing Grange Castle Business Park pumping station, as laid under Reg. Ref. SD16A/0214. The effluent from this pumping station is then pumped via 3 no. rising mains, i.e. 100mm, 200mm & 450mm diameter, into the local infrastructural network which ultimately discharges onto Ringsend Wastewater Treatment Plant (WWTP).

8.36 The existing foul sewer reticulation network has adequate capacity to cater for the proposed effluent discharge from the subject site and there are no known issues noted with the sewer reticulation network.

Water supply

8.37 According to the South Dublin County Council records, there is a 16" (400mm) diameter main located along the eastern boundary of the property, within the newly constructed R120 (Newcastle Road) upgrade, adjacent to the subject site. 2 no. 300mm diameter capped connections with sluice valves, have been left off the aforementioned trunk water main, in order to facilitate development of these lands and for the lands further west, known as Grange Castle West.

8.38 The aforementioned existing watermain is ultimately fed off the existing infrastructure to the north of the 12th Lock Bridge. From discussions with South Dublin County Council, it is understood that there is adequate capacity within the existing watermain network to supply the proposed development.

Flooding

8.39 In accordance with the guidelines produced by the Department of the Environment, Heritage and Local Government - The Planning System and Flood Risk Management (FRM) Guidelines for Planning Authorities, November 2009, a Stage 1 assessment was carried out by Pinnacle in December 2020. The Stage 1 Assessment is 'Flood Risk Identification'. The purpose of the assessment is to identify whether there may be any flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation.

8.40 Based on the indicative flood mapping, the development site is located within Flood Zone C (i.e., where the probability of flooding from rivers is less than 0.1% or 1 in 1000 years – probability of fluvial flooding is low risk); therefore, the proposed dwellings are not at risk of inundation from any of the modelled flood events, including the climate change and residual risk scenarios. The site is

classified as "Less Vulnerable" and therefore the development is classified as appropriate. Refer to accompanying Flood Risk Assessment for further details.

Rating of Importance of Hydrological attributes

8.41 Based on the TII methodology (2009) (See Appendix 7.1), the importance of the hydrological features at this site is rated as 'Low Importance'. The Attribute has a low quality or value on a local scale.

Characteristics of the Proposed Development

8.42 The characteristics of the proposed development with regard to the hydrological environment are outlined below. The characteristics relate to both construction and operation activities. The proposed development comprises the construction of two no. single storey data centres with associated office and service areas. See Chapter 2 for a comprehensive description of the development.

8.43 The proposed datacentre development will result in a hardstanding area of approximately 13,282m2, as follows:

- Red Hatch (Concrete Areas): 6,716m^2;
- Blue Hatch (Tarmac Roads): 6,566m^2;

8.44 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.

8.45 Stormwater will discharge through hydrocarbon interceptors and adequately sized attenuation ponds at the northern end of the site ultimately discharging to the existing storm sewer to the north east of the site. The outflow from the attenuation ponds, will be restricted by way of a hydrobrake flow control device, which will limit the discharge to 6.6/s, which is the calculated QBAR greenfield run-off rate. A connection to the existing off site foul sewer and potable water network will be established via the already permitted network to be established on site.

8.46 The proposed development will result in an increased demand for water of c. 6 m^3/day (average). A confirmation by Irish Water that this resource is available within the existing network is required.

8.47 With regard to foul water, the proposed development is proposed to discharge foul water from the proposed development, via a 225mm diameter gravity foul sewer outfall and discharge into the existing 450mm diameter connection. It is proposed that all foul condensate effluent from the proposed new data halls, will be connected into head manholes adjacent to the data halls. The peak wastewater flow will not be in excess of c. 0.54l/s.

Potential impact of the Proposed Development

8.48 The potential impacts of the construction and operational phases of the proposed development on the surface water environment are outlined in the following paragraphs. Due to the inter-relationship between this section and Chapter 7 (Land Soils, Geology and Hydrogeology) the following impacts discussed will be considered applicable to both.

8.49 It has to be noted that based on the potential sources and distance (c. 20 km downstream) there is no potential for an impact on the nearest Natura European sites (Dublin Bay SAC/SPA).

Construction phase

8.50 The potential impacts on local water courses in the immediate environs of the proposed site have been assessed under the following headings:

- Increased runoff and sediment loading; and
- Contamination of local water courses.

Increased runoff and sediment loading

8.51 Surface water runoff during the construction phase may contain increased silt levels or become polluted from construction activities. Runoff containing large amounts of silt can cause damage to

surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles and access roads

8.52 During the construction phase there is potential for an increased runoff 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 runoff. The potential impact of this is an increase in confined flow rates, leading to increases in surface water runoff and sediment loading which could potentially impact local drainage patterns and/or cause siltation of the existing surrounding watercourses.

Contamination of local water courses

8.53 During the construction phase, there is a risk of accidental pollution incidents from the following sources:

- Spillage or leakage of oils and fuels stored on site;
- Spillage or leakage of oils and fuels from construction machinery or site vehicles;
- Spillage of oil or fuel from refuelling machinery on site; and
- The use of concrete and cement.

8.54 Machinery on site during the construction phase may result in contamination of the surface water. The potential impacts could derive from accidental spillage of fuels, oils, paints and solvents, which could impact surface water and groundwater quality if allowed to infiltrate and to runoff to surface water systems and/or receiving watercourses.

8.55 Concrete operations carried out near surface water bodies during construction activities could lead to a discharge of wastewaters to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora.

Assessment of Impact

8.56 As the potential extent of contamination from the above sources will not significantly alter the receiving environment, and due to the low sensitivity of the receiving environment (i.e., local water courses, see assessment above), the overall impact during construction is considered to be Short Term of Moderate Significance with a neutral effect on quality in accordance with the (EPA, 2017) assessment criteria and Small Adverse in accordance with the (NRA, 2009).

Operational phase

8.57 Once the data centre becomes operational the potential impacts in relation to water have been assessed under the following headings:

- Increased surface water run-off;
- Contamination of surface water;
- Foul water; and
- Water supply.

Surface water runoff

8.58 Without proper control measures, surface water can ingress into the surrounding environment. South Dublin County Council requires all new developments to adhere to the practice of Sustainable Urban Drainage Systems (SuDS) for the control of surface water on site. This is highlighted in the Greater Dublin Strategic Drainage Strategy.

8.59 An increase in the hardstanding area in the development will result in an increase of surface water runoff from the site. 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 2 stormwater storage ponds / wetland area, located in a landscaped area to the northern end of the site adjacent to the canal.

8.60 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;
- Parking bays will be constructed with Permeable paving.

8.61 Prior to discharging into the proposed pond / wetland area, 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.

8.62 The storm water drainage within the entire development has been designed to accommodate a 1:2 year storm frequency. The pond / wetland and porous asphalt, have been designed to accommodate a 1:100 year storm event + 20% climate change.

8.63 The outflow from the proposed development, will be restricted by way of a Hydrobrake facility, which will limit the discharge to 6.6l/s, which is the calculated QBAR greenfield run-off rate. The attenuation system will be fitted with a hydrobrake flow control mechanism limiting total outflow to the allowable QBAR runoff rate. Refer to the Engineering Planning Report by Pinnacle Consulting Engineers for further information.

Contamination of surface water

8.64 Due to the nature of the facilities including the stand-by generators to be located in the vicinity of the proposed data centresthere will be bulk oil storage onsite within self-contained belly tanks. If not, adequately controlled, spillage could cause contamination if allowed to enter the water environment. Accidental leakage from the diesel storage tanks during refuelling may also occur. All surface water drainage will be conducted through an interceptor system with no direct run-off to any open watercourse.

8.65 Within the curtilage of the site there is a potential for leaks and spillages due to the vehicle movements and parking in the car park. Any accidental emissions of oil, petrol or diesel could cause localised contamination if the emissions enter the water environment without mitigation through the use of an onsite interceptor.

Foul water

8.66 The proposed development will lead to an increase in foul water discharge. The public foul sewer system has sufficient capacity in the area. In relation to foul water, the potential effect is considered to be short-term imperceptible in accordance with the (EPA, 2022) assessment criteria.

Water supply

8.67 As stated above, the proposed development will result in an increased demand for water of c. 6m^3/day (average; 0.069 l/s). This estimation has been based on Irish Water's criteria. However, a confirmation by Irish Water that this resource is available within the existing network is required. In relation to water supply, the potential effect on the water supply is considered to be short-term and imperceptible in accordance with the (EPA, 2022) assessment criteria.

Assessment of Impact

8.68 Due to the low storage of bulk chemicals on site, the absence of any substantial direct pathway to a surface water body and due to the low sensitivity of the receiving environment (see assessment above), the overall impact during construction considered to be Short term – not significant in accordance with the (EPA, 2002) assessment criteria and Negligible in accordance with the (TII, 2009) criteria from.

'Do-nothing' scenario

8.69 No impact is predicted from the do-nothing scenario as it will remain in its existing condition (following the enabling works and Phase 3 development).

Remedial or reductive measures

8.70 The design of the proposed development has taken account of the potential impacts of the development and the risks to the water environment local to the area where construction is taking

place. Measures have been developed to mitigate the potential effects on the local water environment. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

8.71 These measures are part of the requirements under the Greater Dublin Strategic Drainage Study and South Dublin County Council. They are not intended to avoid or reduce any potential harmful effects to any European sites, since there is no potential impact on Dublin Bay, given the potential contaminant load chemical and the distance from source to the bay (c. 20 km).

8.72 A Construction Environmental Management Plan (CEMP) has been developed by Winthrop Engineering and Contracting Limited and included with the application documentation. This will be refined by the Applicant and the construction contractor prior to commencement of construction. The CEMP will incorporate the mitigation measures outlined above as they relate to the construction phase. The CEMP will include emergency response procedures in the event of a spill, leak, fire or other environmental incident related to construction. This is an active document which is continuously updated to manage risk during the construction programme. All relevant personnel working on the site will be trained in the implementation of the procedures.

8.73 As a minimum, the CEMP will be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

8.74 Pinnacle Consulting Engineers have outlined mitigation measures for the site in their Engineering Planning Report. The following mitigation measures include, but are not limited to, those provided in that report and are designed to address the impacts associated with the construction and operational phase of the project. Due to the inter-relationship between this section and Chapter 7 (Land, Soils, Geology and Hydrogeology) the following mitigation measures discussed will be considered applicable to both.

Construction phase

8.75 During the construction phase, mitigation measures have been applied for the following potential impacts:

- increased runoff and sediment loading; and
- contamination of local water courses.

8.76 The mitigation measures will ensure that no sediment contamination, contaminated runoff or untreated wastewater will enter any onsite drainage ditches or off-site watercourses during the construction of the proposed development.

Increased runoff and sediment loading

8.77 During the construction phase any drains carrying a high sediment load will be diverted through the settlement ponds. The settlement ponds will be located between the area of construction and the nearest field drain. Surface water runoff will not be discharged directly to local watercourses. The following mitigation measures will be adopted:

- the drainage system and settlement ponds will be constructed as a first step;
- any excavations required will remain open for as little time as possible before the placement of fill. This will help to minimise potential for groundwater ingress into excavations;
- silt traps will be placed in the existing drainage network around the site to minimise silt loss. These should be inspected and cleaned regularly.

- weather conditions will be considered when planning construction activities to minimise risk of run off from the site; and
- distance between topsoil piles etc. and streams will be maintained – to protect from dampening operations.

Contamination of local water courses

8.78 To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents, paints and fuels used during construction will be stored within temporary bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within it (plus an allowance of 30 mm for rainwater ingress). Filling and draw-off points will be located entirely within the bunded area(s). Drainage from the bunded area(s) will be diverted for collection and safe disposal.

8.79 Wet concrete operations adjacent to watercourses will be avoided where possible. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to groundwater.

8.80 The contractor will be required to make provision for removal of any concrete wash waters, most likely by means of tankering off-site and no such wash waters will be discharged to groundwater. Any effluent generated by temporary onsite sanitary facilities will be taken off-site for appropriate treatment.

8.81 Re-fuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles/ equipment will take place in designated bunded areas where possible. Re-fuelling will be avoided in so far as possible at the other work sites but where necessary will take place within appropriately bunded areas.

8.82 If it is not possible to bring a machine to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. The vehicles and equipment will not be left unattended during refuelling. Spill kits and hydrocarbon absorbent packs will be stored in the cab of each vehicle and operators will be fully trained in the use of this equipment.

8.83 The generation of runoff from stockpiles of soils, excavated during construction, will be prevented from entering watercourses by diverting runoff to the settlement ponds on site, and removing the material off-site as soon as possible to designated storage areas.

Operational phase

Increased surface water run-off

8.84 The proposed drainage system for the site in outlined in Pinnacle's Engineering Planning Report and has been designed in accordance with Greater Dublin Strategic Design System (GDSDS) specifications. Roof water will be directed into an onsite reticulation system which will drain, along with road run-off, into the attenuation ponds which are to be located to the north of the proposed data centres. A hydrobrake will also be installed at the outflow to reduce the ultimate discharge. The attenuation system is designed to accommodate a 1:100 year storm event accounting for a 20% increase with climate change.

Contamination of surface water

8.85 Due to a variety of measures such as the design of the attenuation system with hydrocarbon interceptors, the speed restrictions in place and the fact that no refuelling will be carried out on site (when practicable), the likelihood of any spills entering the water environment from vehicles on site is negligible.

8.86 Run-off from the car park areas and access roads / delivery areas will be drained following these options:

- A series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers;
- A Duraflow (or similar approved), porous asphalt product.

8.87 To minimise any impact from material spillages, all oils, solvents, paints and fuels to be stored onsite will be stored within permanently bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank/container within it (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) will be diverted for collection and safe disposal.

Foul water

8.88 In their Engineering Planning Report Pinnacle have proposed to discharge foul water from the proposed development, via a 225mm diameter gravity foul sewer outfall and discharge into the existing 450mm diameter connection. The increase in flow to the existing public foul sewer is not expected to have a negative effect on the foul drainage system in the area.

Water supply

8.89 The water system will be metered to facilitate detection of leakage and the prevention of water loss. Dual & low flush toilets and water economy outlets and water saving measures will also be proposed.

Predicted impact of the Proposed Development

8.90 This section describes the predicted impact of the proposed development following the implementation of the planned mitigation measures.

Construction phase

8.91 The absence of any substantial direct pathway to a water course and the implementation of mitigation measures highlighted above will ensure that the predicted impacts on the surface water environment do not occur during the construction phase and that the residual impact will be ***short term-imperceptible-neutral*** in accordance with the (EPA, 2022) assessment criteria. Following the TII criteria for rating the magnitude and significance of impacts on the water and hydrological related attributes, the magnitude of impact is considered Negligible.

Operational phase

8.92 There will be no direct discharges of contaminated water to the surface water environment during the operational phase. Any accidental emissions of chemicals or oil, petrol or diesel leaks could cause contamination of stormwater discharge if the emissions enter the stormwater system unmitigated.

8.93 The implementation of mitigation measures highlighted above will ensure that the predicted impacts on the surface water environment do not occur during the operational phase and that the residual impact will be ***long term-imperceptible-neutral*** in accordance with the (EPA, 2022) assessment criteria. Following the TII criteria for rating the magnitude and significance of impacts on the water and hydrological related attributes, the magnitude of impact is considered negligible.

'Worst-case' scenario

8.94 The main vulnerability arising to the hydrology from the proposed development is from potential spillages (hydrocarbons) onsite entering stormwater drainage during the operation phase. Stormwater will eventually discharge to surface water bodies but there is no likely impact on receiving water quality above surface water regulations (S.I no 77 of 2019).

Cumulative Effects

8.95 The cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed below.

Construction phase

8.96 Surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses.

8.97 Contamination of local water sources from accidental spillage and leakage from construction traffic and construction materials unless project-specific CEMPs are put in place for each development and complied with. As stated, there are no notable surface water features onsite and no direct hydrological pathways to offsite surface water bodies.

8.98 There is a potential for contamination of watercourses during mitigation measures are required to manage sediment run-off and fuel leakages during construction and operation. All developments are required to ensure they do not have an impact on the receiving water environment in accordance with the relevant legislation (S.I No 77/2019 EU Environmental Objectives (Surface Waters) Amendment Regulations 2019) such that they would be required to manage runoff and fuel leakages.

8.99 The residual cumulative impact on water and hydrology for the construction phase is anticipated to be short-term, neutral in terms of quality and of not significant significance, once appropriate mitigation measures to manage water quality runoff in compliance with legislative requirement are put in place for each development.

Operational phase

8.100 Potential cumulative impacts included in the operational phase include:

- Increased hard standing areas will reduce local recharge to ground and increase surface water run-off potential if not limited to the green field run-off rate from the site;
- Increased risk of accidental releases from fuel storage/delivery unless mitigated adequately
- Increased risk of accidental discharge of hydrocarbons from car parking areas and along roads and unless diverted to surface water system with petrol interceptor; and
- Any additional foul discharges should be treated where appropriate and/or diverted to the foul sewer system and not directly to ground.

8.101 Similar mitigation measures to those described in Section 8.69 will need to be implemented to protect water quality.

8.102 Increase in wastewater loading and water supply requirement is an impact of all development: Each development will require approval from IW confirming available capacity in the water and wastewater infrastructure. The surface water and foul drainage infrastructure and water supply requirements for the Proposed Development has been designed to accommodate the future indicative substation development.

8.103 Development will result in an increase in hard standing which will result in localised reduced recharge to ground and increase in run-off rate. However, each permitted development are required by the Local Authority to comply with the Greater Dublin Strategic Drainage Strategy (GDSDS) and Local Authority requirements by providing suitable attenuation on site to ensure greenfield run-off rates and ensure that there is no increase in offsite flooding as a result of development.

8.104 The residual cumulative impact on water and hydrology for the operational phases is anticipated to be long-term, neutral in terms of quality and not significant significance, once appropriate mitigation measures to manage water quality runoff in compliance with legislative requirement are put in place for each development.

Monitoring

8.105 No monitoring of the surface water is required to protect the hydrological environment upon completion of the development beyond visual inspection of the attenuation pond, hydrocarbon

interceptors and fuel storage bunds to highlight potential contamination from hydrocarbons or excess sediment flow.

Reinstatement

8.106 Not applicable in respect of hydrology issues.

9. NOISE AND VIBRATION

9.1 It is proposed to develop a new data centre (known as DUB 06), to the west of the R120 and to the west of houses and the previously permitted data centre campus of the applicant (i.e. Phases 1, 2, 3 and 4 – that is nearing completion) and north of the permitted developments on this overall site that are known as DUB 04 and west of the permitted DUB 05 (both not commenced), on lands at Ballymakaily, adjacent to the Grange Castle Business Park. Figure 9.1 illustrates the proposed and approved facility in the context of the surrounding environment. Buildings and associated noise sources have been exported from the noise modelling package (DGMR *iNoise*) into Google Earth for illustrative purposes.

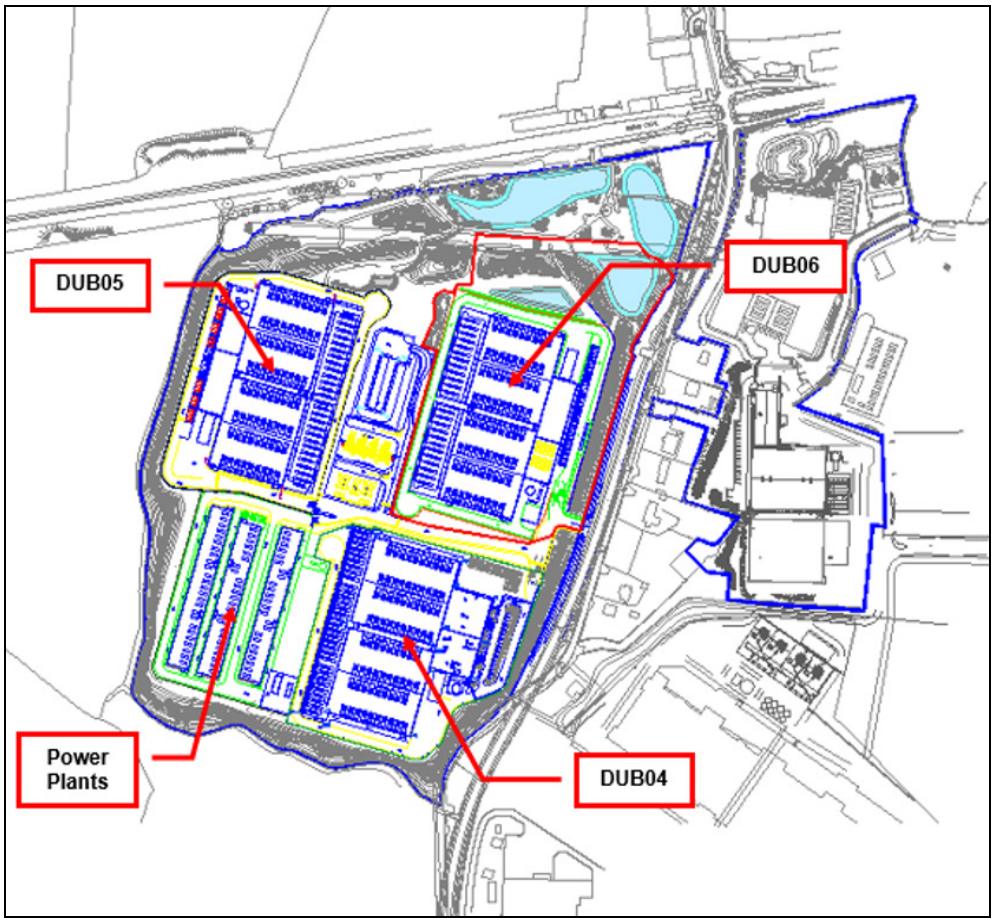


Figure 9.1 Site location and context (Source: Google Earth)

Methodology

9.2 The following methodology has been adopted for this assessment:

- review appropriate guidance and previous planning noise conditions in order to identify appropriate noise criteria for the site;
- 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 site and the previously permitted development phases; and
- comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

9.3 Appendix 9.1 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.

Fundamentals of acoustics

9.4 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.

9.5 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, sound is measured in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

9.6 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.

9.7 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 9.2.

9.8 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.

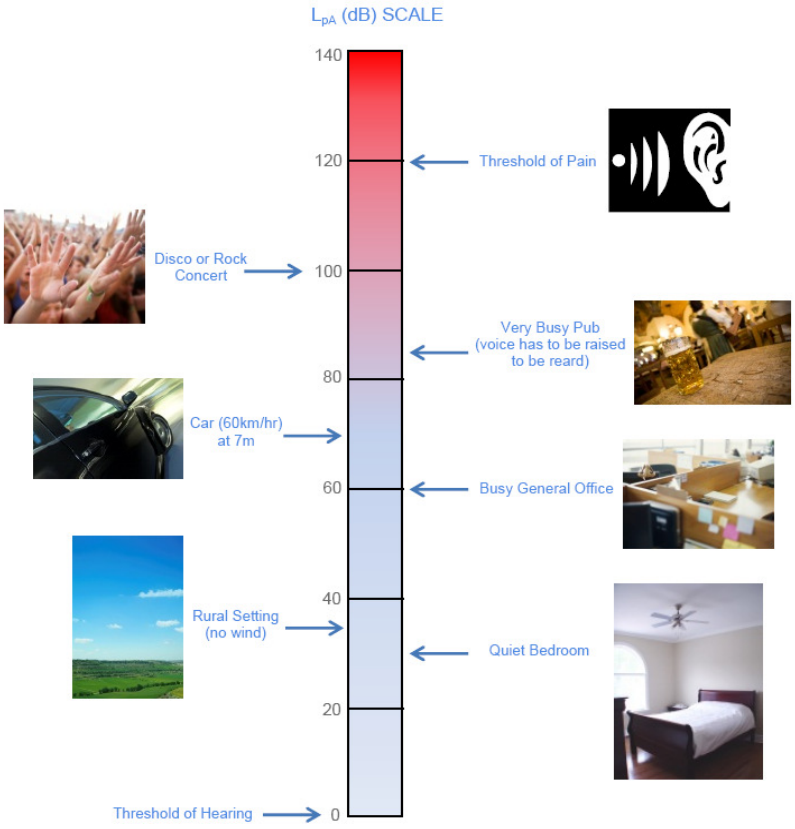


Figure 9.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016))

Receiving environment

9.9 A set of noise surveys were carried out in 2016 and 2020 in support of the DUB 05 application. Full details of the noise monitoring are presented in Appendix 9.2 of the appendices document. Review of the data confirms that the noise criteria proposed in this assessment are appropriate considering the prevailing noise environment.

9.10 It should be noted that the noise criteria applied for the current phase of the campus development are based on noise data and assessment obtained before the Phase 1 site was operational and/or considered planning conditions issued for previous phases by the local authority and/or An Bord Pleanála (ABP) and therefore addresses any concern of 'background creep' and is considered a suitably conservative approach.

9.11 Noise measurements were conducted at five positions on and in the vicinity of the application site that are representative of noise environment expected at the nearest noise sensitive locations. Details for the particular locations are outlined below:

Location S01 Located to the north eastern corner of the site in line with the common boundary of the nearest noise sensitive locations at the junction of the R120 and the Grand Canal.

Location S02 Located on the south western corner of the eastern campus along the common boundary of a nearby noise sensitive location. The location is representative of the row of noise sensitive locations that are located along the R120.

Location S03 Located in the vicinity of a residential location to the north east of the Proposed Development site and to the immediate north-east of the eastern campus. The property is located on the boundary of the Grange Castle Business Park and is immediately adjacent to a number of commercial premises.

Location S04 Located in the north eastern corner of the application site. This location is considered to be representative of noise levels currently experienced in the vicinity of the residential properties on the Grand Canal to the north.

Location S05 Located in the south western corner of the overall site. The location is considered to be representative of noise levels currently experienced in the vicinity of the halting site located to the south-west.

9.12 A review of daytime, evening and night-time noise levels at the monitoring locations are presented in Table 9.1. See Appendix 9.2 for further details.

Table 9.1 Review of measured noise levels

Location	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
		$L_{Aeq,15min}$	L_{AFMax}	$L_{A90,15min}$
S01	Day	58 – 61	76	44 – 47
	Evening	53	63	45
	Night	48 – 49	67	42 – 43
S02	Day	48 – 49	73	41 – 43
	Evening	44	61	41
	Night	40 – 41	63	38 – 39
S03	Day	52 – 53	76	47 – 48
	Evening	51	68	49
	Night	49 – 51	70	48
S04	Day	51 – 62	78	42 – 57
	Evening	48 – 62	87	39 – 50
	Night	42 – 61	79	37 – 55
S05	Day	39 – 56	77	37 – 52
	Evening	37 – 51	76	34 – 50
	Night	36 – 50	65	32 – 48

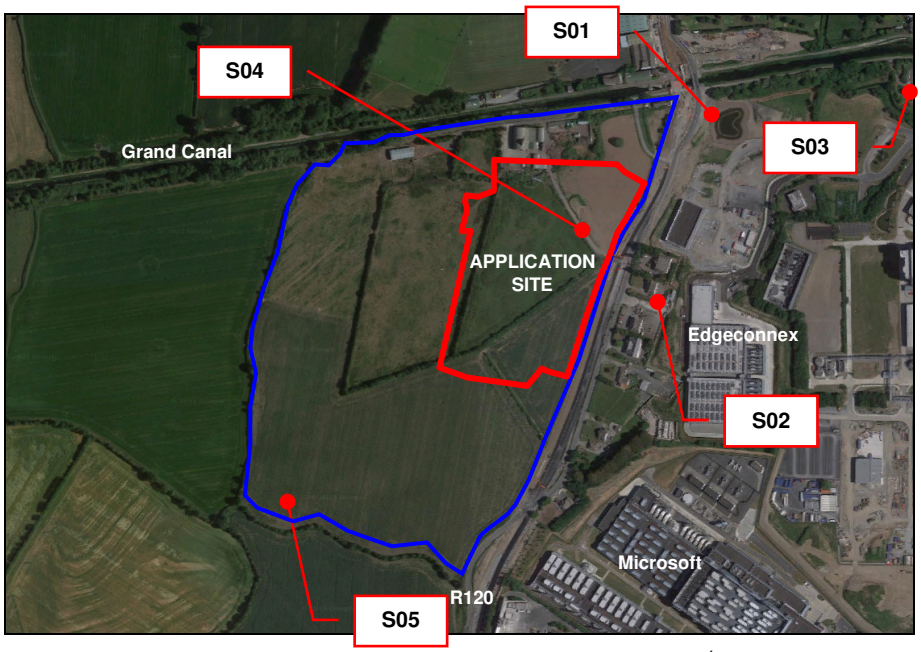


Figure 9.3 Noise monitoring locations (Source: Google Maps) (Note survey 2016 prior to operation of earlier phases of Edgeconnex)

9.13 The following significant noise sources were noted at the monitoring locations (in subjective order of influence):

Table 9.2 Significant noise sources

Location	
S01	S02
• R120 road traffic noise. • Water running in a nearby canal in absence of traffic. • Site work and plant noise associated with existing sites. • During evening period noise dominated by traffic and water noise associated with the canal. • During night time plant noise from existing facilities (to the East and South) is the dominant background source.	• Plant noise from facility to the south. • Noise from existing site including impulsive noise (bangs) and reverse alarms. • Dogs barking and birdsong. • During the evening distant traffic noise and plant noise noted. • During night time existing plant noise from southern existing facilities is the dominant source. Distant traffic also noted.
S03	S04
• Noise dominated by existing plant noise from adjacent facility. • Occasional bus passing by. • Water flow from nearby watercourse. • Reverse alarms and construction noise from nearby site. • As above for evening period with the exception of construction noise. • During night time plant noise from the adjacent facility and water flow from nearby watercourse noted.	• R120 road traffic noise. • Water flow from nearby watercourse. • During night time plant noise from the adjacent facility and water flow from nearby watercourse noted.
S05	
• R120 road traffic noise. • Water flow from nearby watercourse. • During night time plant noise from the adjacent facility and water flow from nearby watercourse noted.	

Noise-sensitive locations

9.14 In the first instance it is considered appropriate to define a noise sensitive location (NSL). In this context, it is considered relevant to adopt the definition supplied by the Environmental Protection Agency (EPA) which states the following in NG4 Appendix I:

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.

9.15 Figure 9.4 presents the NSLs in the vicinity of the proposed development site, each labelled 'NP' with a reference number. Table 9.3 presents the distances from each NSL to the proposed development boundary and to the proposed development building.

Figure 9.4 Noise prediction locations (Background Imagery Source: Google Earth)

Table 9.3 Distances from application boundary and proposed development building to NSLs

Location	Distance from Site Boundary (m)	Distance from Proposed Building (m)
NP01	10	228
NP02	31	256
NP03	340	545
NP04	354	555
NP05	310	490
NP17	51	100
NP18	51	95
NP19	50	92
NP20	54	101
NP21	56	122

Location	Distance from Site Boundary (m)	Distance from Proposed Building (m)
NP22	40	234
NP23	180	480
NP24	49	99
NP25	45	106
NP26	51	121

Characteristics of the Proposed Development

9.16 The Proposed Development will involve groundworks and the development of the proposed new buildings and infrastructure. The proposed buildings include two new adjoined data centre buildings and ancillary elements. Emergency back-up generators are also proposed, to protect the facility against grid power failure. A full description of the Proposed Development is provided in Chapter 2 of this EIA Report. When considering a development of this nature, the potential noise and vibration impacts on the surroundings must be considered for each of two distinct stages:

- construction phase; and
- operational phase.

9.17 As stated, the construction phase will involve extensive excavation over the development site and the erection of new buildings over a phased construction period. 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.

9.18 These issues are discussed in detail in the following sections.

Noise Impact Criteria for the Proposed Development

Construction phase

Criteria for rating noise impacts

9.19 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 normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

9.20 In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise*.

9.21 The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a potential significant noise impact is associated with the construction activities.

9.22 This document sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.4 sets out the values which, when exceeded, signify a potential significant effect at the facades of residential receptors as recommended by BS 5228 – 1. These are cumulative levels, i.e. the sum of both ambient and construction noise levels.

Table 9.4 Example threshold of potential significant effect at dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

9.23 It should be noted that this assessment method is only valid for residential properties. The approach is as follows: for each period (i.e. daytime, evening and night time) the ambient noise level is determined and rounded to the nearest 5dB. Baseline monitoring carried out as part of this assessment would indicate that the categories detailed in Table 9.5 are appropriate in terms of the nearest noise sensitive locations being considered in this instance.

Table 9.5 Rounded baseline noise levels and associated categories

Period	Baseline Noise Category	Construction Noise Threshold Value $L_{Aeq,1hr}$ (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

9.24 See Section 9.45 for the assessment in relation to this site. If the construction noise level exceeds the appropriate category value, then a potential significant effect is deemed to occur.

9.25 This assessment process determines whether a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[32], which should not be exceeded at noise sensitive locations during the construction phase of the development. Table 9.6 sets out these levels.

Table 9.6 Maximum permissible noise levels at the facade of dwellings during construction

Days and Times	Noise Levels (dB re. $2x10^{-5}$ Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

9.26 In exceptional circumstances there may be a requirement that certain construction works are carried out during night-time periods.

Criteria for rating vibration impacts

9.27 Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

32 *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004*, Transport Infrastructure Ireland (TII)

9.28 It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, rock breaking and piling, two of the primary sources of vibration during construction, are typically tolerated at vibration levels up to 12 mm/s and 5 mm/s respectively. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.

9.29 Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard BS 7385: 1993: *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*, and;
- British Standard BS 5228-2: 2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites – Vibration*.

9.30 BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15mm/s at low frequencies rising to 20mm/s at 15 Hz and 50mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

9.31 BS 5228 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values, minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50%. BS 5288-2 also comments that important buildings which are difficult to repair might require special consideration on a case-by-case basis.

9.32 The TII document *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* also contains information on the permissible construction vibration levels as follows:

Table 9.7 Allowable vibration during construction phase

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Operational phase

Criteria for rating noise impacts

9.33 South Dublin County Council (SDCC) do not outline absolute noise limits or specific noise guidance in relation to industrial developments such as the operations considered here. In the absence of such guidance from the local authority consideration is given to the relevant content of the following documents:

- Planning conditions for previous phases development on the wider side issued by SDCC;
- Planning condition for the adjacent DUB04 development (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948) as issued by An Bord Pleanála (ABP) on the lands to the south;
- Planning condition for the adjacent DUB05 development (SDCC Planning Ref. SD21A/0042 as issued by SDCC on the lands to the west; and
- Environmental Protection Agency: "*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)".*

9.34 SDCC have issued the following planning conditions in relation to previous phases of development on the eastern campus:

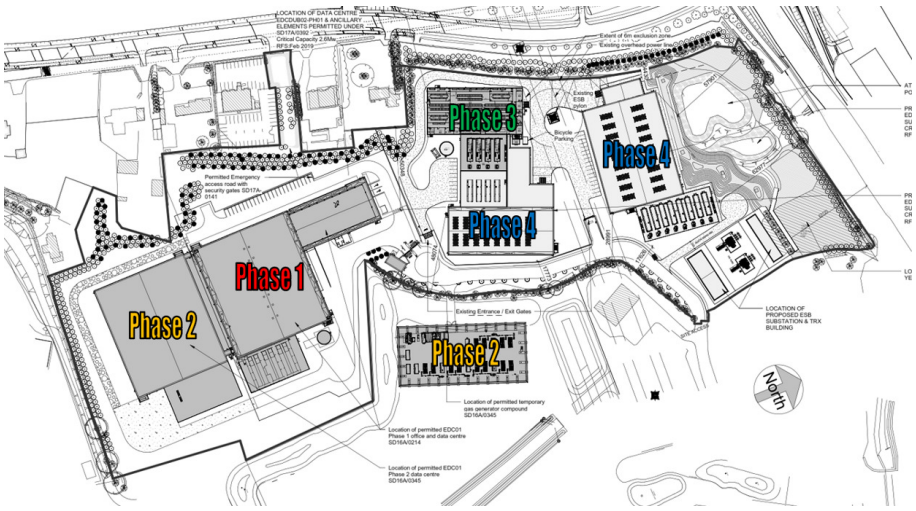


Figure 9.5 Eastern campus site phasing

Phase	Detail
1	Condition 13 (Ref: SD16A/0214 Decision Order No. 0757) deals with operational noise associated with Phase 1 of the development. The following extracts are the relevant sections in terms of the current discussions: *The equipment which would generate noise at the facility and the associated abatement measures shall be designed to ensure that tonal noise does not arise at the noise sensitive locations due to the operation of the facility. Appropriate attenuation measures, including management procedures and a maintenance programme shall be put in place to ensure that tonal noise does not create a nuisance at residential properties on the R120 or the Grand Canal. All mechanical plant items such as motors, pumps and air conditioning units shall be serviced regularly to avoid excessive noise being generated.* In summary, the SDCC permission associated with Phase 1 of the development outlined specific noise conditions in relation to Phase 1 of the development. It is therefore considered appropriate to apply the noise criterion adopted as part of the submitted EIAR for Phase 1 i.e. 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and that site emissions should not be tonal in nature.
2	Condition 15 (Ref: SD16A/0345 Decision Order No. 1151) deals with operational noise associated with Phase 2 of the development. The following extracts are the relevant sections in terms of the current discussions: *Noise due to the normal operation of the Proposed Development during the night time period, expressed as L_{Aeq} over 15 minutes at the façade in a noise sensitive location shall not exceed 45dB(A).* *In addition, the applicant/developer shall comply with the following requirements:* *The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations NSLs due to the facility operation.* In summary, noise from Phase 2 of the development should not exceed 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and should not be tonal in nature.
3	Condition 13 (Ref: SD17A/0141 Decision Order No. 0730) deals with operational noise associated with Phase 3 of the development. The following extracts are the relevant sections in terms of the current discussions: *Noise due to the normal operation of the Proposed Development during the night time period, expressed as L_{Aeq} over 15 minutes at the façade in a noise sensitive location shall not exceed 45dB(A) as per the EIA under scenario A and A1. All mitigation measures detailed in the must be utilised to ensure the cumulative noise does not exceed 46.2dB(A) as per the EIS under scenario A*

	and A1 at the nearest noise sensitive locations. *In addition, the applicant/developer shall comply with the following requirements:* *The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations NSLs due to the facility operation.* In summary, noise from Phase 3 of the development should not exceed 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and should not be tonal in nature. Cumulative noise levels shall not exceed 46.2dB(A). A small extension to the Phase 3 development was granted under ABP Order Ref: ABP-300752-18. There was no material effect in terms of noise associated with the granted extension.
4	Condition 3 (Ref: SD18A/0298 Decision Order No. 1128) deals with operational noise associated with Phase 4 of the development. The following extracts are the relevant sections in terms of the current discussions: *Noise due to the normal operation of the Proposed Development during the night time period, expressed as L_{Aeq} over 15 minutes at the façade in a noise sensitive location shall not exceed 45dB(A) as per the EIA under scenario A and A1. All mitigation measures detailed in the must be utilised to ensure the cumulative noise does not exceed 46.2dB(A) as per the EIS under scenario A and A1 at the nearest noise sensitive locations.* *In addition, the applicant/developer shall comply with the following requirements:* *The applicant shall ensure that the design of the noise sources at the facility and the associated abatement measures will ensure that tonal or nuisance noise will not arise at the Noise Sensitive Locations NSLs due to the facility operation.* In summary, noise from Phase 4 of the development should not exceed 45dB $L_{Aeq,15min}$ at the residential noise sensitive locations and should not be tonal in nature. Cumulative noise levels shall not exceed 46.2dB(A).

9.35 The 2019 planning application for the site to the south of the application site (DUB04) was granted permission by ABP (ABP-305948-19) which applied the following noise condition to the permitted development site:

> *"16. The operational noise level shall not exceed 55 dB(A) $L_{eq\ 1\ hour}$ (corrected for any tonal or impulsive component) at the nearest noise sensitive locations, including dwellings, between 0800 and 2000 hours, Monday to Friday inclusive, and shall not exceed 45 dB(A) $L_{eq\ 1\ hour}$ at any other time. All sound measurement shall be carried out in accordance with ISO 1996-1 :2016 "Acoustics - Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures". Procedures for the purpose of determining compliance with this limit shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.*
>
> ***Reason:** To protect the amenities of property in the vicinity of the site."*

9.36 The most recent application on lands to the west and south-west of the application site (DUB05) was granted permission by SDCC, which applied the following condition 20(e) to the operation of the data centres:

> *"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."*

9.37 Based on a review of the EPA NG4 guidance the following noise criteria would be considered appropriate at the nearest noise sensitive locations:

- Daytime (07:00 to 19:00hrs) 55 dB $L_{Ar,15min}$
- Evening (19:00 to 23:00hrs) 50 dB $L_{Ar,15min}$
- Night time (23:00 to 07:00hrs) 45 dB $L_{Aeq,15min}$

9.38 It is common practice to allow a relaxation of noise limits associated with emergency plant operations. Section 4.4.1 of EPA NG4 also contains the following comments in relation to emergency plant items:

"In some instances, licensed 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".

9.39 It is therefore considered that the proposed noise criterion of 55 dB $L_{Aeq,T}$ on these units is appropriate in emergency scenarios. Note that this criterion applies to the emergency back-up generators only. The noise criteria discussed in Table 9.8 for daytime, evening and night-time periods will be applied to the day-to-day operations of the data centres.

9.40 *Summary of proposed noise criteria:* In terms of operational noise the specific noise from the proposed site will not exceed the following criteria at noise sensitive residences:

Table 9.8 Proposed operational noise criteria

Daytime (07:00 to 19:00hrs)	Evening (19:00 to 23:00hrs)	Night-time (23:00 to 07:00hrs)
55dB $L_{ArT(15mins)}$	50dB $L_{ArT\ (15mins)}$	45dB $L_{Aeq,(15mins)}$
Emergency Operations		
55dB $L_{Aeq,(15mins)}$		

9.41 *Assessment of significance* – The assessment of significance of impact involves the assessment of the baseline data and the use of professional judgement. The relationship between the magnitude of increase in noise level and typical perceived impact is shown in Table 9.8. It shows that small changes in noise levels are not normally noticeable, whereas an increase of 10 dB would be described as a doubling of loudness.

Table 9.9 Significance of change in noise level

Change in Sound Level (dB)	Subjective Reaction	Magnitude of Impact	EPA Glossary of Impacts[33]
0	None	No Change	No Change
0.1 – 2.9	Imperceptible	Negligible	Imperceptible Impact
3 – 4.9	Perceptible	Minor	Slight Impact
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate Impact
10 – 14.9	Over a doubling of loudness	Major	Significant Impact
>15	Over a doubling of loudness	Profound	Profound Impact

9.42 General comment in relation to noise at common boundaries with adjacent sites will be presented in the relevant sections of this document. These criteria have been derived from relevant local and national guidance as outlined previously.

[33] Environmental Protection Agency – *Guidelines on the information to be contained in Environmental Impact Statements* (Section 5), 2002.

Criteria for rating vibration impacts

9.43 Guidance as to an acceptable magnitude of vibration during the operational phase of the development is best taken from British Standard *BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz).* The Standard contains recommendations that continuous vibration in residential buildings should not exceed nominally 0.3mm/s by daytime and 0.2mm/s by night-time.

9.44 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.

Forecasting methods

9.45 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 building services noise, car park activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.*

Potential impact of the Proposed Development

Construction phase

9.46 The construction programme will create typical construction activity related noise on site. During the construction phase of the Proposed Development, a variety of items of plant will be in use, such as, excavators, lifting equipment, dumper trucks, compressors and generators.

9.47 The proposed general construction hours are 07:00 to 19:00hrs, Mondays to Fridays and 09:00 to 13:00hrs on Saturdays. There will also be a requirement for occasional weekday evening works, however evening activities will be significantly reduced in order to manage any associated noise impacts in an appropriate manner. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities, as is the case for activities prior to 8am.

9.48 Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces. Due to the proximity of sensitive locations to site works however, there is little likelihood of structural or even cosmetic damage to existing neighbouring dwellings as a result of vibration.

Table 9.10 Typical noise levels associated with construction plant items

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB $L_{Aeq,1hr}$)
Foundations	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (D7 6)	77
	Poker Vibrator (C4 33)	78
Steel Erection	Tower Crane (C4.48)	76
	Articulated lorry (C11.10)	77
General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

9.49 Due to the fact that the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS 5228-1. Table 9.10 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

9.50 For the purposes of the assessment we have assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this report.

9.51 Table 9.11 presents the predicted daytime noise levels at NSLs, for the indicative construction plant in Table 9.10 for each construction period. Construction noise sources are assumed to be running 66% of the time. A site hoarding offering an acoustic screening of 5dB is included in the calculated values.

Table 9.11 Review of potential daytime construction noise impact

Location	Noise Level $L_{Aeq,1hr}$ for construction phase			
	Foundations [A]	Steel Erection [A]	General Construction [A]	Landscaping [B]
NP01	49	46	48	68
NP02	48	45	47	64
NP03	41	38	40	43
NP04	41	38	40	43
NP05	42	39	41	44
NP17	56	53	55	60
NP18	56	53	55	60
NP19	57	54	56	60
NP20	56	53	55	59
NP21	54	51	53	59
NP22	49	46	48	62
NP23	42	39	41	49
NP24	56	53	55	60
NP25	55	52	54	61
NP26	54	51	53	60

Note A Based on distances to proposed building.
Note B Based on distances to application boundary.
Note C Based on distance of 20m in the case of NP01, being considered more representative of the average distance to landscaping works in the north-east area of the site.

9.52 Indicative predicted noise levels are within the construction noise criteria at both locations. An outline construction noise and vibration management plan is presented in Appendix 9.3. There are no construction activities that would be expected to give rise to noise construction levels that would be considered out of the ordinary or in exceedance of the levels outlined in Table 9.6 on an on-going basis or give rise to a potential significant impact through the process outlined in Table 9.5. The impact on the noise environment due to construction activities will be transient in nature and best-practice measures will be implemented to minimise the impact of construction activities on the noise environment.

9.53 In terms of the additional construction traffic on local roads that will be generated as a result of this development the following comment is presented. In order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% along the local road network. As outlined in the relevant sections of chapter relating to traffic, additional traffic introduced onto the local road network due to the construction phase of the Proposed Development will not result in sufficient changes in traffic volume to cause a significant noise impact.

9.54 It is anticipated that the construction of the facility will be completed during normal construction hours i.e. 07:00 to 19:00hrs Monday to Friday. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. Saturday working or evening hours during long summer days etc. Such occurrences will be kept to a minimum and take place over a short timeframe and as such are unlikely to cause excessive disturbance.

Operational phase

9.55 The primary sources of outward noise in the operational context are deemed medium term and will involve:

- building services noise;
- emergency site operations; and
- additional vehicular traffic on public roads.

9.56 These issues are discussed in detailed in the following sections. See Appendix 9.4 for details of the noise modelling undertaken for this assessment and associated assumptions.

9.57 *Building Services Noise / Emergency Site Operation* – Three scenarios have been developed to consider the noise impact of the proposed operations. All scenarios include the operation of the permitted Gas Plant to the south-west of the overall site. These are as follows:

- Scenario A – Typical Operation of all permitted and proposed data centres including permitted Gas Power Plants (not including the diesel back-up generators);
- Scenario B – Emergency Operation (i.e. typical operation plus all diesel back-up generators); and
- Scenario C – Typical Operation (with generator testing).

9.58 Scenario A would be considered to be the most representative of the day to day operation of the site once a permanent electrical supply is provided. Detailed noise data for plant items associated with typical site operation are presented in Appendix 9.4. Sound power levels for items relevant to Scenario A are summarised as follows:

Table 9.12 Sound power levels advised for DUB06 condenser units

Item	Sound Power Levels, dB								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Total	94	91	82	78	72	70	69	63	81
Left Side	86	83	74	70	64	62	61	55	73
Right Side	86	83	74	70	64	62	61	55	73
Front (Evaporator)	84	81	72	68	62	60	59	53	71
Rear (Condenser)	86	83	74	70	65	62	61	55	73
Top	90	87	78	74	69	66	65	59	77

9.59 The permitted Gas Power Plant items are assessed on the basis of a maximum A-Weighted Sound Pressure Level of 75dB L_{pA} at 1m distance, with them being housed internally within a building. See Appendix 9.4 for specific details and assumptions relevant to this aspect of the assessment.

Table 9.13 Sound power levels assumed for the permitted DUB05 internal gas generator units associated with the permitted Power Plant

Item	Sound Power Levels dB								dB(A)
	63	125	250	500	1000	2000	4000	8000	
75dB(A) at 1m Gen Set	108	105	98	94	90	86	81	79	97

9.60 Scenario B is representative of an emergency situation when a power outage or issue with supply from the national grid has occurred. Noise data for generators used in noise prediction calculations are presented in Appendix 9.4. In summary the Dub 4 generators are required not to exceed a maximum A-Weighted Sound Pressure Level of 75dB L_{pA} at 1m distance.

9.61 Scenario C considers the impact associated with the occasional testing of proposed emergency generators.

9.62 It should be noted that the predicted noise levels presented for Scenario A, B and C consider the cumulative operation of all Edgeconnex Phases 1 to 4 along with DUB04 and DUB 05 operations (permitted developments on site) as well as the Proposed Development (DUB06).

9.63 The results of the iterations of the noise model are presented in Table 9.14 and Table 9.15. All plant will be selected such that no tonal noise emissions are evident at noise sensitive locations. Note the predictions have been presented for the façades of the various noise sensitive locations that have a direct line of sight to the Proposed Development.

Table 9.14 Predicted plant noise levels for various scenarios

Location	Predicted dB $L_{Aeq,T}$		
	Scenario A Typical Operation (all Edgeconnex Data Centres)	Scenario B Emergency Operation (with all Edgeconnex generators)	Scenario C Typical Operation (with Edgeconnex DUB 06 generator testing)
NP01	40	54	42
NP02	40	55	42
NP03	34	52	34
NP04	34	51	37
NP05	37	55	37
NP17	39	50	40
NP18	41	50	41
NP19	40	50	41
NP20	38	50	39
NP21	38	50	39
NP22	39	52	40
NP23	39	53	39
NP24	39	49	39
NP25	39	49	39
NP26	40	50	40

9.64 The predicted levels are based on a situation where the receiver is downwind of all noise sources. For the purposes of the assessment against the adopted criteria this is a robust conservative assumption.

9.65 *Comment on Adopted Noise Criteria Day to Day Operations* – The predicted noise levels presented in Table 9.14 and 9.15 have been compared to the relevant day, evening and night time noise criteria as adopted for this assessment.

9.66 Note A of Table 9.15 indicates that the emergency generator testing shall take place only between 9am and 5pm. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.

9.67 *Scenario A* – All locations are within the relevant adopted daytime and evening limits by a significant margin. All locations comply with the night time criterion. Figure 9.6 presents a noise contour for Scenario A with Figure 9.7 presenting Scenario B.

Table 9.15 Comparison of predicted noise levels vs. adopted noise criteria

Location	Period	Scenario A – Typical Operation			Scenario C – Typical Operation (Generator Testing)		
		Predicted dB $L_{Aeq,T}$	Adopted Limit dB $L_{Aeq,15min}$	Complies ?	Predicted dB $L_{Aeq,T}$	Adopted Limit dB $L_{Aeq,15min}$	Complies?
NP01	Day	40	55	✓	42	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP02	Day	40	55	✓	42	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP03	Day	34	55	✓	34	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP04	Day	34	55	✓	37	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP05	Day	37	55	✓	37	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP17	Day	39	55	✓	40	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP18	Day	41	55	✓	41	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP19	Day	40	55	✓	41	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP20	Day	38	55	✓	39	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP21	Day	38	55	✓	39	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP22	Day	39	55	✓	40	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP23	Day	39	55	✓	39	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP24	Day	39	55	✓	39	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP25	Day	39	55	✓	39	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			
NP26	Day	40	55	✓	40	55	✓
	Evening		50	✓	Note A		
	Night		45	✓			

Note A Indicates that the emergency generator testing shall take place only between 9am and 5pm. Residents of the adjacent dwelling houses shall be provided with adequate prior warning of the proposed testing times exceeding 1 hour in duration.

9.68 *Scenario C* – All locations are within the relevant adopted daytime limits during periods when a single generator is undergoing routine testing.

9.69 *Comment on Emergency Operations* – As discussed previously in the rare and exceptional event of a failure in electricity supply from the national grid standby generators will operate in order to maintain the sites operations. As discussed it is appropriate to adopt a criterion of 55dB $L_{Aeq,T}$ for such scenarios. Table 9.16 reviews the predicted levels for Scenario B.

Table 9.16 Comparison of predicted noise levels vs. adopted noise criterion – emergency generators

Location	Period	Scenario B – Emergency Operation (with all generators)		
		Predicted dB $L_{Aeq,T}$	Adopted Limit dB $L_{Aeq,15min}$	Complies?
NP01	Emergency Operation	54	55	✓
NP02		55		✓
NP03		52		✓
NP04		51		✓
NP05		55		✓
NP17		50		✓
NP18		50		✓
NP19		50		✓
NP20		50		✓
NP21		50		✓
NP22		52		✓
NP23		53		✓
NP24		49		✓
NP25		49		✓
NP26		50		✓

9.70 *Scenario B* - All locations are within the relevant adopted criterion. Figure 9.7 present noise contours for Scenario B.

9.71 *Summary* – Scenario A 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 site specific levels comply with the day, evening and night time criteria adopted for this assessment and typically espoused by SDCC. Scenario B is representative of emergency situations such as a power outage on the national grid. Review of the predicted noise levels and associated noise contours confirm that slight exceedances of the criteria for emergency scenario are expected where there is full site power failure.

9.72 *Review of Increases in Noise Level* – Table 9.17 presents the predicted changes in cumulative noise level associated with the proposed and overall permitted development at the nearest noise sensitive locations to the site (i.e. NP01, NP21, NP23 and NP24).

Table 9.17 Review of predicted changes in existing noise levels

Loc.	Scenario A – Typical Operation Daytime				EPA Glossary of Effects
	Predicted dB $L_{Aeq,T}$	Average Background Level dB $L_{A90,T}$	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NP01	40	45	46.2	+1.2	Not Significant
NP21	38	42	43.5	+1.5	Not Significant
NP23	39	42	43.8	+1.8	Not Significant
NP24	39	42	43.8	+1.8	Not Significant
Loc.	Scenario A – Typical Operation Night Time				EPA Glossary of Impacts
	Predicted dB $L_{Aeq,T}$	Average Background Level dB $L_{A90,T}$	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	
NP01	40	42	44.1	+2.1	Not Significant
NP21	38	38	41	+3	Slight
NP23	39	38	41.5	+3.5	Slight
NP24	39	38	41.5	+3.5	Slight

9.73 Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is 'not significant' for Scenario A – Typical Operation during daytime periods. In term of night time periods the predicted changes are expected to have a 'not significant or

'slight' impact on the nearest noise sensitive locations. It is emphasised that the total noise level of 39 dB $L_{Aeq,T}$ remains a low noise level and is well within the adopted criterion of 45dB $L_{Aeq,T}$.

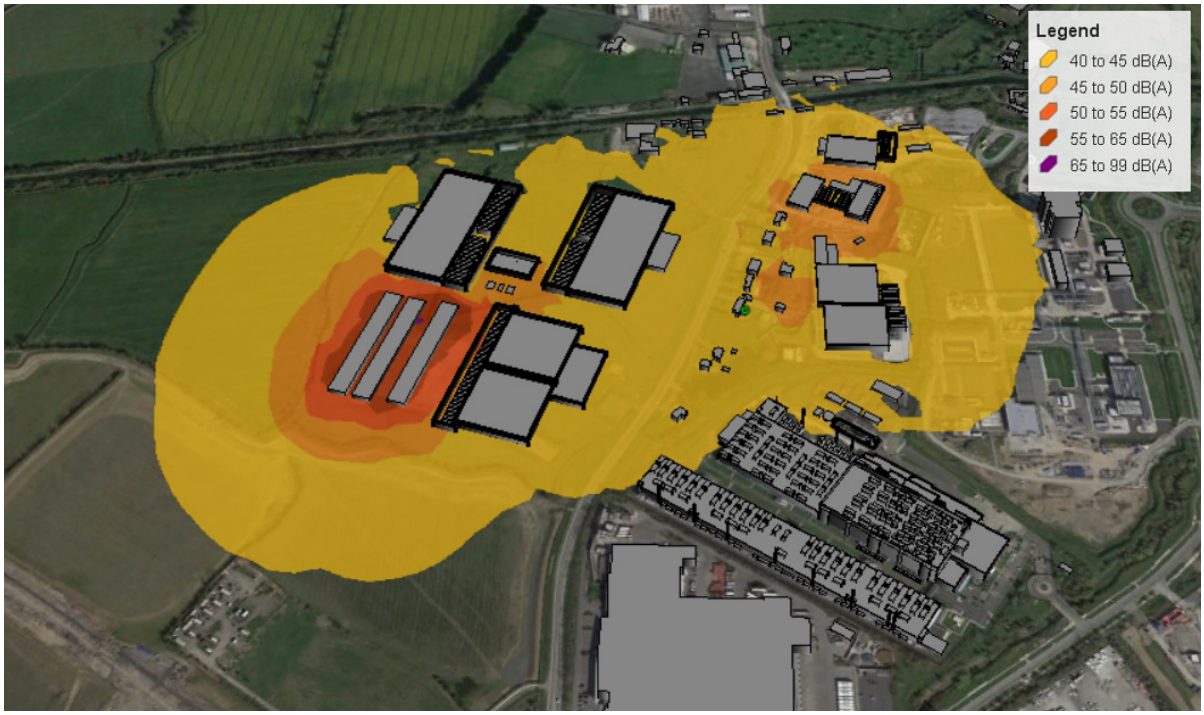


Figure 9.6 Scenario A – Noise contour – typical operation

Figure 9.7 Scenario B – Noise contour – emergency operation (with all generators)

9.74 *Additional vehicular traffic on public roads* – In terms of the additional traffic on local roads that will be generated as a result of this development the following comment is presented: given that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25%, it is considered that additional traffic introduced onto the local road network due to this development will not result in a significant noise impact.

Remedial and mitigation measures

9.75 In order to sufficiently ameliorate 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

9.76 With regard to construction activities, reference will be made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities.

9.77 Various mitigation measures will be implemented and applied during the construction of the Proposed Development. Specific examples of such measures are:

- 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.
- a solid site hoarding of 2.4m height will be erected around the site boundary.

9.78 Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- selection of plant with low inherent potential for generation of noise and/or vibration;
- erection of barriers as necessary around items such as generators or high-duty compressors;
- 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.

9.79 It is recommended that vibration from construction activities to off-site residences be limited to the values set out in Table 9.6. It should be noted that these limits 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%.

Operational phase

9.80 *Building services noise / emergency site operation* – Noise from external plant will be kept within criteria by adherence to the sound power levels presented in Appendix 9.4 through selection of plant items, incorporating appropriately specified in line attenuators where necessary. With due consideration as part of the detailed design process, this approach will result in the site operating within the constraints of the best practice guidance noise limits that have been adopted as part of this detailed assessment. In addition, noise emissions will be broadband in nature and will not contain any tonal or impulsive elements.

9.81 *Additional vehicular traffic on public roads* – The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

9.82 *Noise and Human Health – Guidelines for construction and operational phase*: Noise criteria are provided by relevant bodies with consideration of the likely impact of noise on human health. The construction phase is short-term and therefore any elevated levels of noise will be of limited duration and, as a result, are not expected to pose any risk to human health. In terms of the noise exposure of construction workers and potential hearing damage that may be caused due to exposure to high levels of noise, the Safety, Health and Welfare at Work (General Application) Regulations 2007 (Statutory Instrument No. 299 of 2007) provides guidance in terms of allowable workplace noise exposure levels for employees. The Regulations specify two noise Action Levels at which the employer is legally obliged to reduce the risk of exposure to noise. The appointed contractor will be required to comply with the Regulations and provide appropriate noise exposure mitigation measures

where necessary. No significant noise impacts are expected from the operational phase of the Proposed Development. As such, there is no anticipated risk of long-term exposure to noise on human health resulting from the Proposed Development.

Predicted impact of the Proposed Development

9.83 This section summarises the likely noise and vibration impact associated with the Proposed Development, taking into account the mitigation measures.

Construction phase

9.84 During the construction phase of the project 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, along with the implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. It is reiterated that any construction noise impacts will be ***short term*** in nature. Also, it is considered that as the project progresses from initial ground works that construction noise and vibration impacts will be greatly reduced.

9.85 A summary description of the expected construction phase effects is summarised in Table 9.18 for the nearest noise sensitive locations.

Table 9.18 Description of expected construction phase effects

Quality	Significance	Duration
Negative	***Moderate Effects***	***Short-term***

Operational phase

9.86 *Building services noise / emergency site operation* – Proprietary noise and vibration control measures will be employed 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 impact is not significant.

9.87 *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. The resultant noise impact is not significant.

9.88 A summary description of the expected operational phase effects is summarised in Table 9.19 for the nearest noise sensitive locations.

Table 9.19 Description of expected operational phase effects

Quality	Significance	Duration
Negative	***Not Significant to Slight Effects***	***Long-term***

Cumulative impacts

9.89 The environmental noise survey takes account of noise emissions from existing and permitted developments. It was noted that the existing ambient noise levels in the area were dominated primarily by road traffic on the surrounding road network.

9.90 The noise criteria proposed for new building services plant items has been derived with consideration of existing site noise emissions levels to ensure that cumulative noise emissions do not exceed the relevant noise criteria.

9.91 The potential cumulative noise emissions from the Proposed Development and neighbouring permitted developments, including the Microsoft and Interxion Data Centres have been considered.

As the full extent of permitted data centres were not operational at the time the baseline noise survey was conducted, reference is made to the various noise predictions for these sites which present noise predictions to nearby shared residential receptors. The closest shared receptors to the two neighbouring sites are the receivers NP01, NP21, NP23 and NP24. Table 9.20 presents the predicted cumulative noise levels to these receivers and compares to the proposed noise criteria.

Table 9.20 Assessment of predicted cumulative noise levels at receptors for typical site operation

Receiver Reference (Ref. Figure 9.4)	Predicted Plant Noise Level, typical operation (dB $L_{Aeq,T}$)				Noise Criteria	Complies?
	Edgeconnex	Microsoft	Interxion	Cumulative		
NP01 (Receiver noise levels not presented Microsoft & Interxion EIS assessments. Plant noise levels extracted from EIS noise contour maps)	39	39.4	29	**42**	Day: 55 dB $L_{Ar,T}$ Eve: 50 dB $L_{Ar,T}$ Night: 45 dB $L_{Aeq,T}$	✓
NP21 (Microsoft EIS NP04). (Interexion EIS NP15)	37	41.4	29	**43**		✓
NP23 (Receiver noise levels not presented Microsoft & Interexion EIS assessments. Plant noise levels extracted from EIS noise contour maps)	39	40	25	**43**		✓
NP24 (Microsoft EIS NP01 value corrected to estimate the noise level at the front façade of the dwelling i.e. facing Proposed Development) (Interxion EIS NP11)	38	39.8	27	**42**		✓

9.92 Predicted cumulative plant noise emissions are therefore within the daytime, evening and night-time limit values.

'Do nothing' scenario

9.93 In a 'Do nothing' scenario the existing noise environment would remain. Levels of ambient and background noise may increase slightly over time due to growth in traffic volumes on local and distant road networks.

Monitoring

9.94 It is considered appropriate that a commissioning noise survey be undertaken once the site becomes operational in order to ensure that the relevant noise criteria put forward in this document are complied with.

Reinstatement

9.95 Not applicable in respect of noise and vibration.

10. AIR QUALITY

Introduction

10.1 The originally submitted Air quality and Climate chapter has been subdivided into two separate chapters based on current best practice and the EPA EIA Report Guidelines 2022. This chapter evaluates the impacts which the proposed development may have on Air Quality during the construction and operational stages as defined in the Environmental Protection Agency (EPA) documents Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022). An assessment of the likely dust related impacts as a result of construction activities was undertaken and used to inform a series of mitigation measures. Air dispersion modelling of operational stage emissions from the site was carried out using the United States Environmental Protection Agency's regulated model AERMOD as recommended by the EPA (EPA, 2020a). 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. The modelling was undertaken to assess the impact to ambient air quality from the continuous operation of the gas generators and the scheduled testing of the standby diesel generators and the infrequent emergency operation of the standby diesel generators.

10.2 The proposed data centre development is adjacent to the R120 and the Grange Castle Business Park. The proposed development site is bounded to the north by the Grand Canal; the eastern boundary of the site is formed by the R120 with the permitted EdgeConnex developments previously granted to the west and south. The existing Edgeconnex campus is located on the eastern side of the R120. Agricultural lands bound the overall site to the west and east.

10.3 Most of the land to the east adjacent to the proposed development site is occupied by industrial campuses including pharmaceutical, data centre and food manufacturing uses. The neighbouring EdgeConneX campus is located directly to the east on the opposite side of the R120. The permitted Grange Back-Up Power site as well as the existing facilities of Pfizer, Griffols and Takeda are located further to the east; the Microsoft's data centre campuses are located to the east and south-east. In terms of sensitive residential receptors, one-off dwellings are located to the east of and bounding the R120 with a large residential estate, Grange View, located further east; and additional residential receptors located to the immediate north-east of the overall site and further north and to the south.

10.4 Air dispersion modelling was carried out by AWN Consulting Ltd using the United States Environmental Protection Agency's regulated model AERMOD. The modelling of air emissions from the site was carried out to assess concentrations of Nitrogen Dioxide (NO_2) and the consequent impact on human health. The assessment of the emergency operations scenario was undertaken in order to quantify the impact of the proposed stand-by generators. A cumulative assessment was also undertaken to assess the impact of the proposed development with the neighbouring EdgeConneX site Phases 1, 2, 3, 4, 5 and 6 (including the permitted power plant) and neighbouring EPA licenced sites Takeda, Grange Back-Up Power and Pfizer. Grange Back-Up Power, Takeda and Pfizer have main air emission points which are licensed by the EPA to emit air pollutants. These emission points emit air pollutants on an essentially continuous basis over the course of a year. Other nearby facilities, such as Microsoft, have emission points which are classified as potential emission points as these will only operate under exceptional circumstances (except for testing purposes) and thus will not be in operation on a day-to-day basis. For this reason, the Microsoft emission points were not considered for the purpose of this assessment.

10.5 To obtain all the meteorological information required for use in the model, data collected during 2015 - 2019 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 a full year of meteorological data. Using this input data, the model predicted ambient concentrations at various receptors for each hour of the meteorological year. This study adopted a worst-case approach which will lead to an over-estimation of the actual levels that will arise. 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 development;
- Air dispersion modelling of significant substances released from the site;

- Identification of predicted concentrations of released substances beyond the site boundary; and
- 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.

Criteria for rating of impacts

Ambient Air Quality Standards

10.6 In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC. The ambient air quality standards applicable for NO_2 are outlined in this Directive (see Table 10.1).

10.7 These standards have been used in the current assessment to determine the potential impact of NO_2 emissions from the proposed facility on air quality.

Table 10.1 EU Air Quality Standards 2011

Pollutant	Regulation [Note 1]	Limit Type	Value
Nitrogen Dioxide (NO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
		Critical limit for protection of vegetation	30 µg/m^3 ($NO+NO_2$)

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

Gothenburg protocol

10.8 In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). 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).

10.9 European Commission Directive 2001/81/EC and the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. 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 2020 (EPA, 2020b) 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 applied the 2010 NECD limits until 2020 and established a new national emission reduction commitments which is applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 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 $PM_{2.5}$.

Construction phase

10.10 The current assessment focused firstly on identifying the existing baseline levels of NO_2 in the region of the proposed development (as defined in Chapter 4 of this EIAR) 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.

Operational phase

10.11 Air dispersion modelling was carried out using the United States Environmental Protection Agency's regulated model AERMOD (Version 21112). 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) (2020b)*".

10.12 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.

10.13 The assessment was undertaken in order to quantify the impact of the proposed development on ambient air quality concentrations. To obtain all the meteorological information required for use in the model, data collected during 2015 - 2019 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 modelled meteorological year. The model post-processed the data to identify the location and maximum of the worst-case ground level concentration. This worst-case concentration was then added to the background concentration to give the worst-case predicted environmental concentration (PEC). The PEC was then compared with ambient air quality standards to assess the significance of the releases from the site. This study adopted a conservative approach which will lead to an over-estimation of the actual levels that will arise.

10.14 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 10.1. 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.

10.15 Due to the proximity to surrounding buildings, 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:

- Discrete receptors were identified at which concentrations would be modelled. The impact of the emergency generators was assessed at the following discrete receptor locations at nearby residential receptors.

- A receptor grid was identified at which concentrations would be modelled. The receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. Modelling was carried out covering an area of 64 km^2 with the site at the centre. The outer grid was 8km x 8km in size with receptors every 200m and the inner grid consisted of receptors every 100m over a 2.5 x 2.5km area. The total calculation points for the gridded modelling including boundary receptors are 2,576.

- All on-site buildings and significant process structures were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.

- Hourly-sequenced meteorological information has been used in the model covering the years 2015 – 2019 from Casement Aerodrome as shown in Figure 10.1. 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 7 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 10.2).

- Terrain 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.

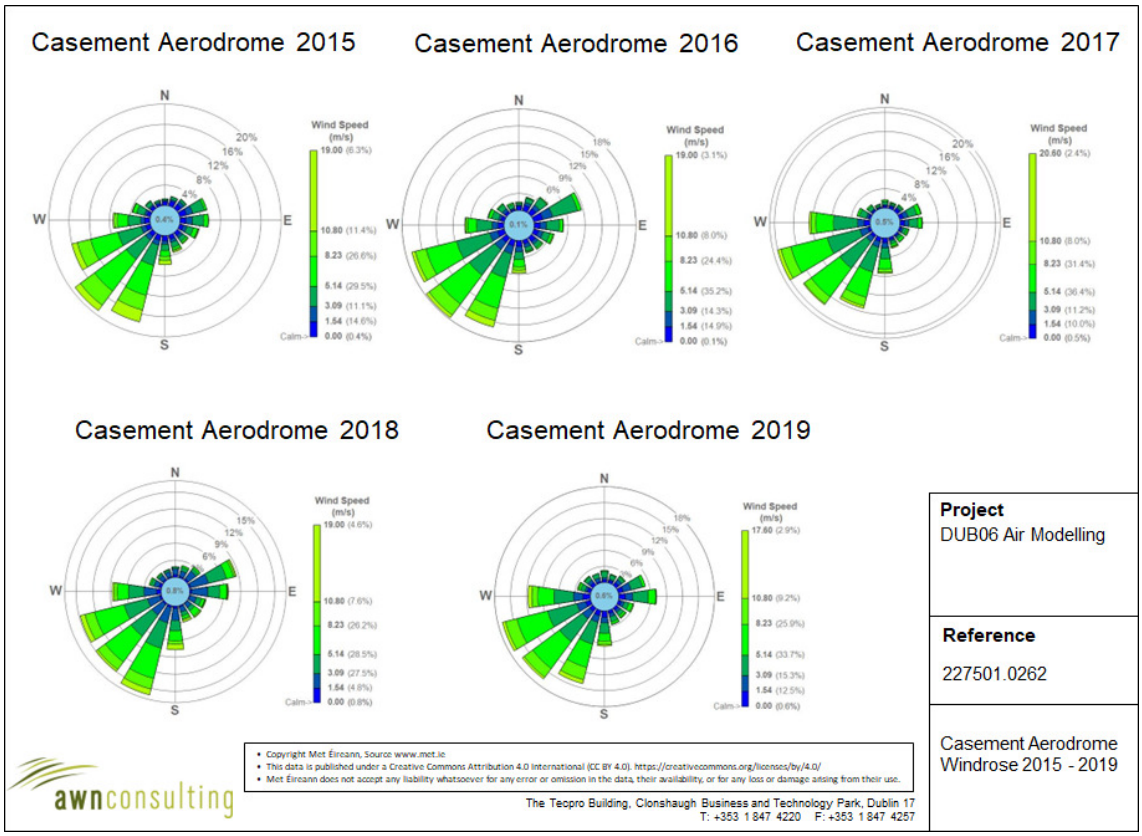


Figure 10.1 Casement Aerodrome Windrose 2015 - 2019

Process emissions

10.34 DUB 6 will have 24 standby diesel generators with 22 operational and 2 catchers. DUB6 diesel generators will only be used in the event of interruption to the supply of natural gas to the gas generator compound and for testing purposes. The modelled maintenance plan for the proposed development comprises the following:

- Testing once per week of all 24 no. standby generators on site at 80% load for a maximum of 1 hour each, 1 generator at a time, sequentially.
- All testing is assumed to occur between 8am and 5pm, Monday to Friday only.

10.36 The model has included testing of the generators on a weekly basis, in reality it is more likely that the generators will be tested on a monthly basis rather than a weekly basis. The modelling has taken a conservative approach and therefore emissions may be over-estimated. Continuous operation was assumed for the running of the temporary gas generation compound.

10.37 Modelling for NO_2 was undertaken in detail. In relation to CO, PM_{10}, $PM_{2.5}$ and benzene no detailed modelling was undertaken. Emissions of these pollutants are significantly lower than the NO_X emissions from the generators relative to their ambient air quality standards and thus ensuring compliance with the NO_2 ambient limit value will ensure compliance for all other pollutants. For example, the emission of CO from the generators is eight times lower than NO_X whilst the CO

ambient air quality standard is 10,000 µg/m^3 compared to the 1-hour NO_2 standard of 200 µg/m^3. Similarly, levels of PM_{10}/$PM_{2.5}$ emitted from the generators will be eighty times lower whilst the ambient air quality standards are comparable.

10.38 The scenarios modelled for this assessment include emergency operation of the generators for 100 hours per year calculated according to USEPA protocol. A testing regime has also been included in the model as detailed above.

10.39 USEPA Guidance suggests that for emergency operations, an average hourly emission rate should be used rather than the maximum hourly rate (USEPA 2011). As a result, the maximum hourly emission rates from the emergency generators were reduced by $\frac{100}{8760}$ and the generators were modelled over a period of one full year. In reality, the emergency generators are likely to run for only 24 - 48 hours per year; however it is not advisable to assume less than 100 hours per year using the USEPA method as this would not be a sufficiently conservative approach.

10.40 A second methodology has recently 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 emergency operational hours of the standby 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 thus the 98th percentile should be used. 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.

10.41 Both the methodology advised in the USEPA guidance as well as the approach described in the UK EA guidance have been applied for the scenarios modelled in this study to ensure a robust assessment of predicted air quality impacts from the standby generators.

10.42 Modelling was undertaken for three separate scenarios to account for emissions from the gas generation compound in isolation and secondly a full cumulative assessment to take into account all existing and proposed phases for EdgeConneX and taking into allow all IED licenced facilities in the region. All scenarios were modelled using the methodologies described above and are detailed below:

Scenario 1: All existing phases of EdgeConneX, both constructed and permitted. Three phases of the gas generator compound are also included. Phase 1 will have 22 gas generators with 18 operational and 4 catchers. Likewise, Phase 2 has 22 gas generators with 18 operational and 4 catchers. Phase 3 has 21 gas generators with 19 operational and 2 catchers.

Scenario 2: Proposed DUB6 development which includes 24 no. standby diesel generators with 22 operational and 2 catchers. Testing and emergency operation of the DUB6 diesel generators is included. In addition, emissions from Phase 1, 2 and 3 of the gas generator compound are included in this scenario.

Scenario 3: This scenario is based on a full cumulative assessment taking into account all existing and proposed phases for EdgeConneX and taking into account all IED licenced facilities in the region. Phases 1, 2 and 3 of the gas generator compound are included for within this scenario in addition to the scheduled testing and emergency operation of the standby diesel generators associated with the EdgeConneX facility.

10.43 The cumulative assessment of Scenario 1 and Scenario 3 above has included the following IED licensed sites: Takeda, Grange Back-Up Power and Pfizer. The source information for the modelled emission points has been summarised in Table 10.2.

10.44 Modelling of NO_X emissions from the facility was based on the ozone-limiting method (OLM) based on the "OLMGROUP ALL" option. It is preferred to the Plume Volume Molar Ratio Method (PVMRM) method (Hanrahan, 1999a, 1999b). The approach has taken into account the following considerations which are outlined in the USEPA memos "Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program" (2010) and "Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (2011):

- Firstly, the PVMRM algorithm may have a tendency to overestimate the conversion of NO to NO_2 for low-level plumes by overstating the amount of ozone available for the conversion as it does not account for the possibility that the vertical extent of the plume may extend below ground-level.

- Secondly, area sources may be overestimated using the PVMRM method as the lateral extent of the plume used in calculating the plume volume depends on the projected width of the area source even if only a portion of the area source actually impacts a nearby receptor.

- Thirdly, although the PVMRM method may be likely to give better results for an isolated source the current assessment will be based on emissions from numerous sources and thus the OLMGROUP ALL method is likely to be of similar or better accuracy as the PVMRM method.

10.45 For the OLM method, it has been assumed that 10% of the NOx in the stack gas is already in the form of NO_2 before the gas leaves the stack, in reality the levels are usually closer to 5% based on the USEPA database of NO_2/NO_X ratios. Actual hourly ozone concentrations from the air monitoring station in Rathmines were used in the OLM model runs for each relevant year (EPA, 2021b).

Table 10.2 Process emissions used in modelling assessment

Stack Reference	Height Above Ground Level (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temp (K)	Max Volume Flow (Nm^3/hr)	Exit Velocity (m/sec actual)	NO_2	
							Concentration (mg/Nm^3)	Mass Emission (g/s)
Proposed DUB6 Standby Diesel Generators (Emergency Operations)	25	0.65	0.33	773.15	6,164	21.4	1,800	3.22 Note 1 / 0.037 Note 2
Proposed DUB6 Standby Diesel Generators (Testing)	25	0.65	0.33	773.15	6,164	21.4	1,800	0.805 Note 3
Permitted DUB5 Standby Diesel Generators (Emergency Operations)	25	0.65	0.33	773.15	6,164	21.4	1,800	3.22 Note 1 / 0.037 Note 2
Permitted DUB5 Standby Diesel Generators (Testing)	25	0.65	0.33	773.15	6,164	21.4	1,800	0.805 Note 3
Permitted Gas Power Plant	25	0.70	0.385	663.15	5,211	14.7	250	0.362 Note 4
EdgeConneX Phase 4 Standby Generators (Emergency Operations)	15.0	0.5	0.20	743	5,996	39.3	2,572	5.7 Note 1 / 0.13 Note 2
EdgeConneX Phase 4 Standby Generators (Testing)	15.0	0.5	0.20	805.15	7,980	37.5	2,572	1.43 Note 3
EdgeConneX Phase 1, 2 & 3 Standby Generators (Emergency Operations)	15.0	0.5	0.20	805.15	7,980	37.5	2,572	5.7 Note 1 / 0.13 Note 2
EdgeConneX Phase 1, 2 & 3 Standby Generators (Testing)	15.0	0.5	0.20	805.15	7,980	37.5	2,572	5.7 Note 3
Neighbouring EdgeConneX Gas Generators	15.0	0.5	0.20	754.2	3,017	25.4	489	0.58 Note 4
Takeda Stack	15.0	0.56	0.25	533.15	5,850	12.9	140	0.23 Note 4
Pfizer A1-1	45.0	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 4
Pfizer A1-2	45.0	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 4
Pfizer A1-3	45.0	0.85	0.57	441.15	13,755	10.9	75	0.29 Note 4
Pfizer A2-1	45.0	2.0	3.14	441.15	64,065	9.2	75	1.33 Note 4
Pfizer A2-2	45.0	2.0	3.14	441.15	64,065	9.2	75	1.33 Note 4
Grange A2-1	25.0	2.8	6.0	663.15	288,000	27.6	75	4.5 Note 4
Grange A2-1	25.0	3.2	8.0	663.15	216,000	27.6	75	6.0 Note 4

Note 1 Maximum emission rates used to model the hypergeometric distribution at the 98th%ile confidence level.

Note 2 Reduced emission rates based on USEPA protocol used to model emissions during emergency operation of generators based on 100 hours of operation.

Note 3 Maximum emission rates used to model scheduled emissions including batch testing

Note 4 Continuous operation assumed 24 hours per day, 365 days per year

Receiving environment

10.46 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 Monitoring Annual Report 2020*" (EPA, 2021a) details the range and scope of monitoring undertaken throughout Ireland.

10.47 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 (EPA, 2021a). 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, Grange Castle is categorised as Zone A (EPA, 2021a).

10.48 In 2020 the EPA reported (EPA, 2021a) 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. 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, they have not been included in the baseline section and previous data has been used to determine the baseline air quality in the region of the site.

10.49 With regard to NO_2, continuous monitoring data from the EPA (EPA 2021a), at suburban Zone A background locations in Rathmines, Dun Laoghaire, Swords and Ballyfermot show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 13 - 22 µg/m^3 over the period 2015 - 2019 (see Table 10.3). Sufficient data is available for the station in Ballyfermot to observe long-term trends since 2014 (EPA 2021a), with annual average results ranging from 16 – 20 µg/m^3. Based on these results, an estimate of the current background NO_2 concentration in the region of the proposed development is 15 µg/m^3 based on the results for Ballyfermot and acknowledging the more rural nature of the current location relative to Ballyfermot.

10.50 In relation to the annual averages, the ambient background concentration is added directly to the process concentration. With regard to short-term peak concentrations of NO_2 a value of twice the annual mean background concentration was added to the process concentration.

Table 10.3 Trends In Zone A Air Quality - Nitrogen Dioxide (µg/m^3)

Station	Station Classification Council Directive 96/62/EC	Averaging Period	Year					
			2014	2015	2016	2017	2018	2019
Rathmines	Urban Background	Annual Mean NO_2 (µg/m^3)	17	18	20	17	20	22
		99.8th%ile 1-hr NO_2 (µg/m^3)	105	105	88	86	87	102
Ballyfermot	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	16	17	17	17	20
		99.8th%ile 1-hr NO_2 (µg/m^3)	93	127	90	112	101	104
Dun Laoghaire	Suburban Background	Annual Mean NO_2 (µg/m^3)	15	16	19	17	19	15
		99.8th%ile 1-hr NO_2 (µg/m^3)	86	91	105	101	91	90
Swords	Suburban Background	Annual Mean NO_2 (µg/m^3)	14	13	16	14	16	15
		99.8th%ile 1-hr NO_2 (µg/m^3)	37	93	96	79	85	80

Characteristics of the Proposed Development

10.51 When considering a development of this nature, the potential air quality impact on the surroundings must be considered for each of two distinct stages:

- construction phase, and;
- operational phase.

10.52 The construction phase will involve excavation over the development site and the erection of new buildings over a phased construction period. The primary sources of air emissions in the operational context are deemed long term and will involve the emergency operation and testing of the generators.

10.53 These issues are discussed in detailed in the following sections.

Potential impact of the Proposed Development

Construction phase

10.54 The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. 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.

10.55 It is important to note that the potential impacts associated with the construction phase of the proposed development are ***short-term*** in nature. When the dust minimisation measures detailed in the mitigation section of this chapter are implemented, fugitive emissions of dust from the site will ***not be significant*** and will pose no nuisance at nearby receptors.

Operational phase

10.56 The potential impact to air quality during the operational phase of the proposed development is a breach of the ambient air quality standards as a result of air emissions from the gas generators and the standby diesel generators. However, 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.

Do-nothing scenario

10.57 The Do-Nothing scenario includes retention of the site with no development in place. In this scenario ambient air quality at the site will remain as per the baseline and will also change in accordance with trends within the wider area (including influences from new developments in the surrounding industrial estates, changes in road traffic, etc).

Remedial or reductive measures

10.58 In order to sufficiently ameliorate the likely air quality impact, a schedule of air control measures has been formulated for both construction and operational phases associated with the proposed development.

Construction phase

10.59 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 and the UK (IAQM (2014), The Scottish Office (1996), UK Office of Deputy Prime Minister (2002) and BRE (2003)) and the USA (USEPA (1997)).

Site management

10.60 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.

10.61 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 10.1 for the windrose for Casement Aerodrome). As the prevailing wind is predominantly south-westerly, locating construction compounds and storage piles where sensitive receptors are not to the north-east, will minimise the potential for dust nuisance to occur at sensitive receptors.

10.62 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 0.2 mm/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 were care will be needed to ensure that dust nuisance does not occur. The following measures should be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must 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 should also include head/regional office contact details;
- It is recommended that community engagement 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; and
- At all times, the procedures put in place will be strictly monitored and assessed.

10.63 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

10.64 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

10.65 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 should be postponed until the gale has subsided.

Storage piles

10.66 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 should 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
- Where feasible, 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

10.67 Spillage and blow-off of debris, aggregates and fine material onto public roads should 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; and
- In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of dust mitigation measures

10.68 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 specification of a site policy on dust and 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;
- The specification of effective measures to deal with any complaints received.

Operational phase

10.69 The standby diesel generators have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the plume. Provided each standby diesel generator flue stack is built to a height of 25m above local ground level and based on the site layout modelled and hours of operation, the air impact assessment has demonstrated that ***mitigation measures are not required***.

10.70 Under the previous permission similarly the stack heights of the gas generators were designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the plume. Provided each gas generator flue stack is built to a height of 25m above local ground level, as per its permission, and based on the site layout modelled, the air impact assessment has demonstrated that mitigation measures are not required.

Predicted impact of the Proposed Development

Construction phase

10.71 When the dust mitigation measures detailed in the mitigation section of this report are implemented, fugitive emissions of dust and particulate matter from the site will be ***short-term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

Human Health

10.72 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 ***short-term*** and ***imperceptible*** with respect to human health.

Operational phase

Air Quality

Scenario 1 (USEPA Methodology)

10.73 This assessment involved modelling the continuous operation of the 18 no. gas generators associated with Power Plant 1, the Phase 2 18 no. gas generators associated with Power Plant 2 and the 19 no. gas generators associated with Power Plant 1 and the overall site, apart from the current application. In addition, emissions from the IED Licenced sites Takeda, Grange Back-Up Power and Pfizer were also included in the model as well as the emissions associated with Phases 1, 2, 3, 4 and 5 of the neighbouring EdgeConneX facility.

10.74 The NO_2 modelling results at the worst-case off-site receptor are detailed in Table 10.4. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for NO_2. For the worst-case year, emissions from the site lead to an ambient NO_2 concentration (including background) which is 70% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 89% of the annual limit value at the worst-case off-site receptor. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations are illustrated as concentration contours in Figure 10.2 and Figure 10.3.

Table 10.4 Dispersion modelling results – Scenario 1

Pollutant / Meteorological Year	Background (µg/m^3)	Averaging period	Process Contribution (µg/m^3)	Predicted Environmental Concentration (µg/m^3)	Standard (µg/m^3) Note 1
NO_2 / 2015	15	Annual mean	19.8	34.8	40
	30	99.8th%ile of 1-hr means	95.9	125.9	200
NO_2 / 2016	15	Annual Mean	17.8	32.8	40
	30	99.8th%ile of 1-hr means	95.5	125.5	200
NO_2 / 2017	15	Annual mean	19.2	34.2	40
	30	99.8th%ile of 1-hr means	96.2	126.2	200
NO_2 / 2018	15	Annual mean	19	34	40
	30	99.8th%ile of 1-hr means	109.6	139.6	200
NO_2 / 2019	15	Annual mean	20.5	35.5	40
	30	99.8th%ile of 1-hr means	110.7	140.7	200

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011)

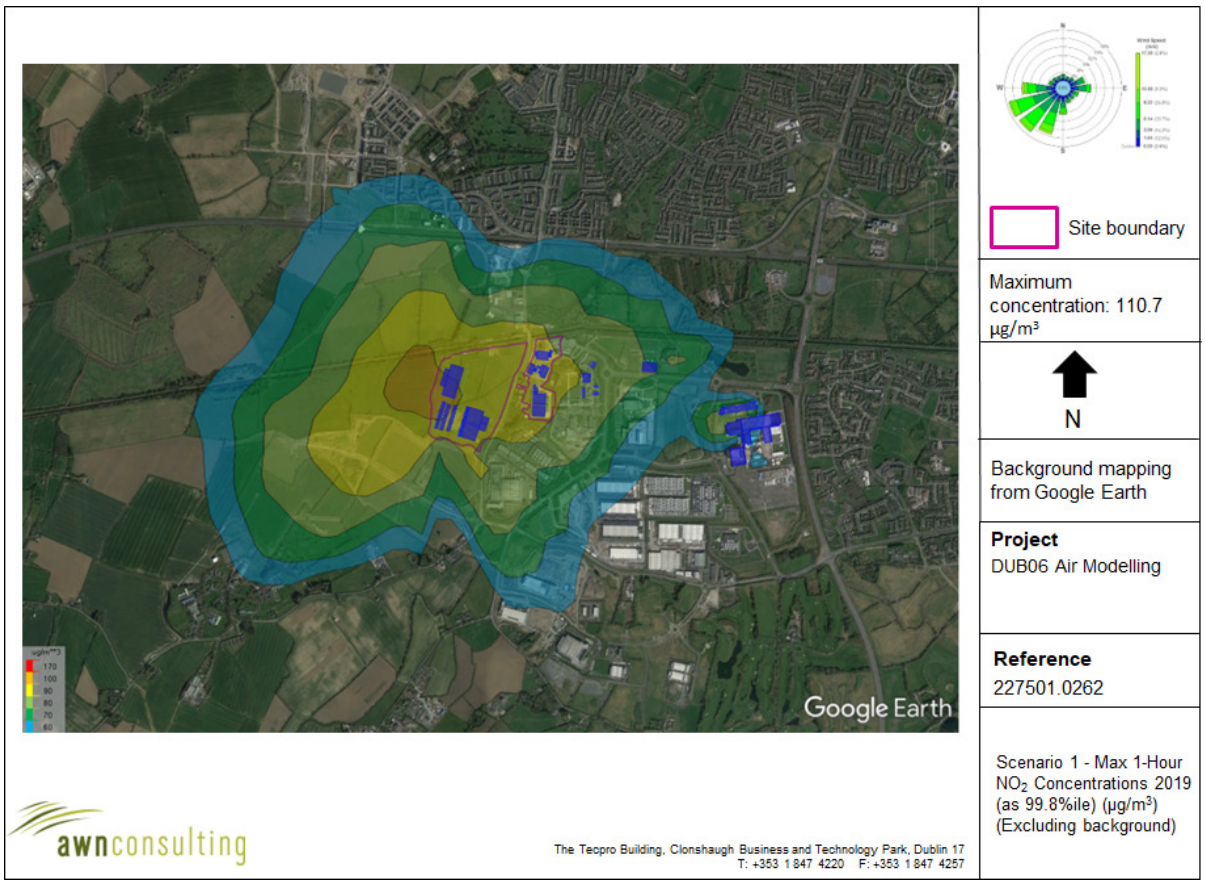


Figure 10.2 Scenario 1 Maximum 1-Hour NO_2 Concentrations (as 99.8th percentile) (Year 2019)

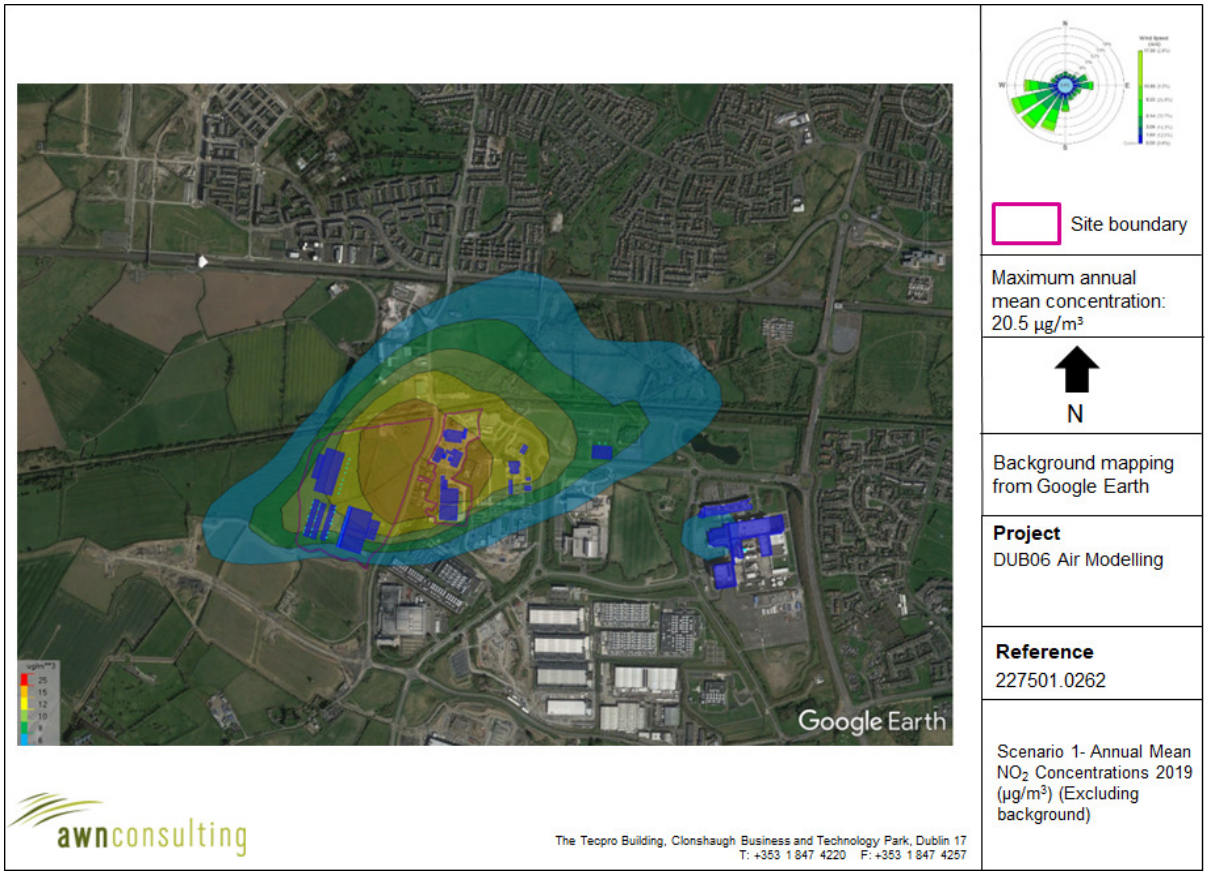


Figure 10.3 Scenario 1 Annual Mean NO_2 Concentrations (Year 2019)

Scenario 2 (USEPA Methodology)

10.75 This assessment involved modelling the continuous operation of the 18 no. gas generators associated with Phase 1, the Phase 2 18 no. gas generators and the Phase 3 19 no. gas generators as well and also considering scheduled testing and infrequent emergency operation of the DUB 6 diesel generators. The NO_2 modelling results at the worst-case off-site receptor are detailed in Table 10.5. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for NO_2. For the worst-case year, emissions from the site lead to an ambient NO_2 concentration (including background) which is 69% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 80% of the annual limit value at the worst-case off-site receptor. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations are illustrated as concentration contours in Figure 10.4 and Figure 10.5.

Table 10.5 Dispersion modelling results – Scenario 2

Pollutant / Meteorological Year	Background (µg/m^3)	Averaging period	Process Contribution (µg/m^3)	Predicted Environmental Concentration (µg/m^3)	Standard (µg/m^3) Note 1
NO_2 / 2015	15	Annual mean	15.9	30.9	40
	30	99.8th%ile of 1-hr means	92.7	122.7	200
NO_2 / 2016	15	Annual Mean	13.7	28.7	40
	30	99.8th%ile of 1-hr means	90.4	120.4	200
NO_2 / 2017	15	Annual mean	16.1	31.1	40
	30	99.8th%ile of 1-hr means	92.9	122.9	200
NO_2 / 2018	15	Annual mean	14.7	29.7	40
	30	99.8th%ile of 1-hr means	101.5	131.5	200
NO_2 / 2019	15	Annual mean	16.9	31.9	40
	30	99.8th%ile of 1-hr means	108.4	138.4	200

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011)

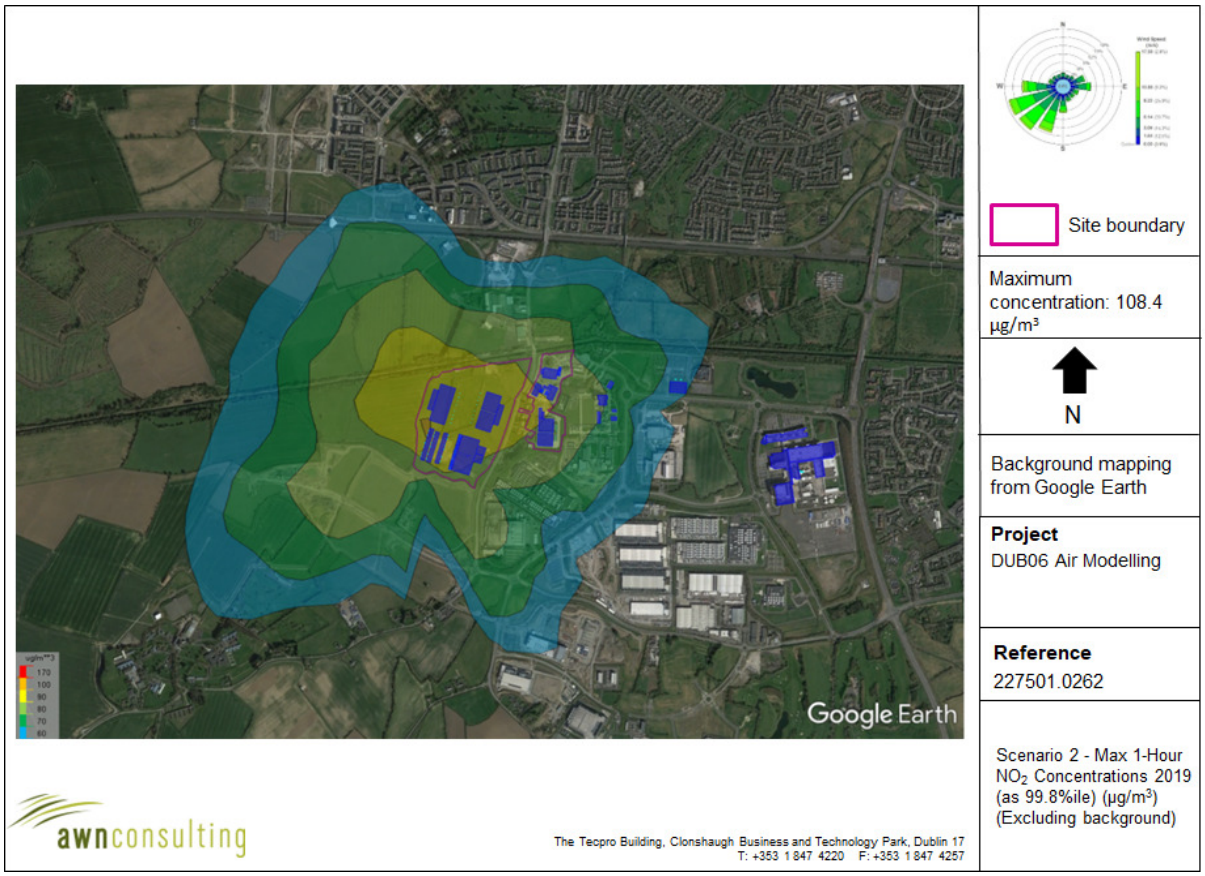


Figure 10.4 Scenario 2 Maximum 1-Hour NO_2 Concentrations (as 99.8th percentile) (Year 2019)

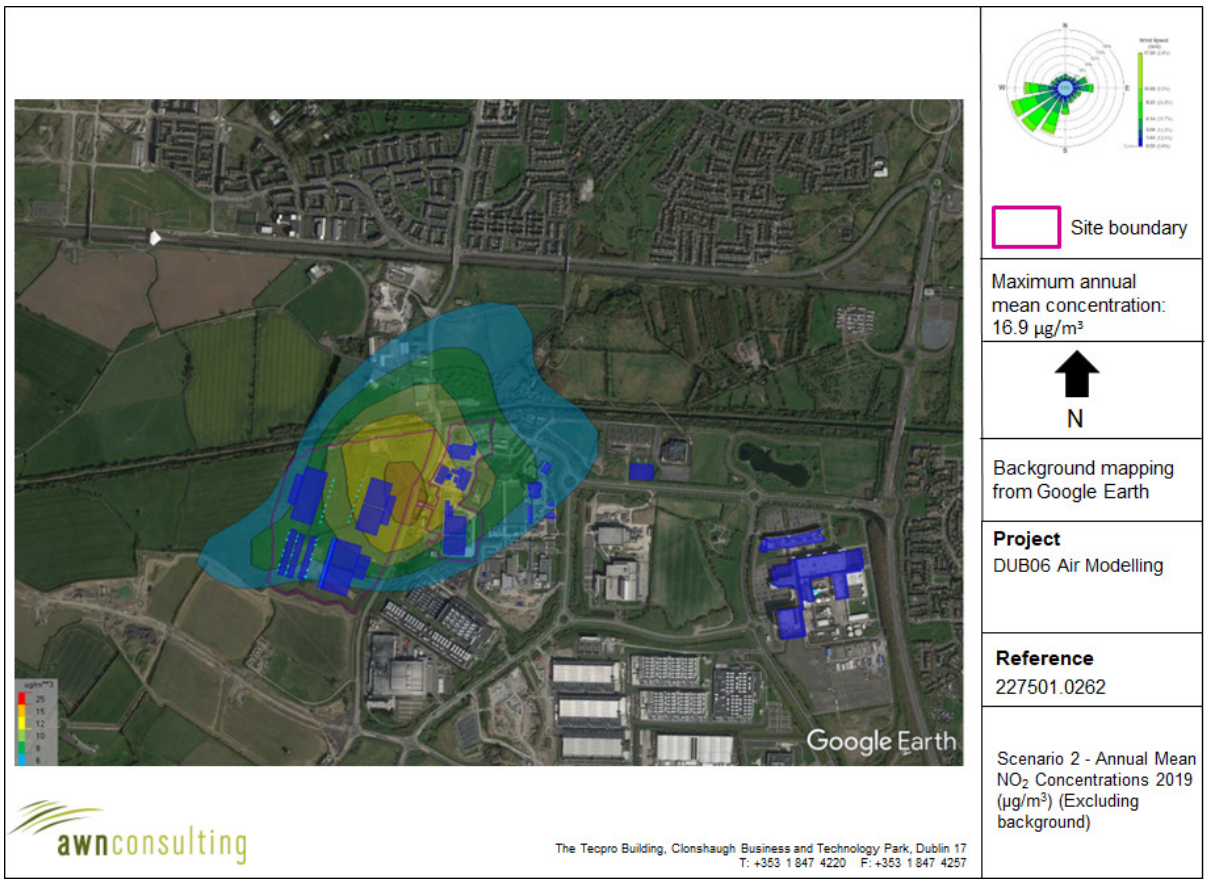


Figure 10.5 Scenario 2 Annual Mean NO_2 Concentrations (Year 2019)

Scenario 3 - Cumulative Assessment (USEPA Methodology)

10.76 The cumulative assessment involved modelling the continuous operation of the 18 no. gas generators associated with Power Plant 1, 18 no. gas generators associated with Power Plant 2 and 18 no. gas generators associated with Power Plant 3 and also considering scheduled testing and emergency operation of the DUB 6 diesel generators.

10.77 In addition, emissions from the IED Licenced sites Takeda, Grange Back-Up Power and Pfizer were also included in the model as well as the emissions associated with Phases 1, 2, 3, 4 and 5 of the neighbouring EdgeConneX site. The NO_2 modelling results at the worst-case off-site receptor are detailed in Table 10.6. The results indicate that the ambient ground level concentrations are below the relevant air quality standards for NO_2. For the worst-case year, emissions from the site lead to an ambient NO_2 concentration (including background) which is 71% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 96% of the annual limit value at the worst-case off-site receptor. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations are illustrated as concentration contours in Figure 10.6 and Figure 10.7.

Table 10.6 Dispersion modelling results – Scenario 3, cumulative assessment

Pollutant / Meteorological Year	Background (µg/m³)	Averaging period	Process Contribution (µg/m³)	Predicted Environmental Concentration (µg/m³)	Standard (µg/m³) Note 1
NO_2 / 2015	15	Annual mean	20.6	35.6	40
	30	99.8th%ile of 1-hr means	97.5	127.5	200
NO_2 / 2016	15	Annual Mean	20.3	35.3	40
	30	99.8th%ile of 1-hr means	97.7	127.7	200
NO_2 / 2017	15	Annual mean	21.8	36.8	40
	30	99.8th%ile of 1-hr means	97.1	127.1	200
NO_2 / 2018	15	Annual mean	21.4	36.4	40
	30	99.8th%ile of 1-hr means	111.9	141.9	200
NO_2 / 2019	15	Annual mean	23.5	38.5	40
	30	99.8th%ile of 1-hr means	110.7	140.7	200

Note 1 Air Quality Standards 2011 (from EU Directive 2008/50/EC and S.I. 180 of 2011)

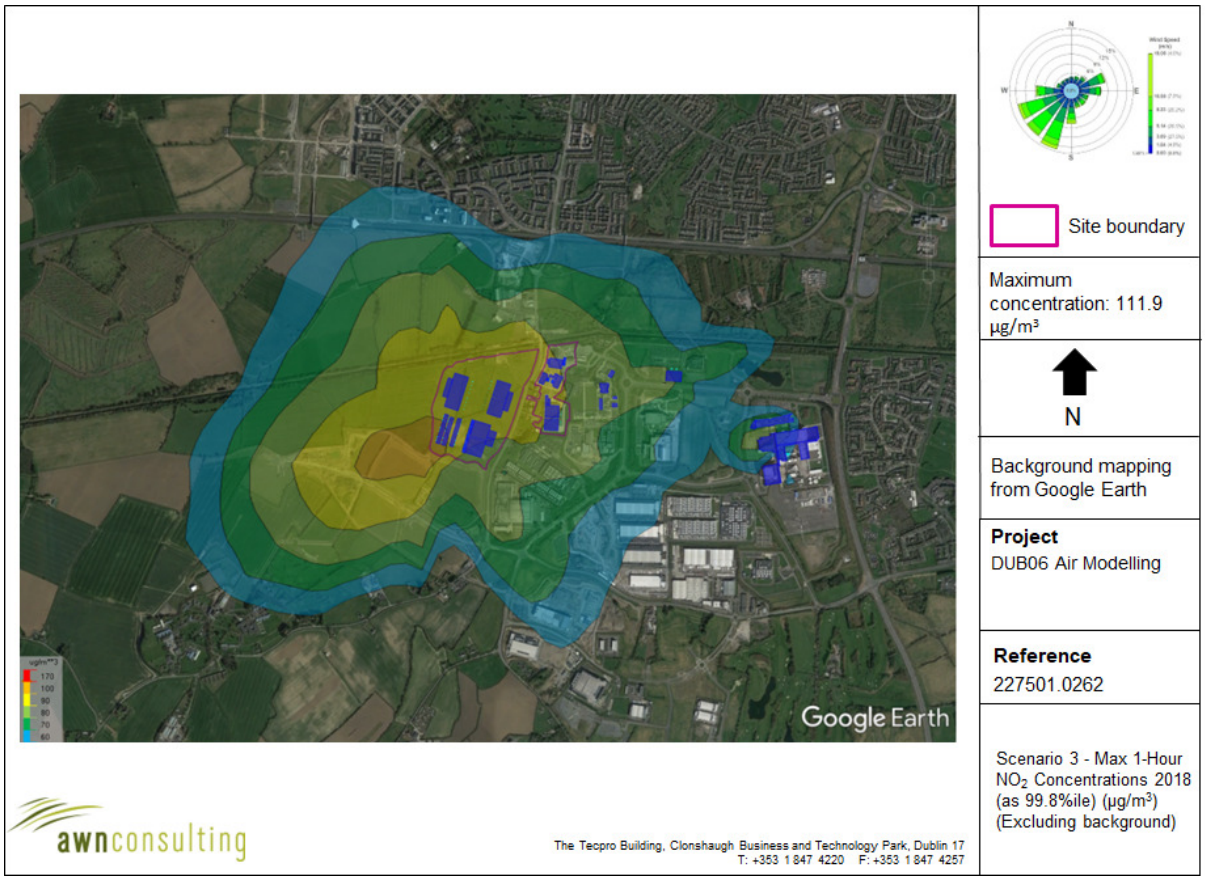


Figure 10.6 Scenario 3 - Maximum 1-Hour NO_2 Concentrations (as 99.8th percentile) (Year 2018)

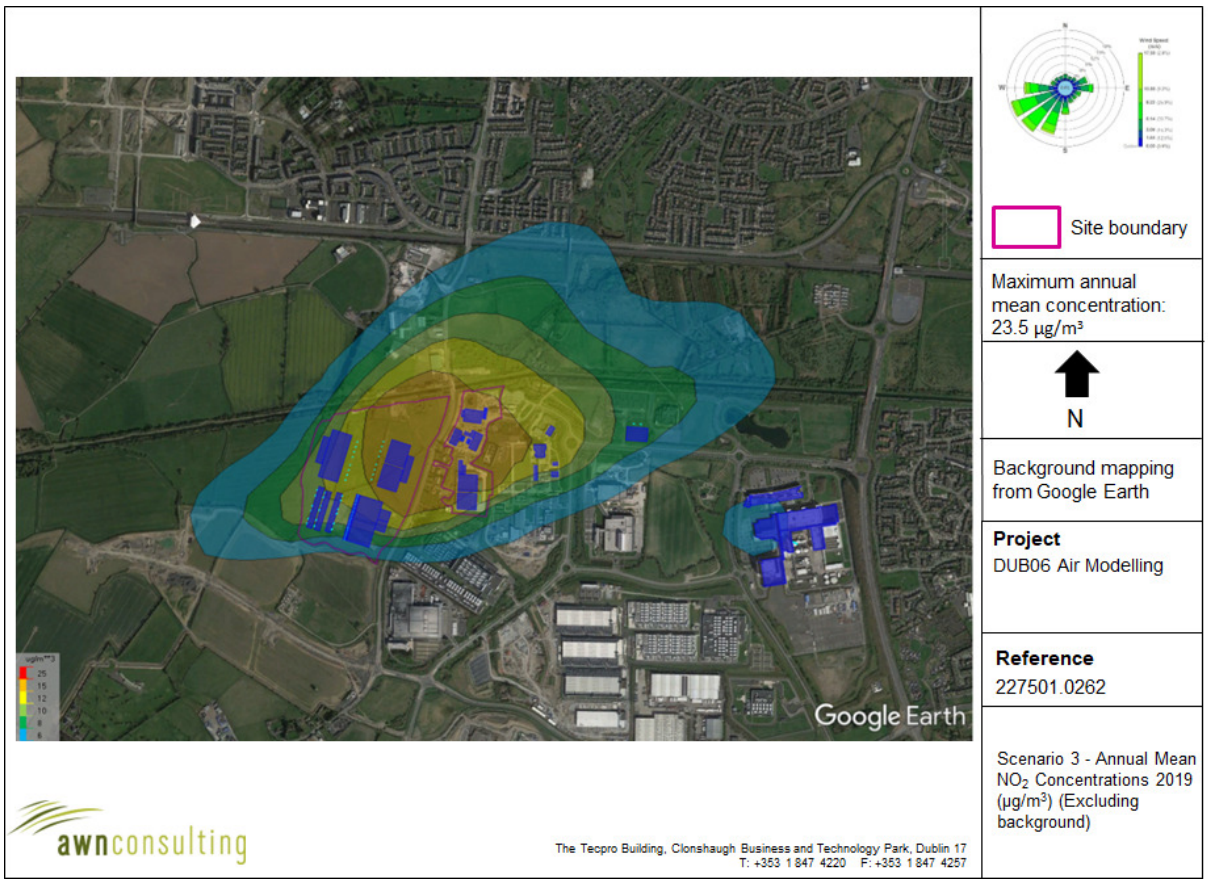


Figure 10.7 Scenario 3 - Annual Mean NO_2 Concentrations (Year 2019)

Scenario 1 - Existing Scenario (UK EA Methodology)

10.78 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 worst-case residential receptor for scenario 1. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 10.7. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the standby diesel generators and assuming continuous operation of the gas generators. The results indicate that in the worst-case year, the existing standby diesel generators can operate for up to 72 hours before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). This scenario also includes the continuous operation of the generators associated with Gas Plants 1, 2 & 3.

Table 10.7 Hypergeometric statistical results at worst-case residential receptor – Existing Scenario

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 / 2015	72	**0.02**
NO_2 / 2016	87	
NO_2 / 2017	93	
NO_2 / 2018	76	
NO_2 / 2019	79	

Note 1 Guidance Outlined In UK EA publication "Diesel Generator Short-term NO_2 Impact Assessment" (EA, 2019)

Scenario 2 - DUB6 and Gas Generators (UK EA Methodology)

10.79 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 worst-case residential receptor for DUB06 diesel generators only. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 10.8. The results have been compared to the 98th percentile confidence level to

indicate if an exceedance is likely at various operational hours for the standby diesel generators and assuming continuous operation of the gas generators. The results indicate that in the worst-case year, the 24 no. standby DUB6 diesel generators can operate for up to 2,635 hours before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). This scenario also includes the continuous operation of the generators associated with Gas Plants 1, 2 and 3.

Table 10.8 Hypergeometric statistical results at worst-case residential receptor – DUB06

Pollutant / Meteorological Year	Hours of operation (Hours) (98thº%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98thº%ile) Note 1
NO_2 / 2015	8,760	**0.02**
NO_2 / 2016	8,784	
NO_2 / 2017	8,760	
NO_2 / 2018	4,500	
NO_2 / 2019	2,635	

Note 1 Guidance Outlined In UK EA publication "Diesel Generator Short-term NO_2 Impact Assessment" (EA, 2019)

Scenario 3 - Cumulative Assessment (UK EA Methodology)

10.80 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 worst-case residential receptor. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 10.9. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the cumulative standby diesel generators for Phases 1 - 6 and assuming continuous operation of the Phase 1, 2 & 3 gas generators. The results indicate that in the worst-case year, based on the cumulative assessment involving the continuous operation of the nearby IED licenced sites, the 18 no. gas generators associated with Gas Plant 1, the 18 no. gas generators associated with Gas Plant 2, and the 19 no. gas generators associated with Gas Plant 3, the backup generators associated with Phases 1, 2, 3, 4, 5 and 6 of EdgeConneX sites can operate for 50 hours before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). Figure 10.8 shows the statistical distribution predicted for the 98th percentile (based on 50 hours of operation per year). However, the UK guidance recommends that there should be no running time restrictions placed on standby generators which provide power on site only during an emergency power outage.

Table 10.9 Hypergeometric statistical results at worst-case residential receptor – Cumulative Assessment

Pollutant / Meteorological Year	Hours of operation (Hours) (98thº%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98thº%ile) Note 1
NO_2 / 2015	50	**0.02**
NO_2 / 2016	59	
NO_2 / 2017	55	
NO_2 / 2018	53	
NO_2 / 2019	54	

Note 1 Guidance Outlined In UK EA publication "Diesel Generator Short-term NO_2 Impact Assessment" (EA, 2019)

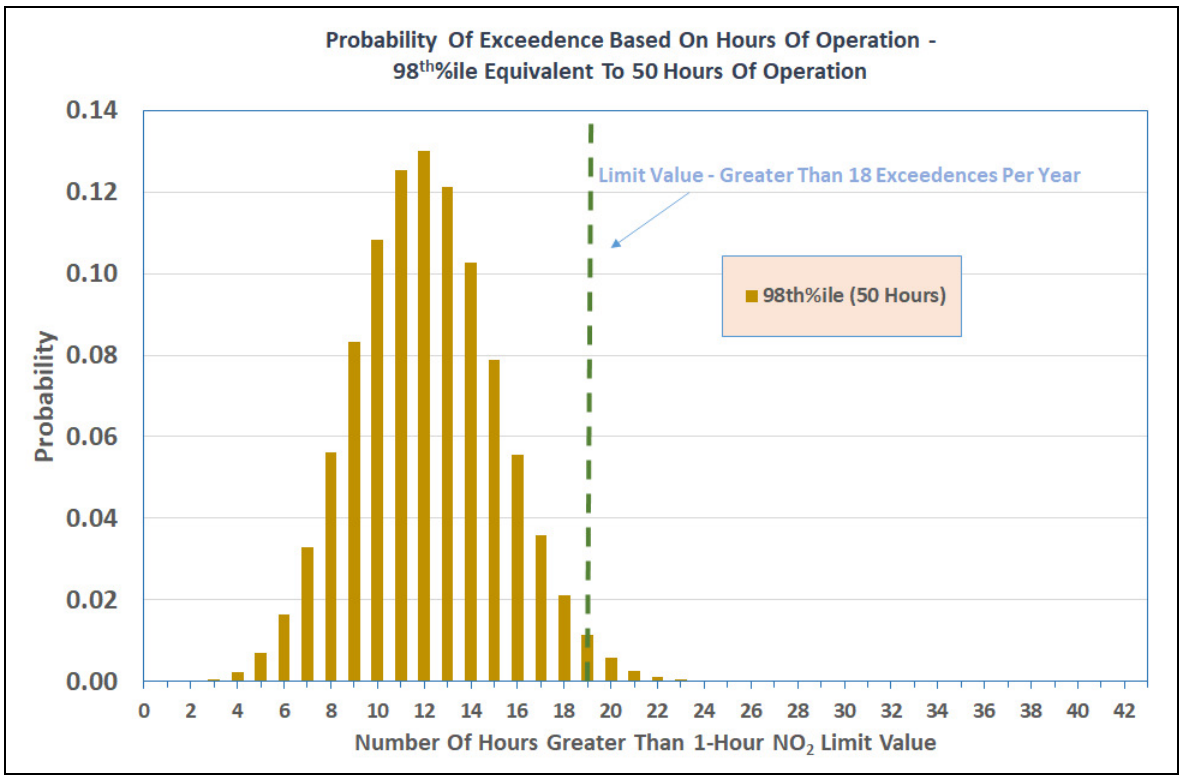


Figure 10.8 Probability of Exceedance of 1-Hour NO_2 Ambient Air Quality Limit Value based on Hours of Operation for Emergency Generators for Proposed Development – Cumulative Assessment

Summary of modelling assessment

10.81 The results of the modelling assessment based on the proposed development have found that ambient concentrations of NO_2, due to emissions from the gas generators, scheduled testing of diesel generators on site and standby operation of the diesel generators, are below the air quality limit values. Thus, it is predicted that the impact of the proposed development on air quality will be ***long-term, negative*** and ***not significant***.

10.82 The cumulative assessment results are also within the relevant air quality limit values for NO_2 and as such the impact to air quality as result of emissions from both the proposed development and Phases 1, 2, 3, 4 and 5 of the neighbouring EdgeConneX site and Licenced IED sites at Grange Back-Up Power, Takeda and Pfizer is predicted to be ***long-term***, ***negative*** and ***insignificant***.

Human health

10.83 The 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 standby 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. Conservative assumptions were made when determining the input data for the air modelling assessment and the approach used in the study leads to an over-estimation of the actual levels that will arise. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary.

Monitoring

10.84 No monitoring is required.

Residual impacts

10.85 The results of the air dispersion modelling study show that the residual impacts of the proposed development on air quality will not be significant.

11. CLIMATE

Introduction

11.1 AWN Consulting Limited has been commissioned to conduct a climate impact assessment of the proposed development. This chapter evaluates the impacts which the proposed development may have on Climate as defined in the EPA EIA Report Guidelines 2022.

11.2 In relation to the proposed development, the facility will have 21 gas engines which will have a stack height of 25m above ground level and 24 back-up generators which will have a stack height of 25m above ground level.

11.3 This chapter has been prepared by AWN Consulting Limited – Dr Edward Porter (BSc PhD C Chem MRSC MIAQM) and reviewed by Dr. Avril Challoner (BSc PhD C Chem MRSC MIAQM). Dr. Edward Porter is Director with responsibility for Air Quality with AWN cConsulting. 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 climate, air quality, odour and air dispersion modelling.

11.4 Dr. Avril Challoner is a Principal Environmental Consultant in the Air Quality section of AWN Consulting. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, HDip in Statistics from Trinity College Dublin and has completed a PhD in Environmental Engineering (Air Quality) in Trinity College Dublin graduating in 2013. She is a Member of the Institute of Air Quality Management and specialises in the fields of climate, air quality, EIA and air dispersion modelling.

Methodology

11.5 The climate assessment has been carried out in line with the guidance outlined in the European Commission publication "*Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report*" (EC, 2017) and the EPA publication "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports 2022*" (EPA, 2022a) and using the methodology outlined in the guidance documents published by IEMA and the EPA.

11.6 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 (2021) Design Manual for Roads and Bridges Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 – Climate.

11.7 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, 2021) 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).

11.8 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.

Relevant Guidelines, Policy and Legislation

11.9 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℃ above pre-industrial levels with efforts to limit this rise to 1.5℃. 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.

11.10 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℃ 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 ℃ rapid, deep and sustained reductions in global greenhouse gas emissions of 43% by 2030 relative to the 2019 level will be required.

11.11 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}.

Emission Trading System

11.12 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.

11.13 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)

11.14 As shown in Figure 11.1 in the most recent verified emissions from the ETS covering 2005 – 2021 this trend is continuing with the exception of 2020 due to COVID.

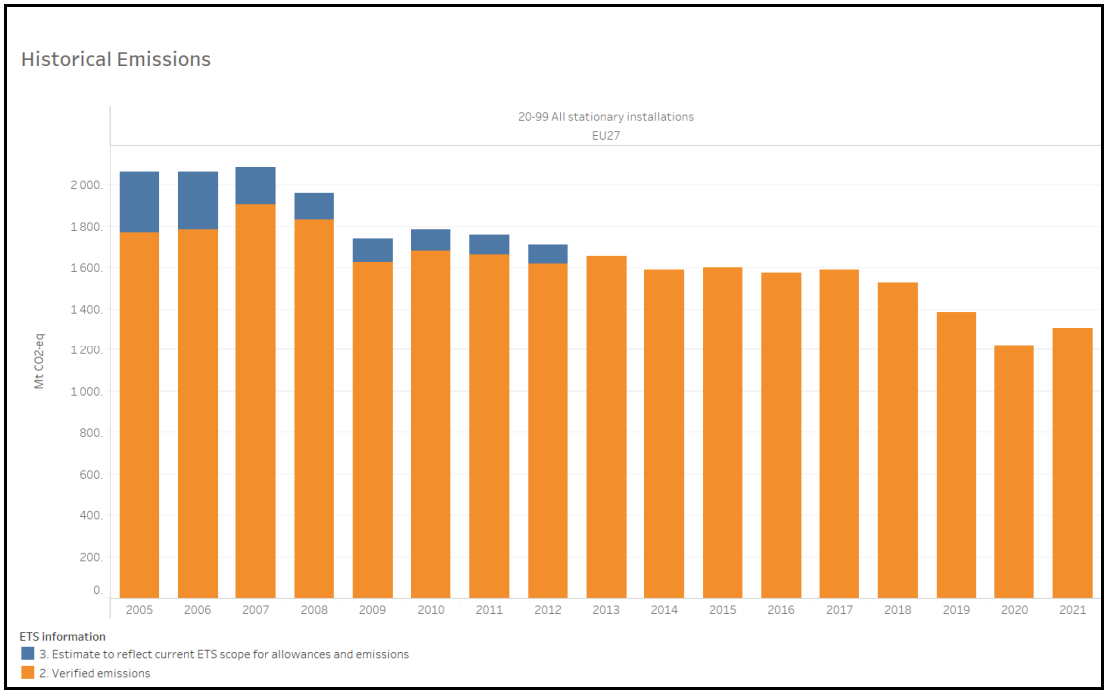


Figure 11.1 Historical ETS Verified Emissions 2005 - 2021
Taken from https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1

11.15 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."

11.16 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 11.2, both the energy industries and "other industries" are predicted to decrease significantly by 2030.

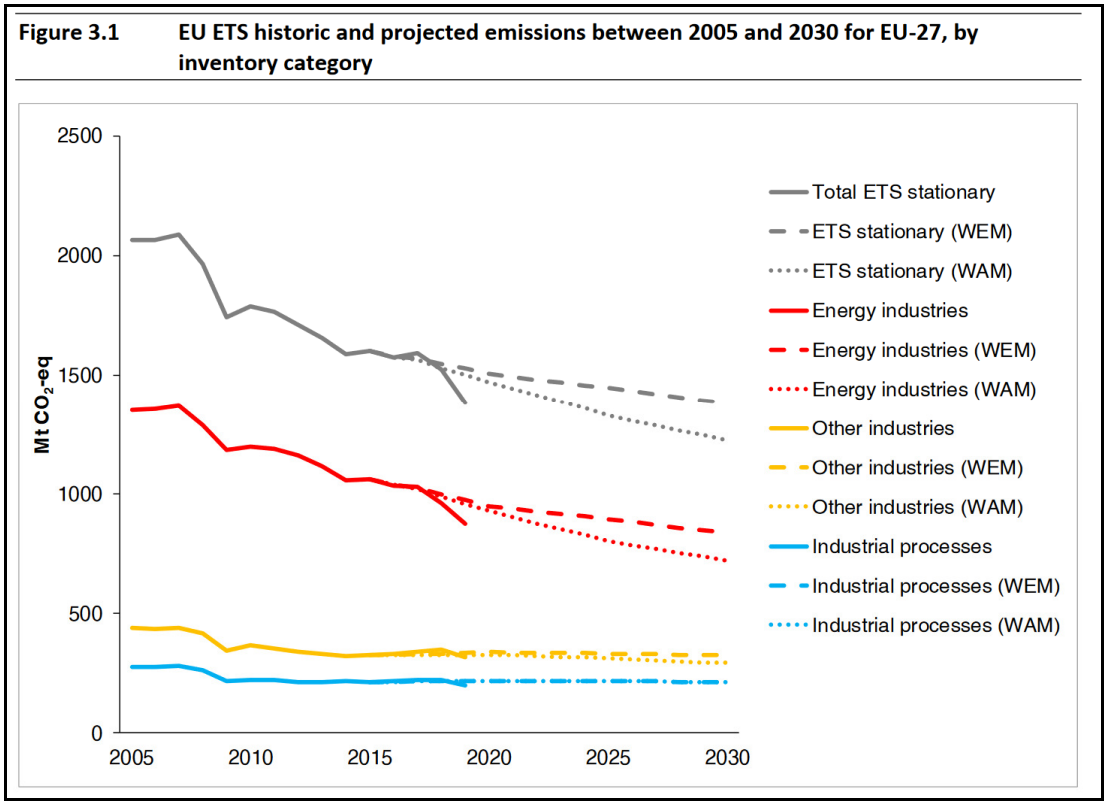


Figure 11.2 Historical ETS Verified Emissions & Project Emissions 2005 – 2030 (WEM = with existing measures, WAM = with additional measures)

National Legislation

11.17 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'.

11.18 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.

11.19 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.

11.20 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'.

11.21 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.

11.22 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).

11.23 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"*.

11.24 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).*

11.25 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.

11.26 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.

11.27 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.

11.28 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 11.1, as well as the average annual reduction for each 5-year period.

Table 11.1 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

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.

11.29 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 11.2. 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.

Table 11.2 Sectoral Emission Ceiling 2030

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

11.30 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.

11.31 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 11.3 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.

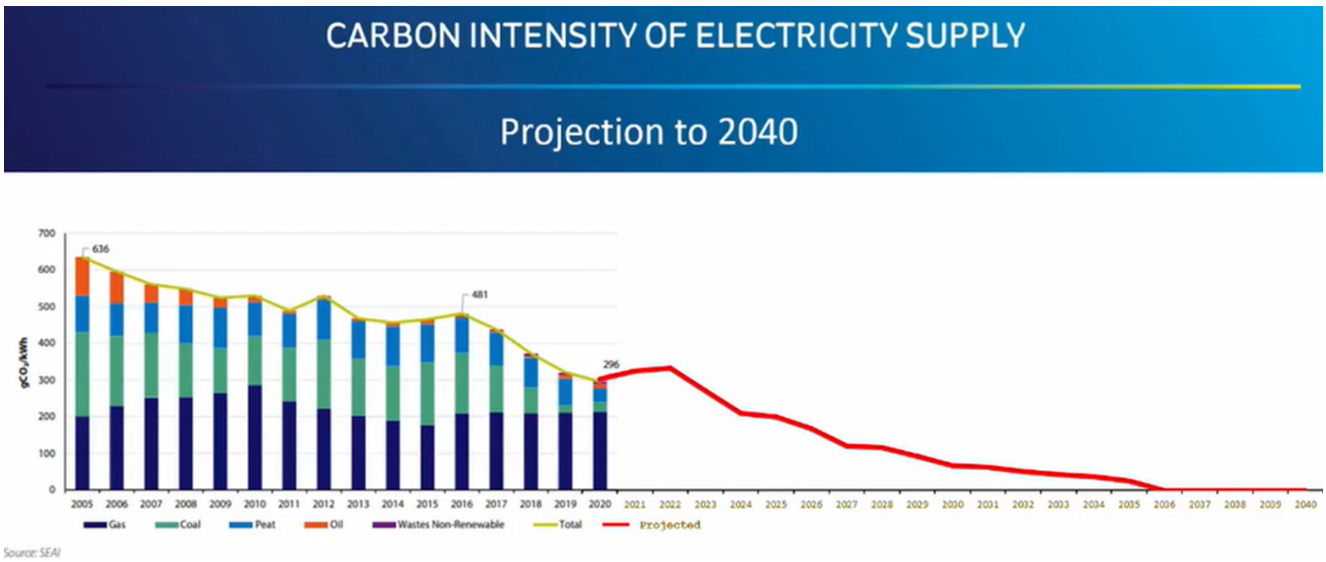


Figure 11.3 ESB Presentation at EPA Climate Change Conference 2022

11.32 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.

11.33 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.

11.34 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).

Climate Criteria for the Rating of Impacts

11.35 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.

11.36 The assessment aims to quantify the difference in GHG emissions between the proposed project and the baseline scenario (the alternative project/solution in place of the proposed project). 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.

11.37 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.

11.38 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).

Construction phase

11.39 For the purpose of the qualitative climate assessment of the construction phase, the combined impact of concurrent construction of all proposed buildings at the site has been assumed to occur together.

11.40 The current assessment thus focused on identifying the impact of the construction phase of the development on climate was determined by a qualitative assessment of the nature and scale of GHG generating construction activities associated with the proposed development.

Operational phase

11.41 The assessment for the Proposed Development is based on the use of electricity to power the facility in addition to the emergency operation of the backup generators for 72 hours per year. The back-up 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.

11.42 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.

11.43 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.

11.44 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[34] 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℃ compatible trajectory towards net zero.
- Minor adverse impact (not significant): A project that is compatible with the budgeted, science based 1.5℃ 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[35] (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.
- 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.

11.45 The impact of the operational phase of the proposed development on climate was determined by an assessment of the direct (due to natural gas and infrequent diesel usage) and indirect CO_2 emissions associated with electricity over the period 2025 to 2030. The change in the renewable fraction of electricity from the national grid and the biomethane fraction of natural gas with time have also been considered.

Significance Criteria – Vulnerability of the Proposed Scheme to Climate Change

11.46 *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.

11.47 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

[34] 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.

[35] 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.*"

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 11.3, 11.4 and 11.5.

Table 11.3 Likelihood Categories

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 11.4 Measure of Consequence

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 11.5 Significance Matrix

		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)

Receiving environment

11.48 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).

11.49 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.

11.50 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).

Climate Baseline

11.51 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).

11.52 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.

11.53 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.

11.54 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 19.4% average annual emissions reduction from 2022-2025 to stay within budget.

11.55 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).

Vulnerability of the Project to Climate Change

11.56 The Proposed Development study area for assessing a project's vulnerability to climate change should be based on the construction footprint / project boundary. 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.

11.57 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 1.6 (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 6 km southeast 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.

11.58 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.

11.59 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 76.5 mm over a nine-hour period at Casement Aerodrome, which has an annual probability of 1 in 60 years.

11.60 Future climate predictions undertaken by Met Éireann have been published in 'Ireland's Climate: the road ahead (Met Éireann, 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.

11.61 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.

11.62 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.

11.63 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℃ 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℃ and 1.6℃ (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).

11.64 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℃ and 1.3 to 1.6℃ 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℃. 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.

Table 11.6 Casement Aerodrome 1981-2010

	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	19.8	19.5	17.1	13.6	10.2	8.3	13.4
Mean Daily Min	2.1	2.0	3.3	4.1	6.6	9.4	11.5	11.3	9.5	7.0	4.2	2.4	6.1
Mean Temperature	5.1	5.1	6.8	8.2	10.9	13.6	15.7	15.4	13.3	10.3	7.2	5.4	9.7
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
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
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
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
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
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

Existing GHG Emissions Baseline

11.65 For 2021, baseline GHG emissions in Ireland are estimated to be 61.528 Mt CO_{2eq} as shown in Table 11.7. 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.

Table 11.7 GHG Emissions in Ireland 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%

Potential impact of the Proposed Development

Construction phase

11.66 The proposed development will comprise the construction of a data centre, 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) 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.

11.67 As outlined in Section 11.6, mitigation measures will be implemented for the construction phase of the proposed development to ensure GHG emissions will be minimised.

Operational phase

11.68 The key works which will have a potential impact on climate during operation of the proposed development are summarised below:

(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 GHG 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 GHG emissions. A review of operational data from similar operational data storage 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 GHG emissions. 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 12). Therefore, no local GHG emissions assessment of the traffic impact is required for this development; and

(iv) The direct air emissions, based on operation of the gas generators will have an impact on air emissions. However, it is predicted that these will not be significant in relation to Ireland's national emission ceiling limits for GHGs.

Likely significant impacts

Construction phase

11.69 Construction traffic would be expected to be the dominant source of direct greenhouse gas emissions as a result of the Proposed Development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development. The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2016) 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.

11.70 It is important to note that the potential impacts associated with the construction phase of the Proposed Development are short-term in nature. When the mitigation measures detailed in the mitigation section of this chapter are implemented, direct GHG emissions from the site 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.

11.71 Initial commissioning activities will involve testing of the gas turbines and back-up generators on site in a similar manner to the operational phase testing. The operational modelling has considered continuous operation of the gas turbines and the testing of the back-up diesel generators on a weekly basis and this does not result in a significant impact to climate. Therefore, it is predicted that the initial commissioning tests will result in an ***imperceptibly negative*** impact to climate in the ***short-term*** and thus have a ***not significant*** impact.

Impact of Climate Change on the Construction Phase

11.72 Appropriate flood risk measures and extreme weather events have been considered as part of the construction planning. However, 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 11.3, Table 11.4 and Table 11.5, the likelihood of extreme weather and flooding is assessed to be of a low likelihood and with a moderate adverse effect leading to a finding of low risk and thus a non-significant impact.

Operational phase

11.73 The Proposed Development 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 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.

11.74 In addition, as outlined in the *Regulation (EU) 2018/842*, any new electricity provider (including the Proposed Development*)* 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.

Impact of Climate Change on the Operational Phase

11.75 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.

11.76 As a result of this there is the potential for flooding related impacts on site in future years. Chapter 8 (Hydrology) of the EIAR 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. Thus, in line with the methodology outlined in Table 11.3, Table 11.4 and Table 11.5, 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.

11.77 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.

11.78 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.

Do Nothing Scenario

Construction phase

11.79 Under the Do Nothing Scenario no construction works will take place and the previously identified impacts of GHG emissions and emissions from equipment and machinery will not occur. The climate 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 climate.

Operational phase

11.80 Under the Do Nothing Scenario, the main GHG emissions will be indirect emissions associated with the use of electricity for the operation of the DUB04 data centre, the use of gas engines to provide power to the DUB05 data centre and infrequent operation of the backup generators. The indirect (due to electricity) and direct (due to natural gas and diesel usage) CO_2 emissions to operate the Do Nothing scenario has been assessed below in the context of Ireland's national annual CO_2 emissions. The expected emission rates for each year from 2025 to 2040 is shown below in Table 11.8 for electricity and in Table 11.9 for natural gas/biomethane mix.

Table 11.8 Carbon Intensity of Electricity From 2025 - 2040

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.

11.81 The GHG emissions from natural gas will be based on the expected GHG emission rate in 2025 taking into the account the GNI projections out to 2040 (Ervia, 2019). The expected values for each year from 2025 to 2040 is shown below in Table 11.9.

Table 11.9 Carbon Intensity of Natural Gas/Biomethane From 2025 - 2040

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
2033	0.354
2034	0.347
2035	0.341
2036	0.334
2037	0.329
2038	0.325
2039	0.318
2040	0.311

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.

11.82 For the Do Nothing scenario, the facility will use 45.1 MW of electricity from the National Grid to power DUB04 and 45.1 MW of natural gas from the gas engines to power DUB05. Thus, based on electricity from the National Grid for 8,688 hours per year for DUB04, natural gas from the gas engines for 8,688 hours per year for DUB05 and diesel generators usage for 72 hours per year for both DUB04 and DUB05, will consume 90.1MW of power this equates to 787.4 GWh annually. This

translates to approximately 256,350 tonnes of CO_2eq per year (including generator testing) based on the likely 2025 electricity mix and natural gas/biomethane mix and approximately 181,120 tonnes of CO_2eq per year (including generator testing) based on the likely 2030 electricity mix (ESB, 2022) as outlined in Table 11.10 for each year from 2025 to 2030.

11.83 For the Do Nothing Scenario, the electricity provided through the national grid and the onsite gas engines 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.

Table 11.10 GHG Emissions for Proposed Development Scenario (Tonnes CO_{2eq})

Year	Existing Development (90.1MW)
2025	256,347
2026	242,102
2027	226,973
2028	211,844
2029	198,482
2030	185,121

Mitigation Measures

11.84 In order to sufficiently ameliorate the likely climate impact, a schedule of mitigation measures has been formulated for the construction and operational phases associated with the proposed development.

Construction phase

11.85 The objective of the mitigation measures outlined below is to ensure that GHG emissions are minimized wherever possible during the construction phase of the proposed development. The 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.

Operational phase

11.86 The gas engines and diesel generators will be regularly serviced to ensure that they operate to their maximum efficiency. In addition, Solar PV panels will be installed at roof level. Additionally, waste heat associated with the facility will have the capacity to connect with a future district heating scheme developed by others. In addition to the above factors, the following measures will be employed by the facility.

- The facility will purchase GO RECS to offset the carbon footprint at 100% carbon free for 2021 and onwards,
- 24/7 Green Energy Renewable Matching will be committed to as part of the development.

11.87 The Applicant will enter into binding agreements that will obligate the end user, to enter into arrangements which are capable of underpinning new renewable energy generation calculated to offset the energy consumed by the proposed development from the electricity grid or onsite gas generators.

11.88 Through these obligations, it is the goal of the Applicant that for every unit of energy consumed by the data centre, a unit of new renewable energy generation would be despatched to the wider electricity system to off-set it, thus delivering the objective of operating the proposed development on a net zero carbon basis that would not impact Ireland's overall climate targets.

Residual effects of the proposed development

Construction phase

11.89 The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction'* (IAQM, 2016) 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 potential impact on climate change from the Proposed Development is deemed to be ***short-term, imperceptibly negative*** and ***not significant*** in relation to Ireland's obligations under the EU 2030 target.

11.90 When the mitigation measures detailed in the mitigation section (section 11.6.1) of this chapter are implemented, emissions of GHG from the site will be ***neutral***, ***short-term*** and ***not significant*** in nature.

Operational phase

11.91 The Proposed Scenario 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.

Impact of Climate Change on the Operational Phase

11.92 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 will be ***imperceptible***.

Impact of the Operational Phase on Climate

11.93 Under the Proposed Development Scenario, the main GHG emissions will be the use of the gas engines to provide power to 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 Proposed Development has been assessed below in the context of Ireland's national annual CO_2 emissions. The expected emission rates for each year from 2025 to 2040 is shown in Table 11.9.

11.94 For the Proposed Development, the facility will use natural gas/biomethane the mix of which will change with year as the biomethane fraction increases. Thus, based on natural gas from the gas engines for 8,688 hours per year and diesel generators usage for 72 hours per year, will consume 45.1MW of power this equates to 393.6 GWh annually. This translates to approximately 163,610 tonnes of CO_2eq per year (including generator testing) based on the likely 2025 natural gas / biomethane mix and approximately 145,940 tonnes of CO_2eq per year (including generator testing) based on the likely 2030 natural gas / biomethane mix (ESB, 2022) as outlined in Table 11.11.

11.95 For the Proposed Scenario, the gas engines 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.

Table 11.11 GHG Emissions for Proposed Development Scenario (Tonnes CO_{2eq})

Year	Proposed Development (45.1MW)
2025	163,614
2026	160,079
2027	155,660
2028	151,241
2029	148,590
2030	145,938

Overall Impact of the Existing and Proposed Development on Climate

11.96 Under the Overall Development Scenario, the main GHG emissions will be the use of electricity to provide power to DUB04 data centre, the gas engines to provide power to DUB05 and DUB06 data centres and infrequent operation of the backup generators for all data centres. The indirect (due to electricity) and direct (due to natural gas and diesel usage) CO_2 emissions to operate the Proposed Development has been assessed below in the context of Ireland's national annual CO_2 emissions. The expected emission rates for each year from 2025 to 2040 is shown in Table 11.8 for electricity and Table 11.9 for natural gas / biomethane.

11.97 For the Overall Development Scenario, based on electricity for 8,688 hours per year and diesel generators usage for 72 hours per year (to power DUB04), will consume 45.1MW of power this equates to 393.6 GWh annually and natural gas from the gas engines for 8,688 hours per year and diesel generators usage for 72 hours per year (ro power DUB05 and DUB06), will consume 45.1MW of power this equates to 787.4 GWh annually. This translates to approximately 256,350 tonnes of CO_2eq per year (including generator testing) based on the likely 2025 electricity and natural gas / biomethane mix and approximately 185,120 tonnes of CO_2eq per year (including generator testing) based on the likely 2030 electricity and natural gas / biomethane mix (ESB, 2022) as outlined in Table 11.12.

11.98 For the Overall Development Scenario, the indirect electricity supplied of the facility and the direct gas engines 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.

Table 11.12 GHG Emissions For Overall Development Scenario (Tonnes CO_{2eq})

Year	Proposed Development (45.1MW)
2025	256,347
2026	242,102
2027	226,973
2028	211,844
2029	198,482
2030	185,121

Determination of the Impact of the Operational Phase on Climate

11.99 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 11.2.4. 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 11.2.4).

11.100 In reference to Principle 1 of IEMA Guidance (IEMA, 2022), the Proposed Scenario and the Overall Development Scenario 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'). 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..."*[36]. A study published in 2020 by Science[37] 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. A report from IEA

[36] IEA Data Centres and Data Transmission Networks – June 2020

[37] Masanet, Eric; Shehabi; Arman, Lei; Nuoa, Smith, Sarah; Koomey, Jonathan; "Recalibrating global data centre energy-use estimates", Sciencemag.org, February 28, 2020, Vol. 367, Issue 6481; ("Expressed as energy use per compute instance, the energy intensity of global datacentres has decreased by 20% annually since 2010….").

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 be mostly offset by ongoing efficiency improvements for data centre infrastructure as shown in Figure 11.4.

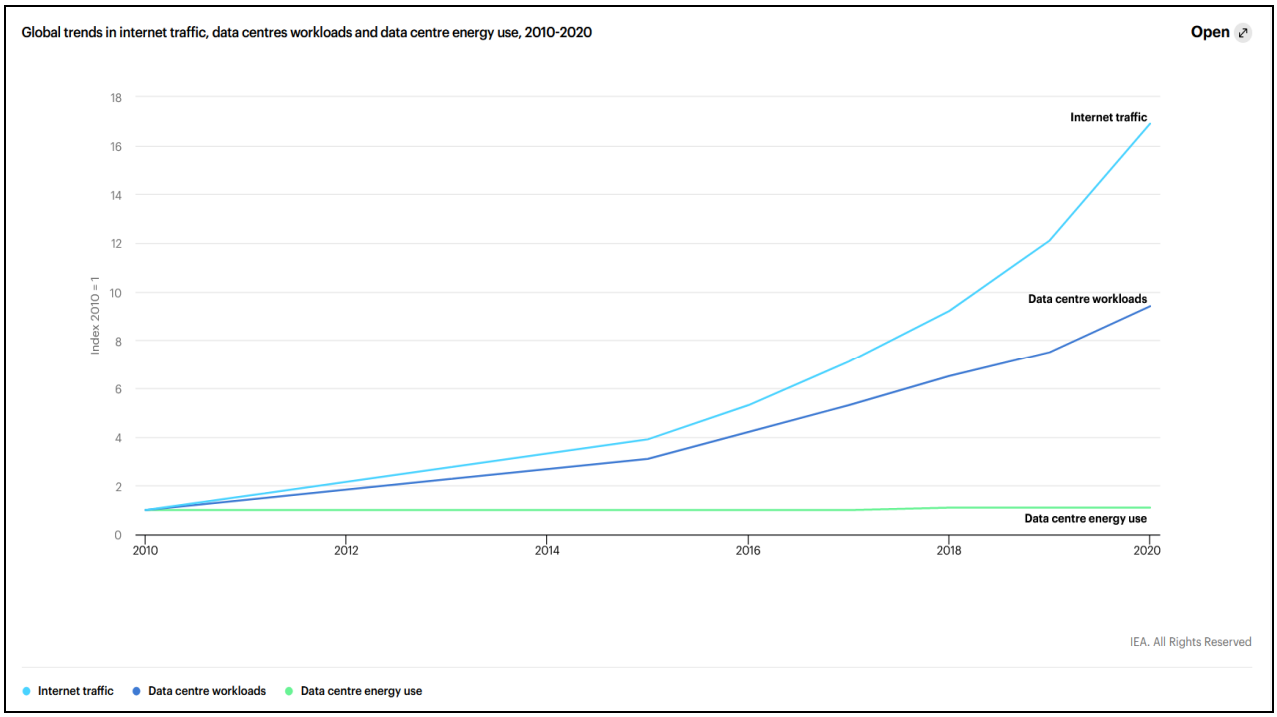


Figure 11.4 Global Trends In Internet Traffic, Data Centres Workloads & Data Centre Energy Use, 2010 – 2020 (IEA, 2021)

11.101 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[38]. 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).

11.102 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 waste heat associated with the facility will have the capacity to connect with a future district heating scheme developed by others.

11.103 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). The Proposed Development and Overall Development are committed to Ireland's 2023 Climate Action Plan to meet 80% of electricity demand from renewable sources by 2030. The applicant intends to enter into binding agreements that will obligate the end user, to enter into arrangements which are capable of underpinning new renewable energy generation calculated to offset the energy consumed by the proposed development from the electricity grid or onsite gas generators.

11.104 Through these obligations, it is the goal of the Applicant that for every unit of energy consumed by the data centre, a unit of new renewable energy generation would be despatched to the wider electricity system to off-set it, thus delivering the objective of operating the proposed development on a net zero carbon basis that would not impact Ireland's overall climate targets.

[38] https://blog.aboutamazon.eu/aws/amazon-announces-new-project-in-ireland-as-part-of-commitment-to-be-100-powered-by-renewable-energy-by-2025

11.105 As the Proposed Development and Overall Development are 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 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 Proposed Development and the Overall Development will be no more than 0.051% of the total EU-wide ETS market which is imperceptible.

11.106 The Proposed Development will account for approximately 396 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 45.1MW.

11.107 The Overall Development will account for approximately 1191 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 1191MW.

11.108 Table 11.13 shows the significance of the Proposed Development and Overall Development 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 11.13, the impact of the Proposed Development and Overall Development prior to mitigation would be deemed to be a moderate, adverse impact. Although the Proposed Development and Overall Development 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.

11.109 Also presented in Table 11.13 is the Proposed Development and Overall Development impact post mitigation. As outlined above the project will use "best practice" adaptive design measures (PV panels, waste heat associated with the facility will have the capacity to connect with a future district heating scheme developed by others) and by using long term corporate power purchase agreements. With the implementation of these measures the impact of the Proposed Development and Overall Development, in line with the IEMA methodology (IEMA, 2022), is reduced to a minor adverse, non-significant impact.

11.110 Similarly, Table 11.13 shows the significance of the Proposed Development and Overall Development 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 11.13, the impact of the Proposed Development and Overall Development prior to mitigation would be deemed to be a moderate, adverse impact. Although the Proposed Development and Overall Development 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.

11.111 Also presented in Table 11.13 is the Proposed Development and Overall Development impact post mitigation. As outlined above the project will use "best practice" adaptive design measures (PV panels, waste heat associated with the facility will have the capacity to connect with a future district heating scheme developed by others) and by using long term corporate power purchase agreements. With the implementation of these measures the impact of the Proposed Development and Overall Development, in line with the IEMA methodology (IEMA, 2022), is reduced to a minor adverse, non-significant impact.

Table 11.13 GHG Emissions Associated With Proposed Scenario Compared To Sectoral Emission Ceiling & ETS

Scenarios	% Of 2030 ETS Total[Note 1]	% Of Electricity Emission 2030 Ceiling[Note 2]	Significance (Prior to mitigation)	Significance (After mitigation)
Proposed Development	0.021%	5.1%	Moderate Adverse	Minor Adverse
Overall Development	0.033%	9.6%	Moderate Adverse	Minor Adverse

Note 1 ETS 2030 Total = 690.91 Million Tonnes CO_{2eq}
Note 2 Based on 5-year average 2026 - 2030

11.112 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. Given that the use of electricity to power the facility will achieve net zero by 2050 and the commitment to offset all interim fossil fuel derived GHG emissions by the purchase of Corporate Power Purchase Agreements (CPPAs) the predicted impact to climate is deemed to be ***indirect***, ***long-term, negative*** and ***minor adverse***.

11.113 The operational phase impact of the Proposed Development, based on the EPA EIAR Guidelines (EPA, 2022), is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Cumulative Impact

11.114 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).

Residual Impact

11.115 Once the mitigation measures outlined in Section 11.6 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 and Overall Development will be **indirect,** ***long-term, negative*** and ***minor adverse.*** Thus, in terms of climate, both the construction phase and operational phase of the Proposed Development and Overall Development will be ***not significant***.

Interactions

11.116 The potential interaction between Climate and other Sections in the EIAR is primarily limited to *Population & Human Health* and *Traffic & Transportation*. This Climate Section has been prepared in consideration of and in conjunction with the relevant outputs of these Sections.

Monitoring

11.117 As part of the sites operational licence (IEL), there will be a requirement for ongoing GHG monitoring.

Difficulties Encountered In Compiling Information

11.118 No significant difficulties were encountered in the process of compiling the climate chapter of the EIAR.

Compliance with Section 15 Of The Climate Action & Low Carbon Development Act (Amended) 2021

11.119 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."

11.120 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).*

11.121 Thus, the indirect electricity emissions and the direct emissions from backup diesel generators 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.

11.122 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.

11.123 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.

11.124 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.

11.125 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)*

11.126 Thus, the Proposed Development aligns with the national climate objective as the Proposed Development 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.

11.127 In regards to (E) the objectives of mitigating greenhouse gases, the Proposed Development has the following benefits which will all help to mitigate greenhouse gas emissions:

I. The Proposed Development 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 facilitating district heating 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 is committed to offset all interim fossil fuel derived GHG emissions by the purchase of Corporate Power Purchase Agreements (CPPAs).

11.128 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.

12. LANDSCAPE AND VISUAL IMPACT

Introduction

12.1 This chapter should be read in conjunction with the site layout plans for the site and project description provided in Chapter 2 of this EIAR. The purpose of this assessment is to analyse the existing landscape and to assess the likely potential visual impacts arising from the Proposed Development on the existing landscape and any mitigation measures proposed. The criteria as set out in the current EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (Published May 2022) are used in the assessment of the likely impacts.

Methodology

12.2 The assessment was carried out by visiting the site and its surroundings in June 2022, by analysis of the proposals through photomontages, plans, aerial photographs, the tree survey by The Tree File Ltd. (updated as part of this AI response), historic maps and by reference to the South County Dublin Development Plan 2022-2028 and the Landscape Character Assessment of South Dublin County Council (Appendix 9, South County Dublin Development Plan 2022-2028). Through analysis of the above, the subject lands were assessed in relation to their surrounding environment to identify a study area in which both visual and landscape character impacts would be perceivable. Important landscape features on subject lands and in the wider area were identified as part of this process.

12.3 The proposed viewpoints for the verified views were selected to represent points in the local landscape from which the development would potentially be visible. Various viewpoints have been selected to provide a well-rounded and realistic representation of how the development will look from different aspects, Views are located, from all direction towards the subject lands, both at close-range and long-range, and have been selected to overlook important local features such as the Grand Canal and the protected structures at the lock.

12.4 The buildings are modelled in three-dimensional AutoCAD software by the project Architect and given to a CGI modeller. Two-dimensional AutoCAD drawings are submitted by the Landscape Architect for the CGI modellers to accurately model the external parts of the development. Liaison between the CGI specialists and the project Architect and Landscape Architect on their respective designs informs the final appearance of the verified views. For details on methodology in relation to the surveying of photo view locations, lenses and specifics on the development of the verified views, refer to the accompanying the A3 document completed by the CGI specialists, Digital Dimensions Ltd. and is replicated at a smaller scale within this chapter.

12.5 The criteria as set out in the EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022) are used in the assessment of the likely impacts.

12.6 The ratings may have negative, neutral or positive application where:

- Positive effect - a change which improves the quality of the environment;
- Neutral effect – no effects or effects that are imperceptible, within normal bounds of variation or within the margins of forecasting error
- Negative effect - a change which reduces the quality of the environment.

12.7 Terms relating to the duration and frequency of effects are as described in the EPA Guidelines as:

- Momentary impact – a few seconds or minutes;
- Brief impact – less than a day;
- Temporary impact - lasting one year or less;
- Short-term impact - lasting one to seven years;
- Medium-term impact - lasting seven to fifteen years;
- Long-term impact - lasting fifteen to sixty years; and
- Permanent impact - lasting over sixty years.

12.8 The significance of impacts and effects on the perceived landscape will depend partly on the number of people affected, but also on judgments about how much the changes will matter and in relation to other senses i.e. sound, feeling, etc., experienced by those concerned.

Receiving environment

12.9 The proposed built development is located 135m south of the Grand Canal tow path at its closest point. The site is situated to the west of the Grange Castle Business Park, separated by the R120 road. The overall site is an irregular shaped area measuring 670m on its longest north-south axis and 465m on its longest east west axis. The total land area of the application site measures 5.14ha.. The application site is a smaller portion of the overall site.

12.10 The ground levels within the overall site area are generally flat with a slow and gradual fall from the western edge of the overall site towards the north eastern corner. From the lowest level in the north east (63.40m, near the residence at the 12th lock) the lands rise by 6m towards the south-west of the site (69.43m). However, the change in ground levels are more subtle within the application site and fall from south-west to north-east by c. 1m. There is a localised high ridge line on a berm created by spoil in the north of the overall site. The berm is approximately 80m long on the east west axis and stands at between 2-3m higher than the surrounding ground levels.

12.11 The land use of the application site and the overall site is primarily arable agricultural fields with traditional hedgerow field boundaries. The hedgerows are low and sparsely vegetated in sections. The land in the most northern section of the overall site contains several buildings, primarily agricultural barns and sheds but also a number of residences. The field pattern is also smaller in the northern section of the lands. Two large electricity pylons are situated in the northern section of the lands with the power cables running across the site on an east west axis.

12.12 The overall lands are bounded on the north by the Grand Canal public amenity and proposed Natural Heritage Area. The site is separated from the canal and towpath by a local access road and trees and vegetation along the edge of the canal. To the south and west, the site is bounded by a field boundary hedgerow beyond which are agricultural fields like those on the subject lands. The eastern section of the site is bounded by the recently upgraded R120 public road. There are several residential properties and quasi-residential properties on the opposite side of the R120 road and abutting the site in the north eastern corner.

12.13 In the wider landscape the site is in a generally flat landscape on the edge of two landscape types. The landscape to the east and south east is characterised by large built developments and new tree lined roads. Between these built developments are large flat green areas that were used for agriculture and the landscape is still of a traditional field and hedgerow boundary typology. To the west and south the landscape is that of a traditional agricultural landscape with medium to large field patterns. The landscape to the north beyond the canal is that of the urban fringe characterised by the transition from rural landscape to a built urban environment.

12.14 According to the Tree Survey and Report, by the Tree File Ltd. (refer to Appendix 12.2) the historic tree cover on the overall site is primarily contained within the agricultural hedgerows on the northern boundary. Throughout the rest of the site there are no trees worthy of including in the report. The arrangement of the trees and hedgerows are remnants of the agricultural stock proof field boundaries. The report finds that due to the lack of management and subsequent deterioration the original Hawthorn is now overrun by Bramble, Blackthorn and Ivy in several places. The overall site is described as supporting 'little material of Arboricultural interest' and having very few trees that would be considered valuable.

12.15 Throughout the application site area there are no trees worthy of including in the report.

12.16 Within the application lands there is an extant permission for a Data Centre facility (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948) on lands to the south; and for a pair of data centres and a Gas Power Plant on lands to the west and south-west as permitted under SDCC Planning Ref. SD21A/0042. The permitted developments are very similar to the nature and extent of the Proposed Development. This development is the third and final phase of the overall site, however the permitted development will be subject to some minor amendments as a result of this application.

Characteristics of the site

12.17 Character, for the purposes of this assessment refers to the interaction of elements in the landscape that combine to give the area its particular identity. In this context, impacts on character include the

effect on existing land uses and responses that are felt towards the combined effects of the proposed development.

12.18 The character of the site and its environs has largely been determined by the following:

- flat topography in the site and its surrounding environs;
- landscape history of agricultural use with a traditional hedgerow field boundary;
- built structures and hardstanding in the northern section of the site;
- recently upgraded road along the eastern boundary with no vegetation buffer;
- electricity pylons and power cables;
- the canal and its towpaths and lock; and
- number of very large buildings in the local landscape.

12.19 In the wider context, the subject site lies on the boundary between two landscape types. The environment to the east with its contrast of new built structures and historic field patterns would be considered a 'transitional landscape'. The environment to the west would be considered a traditional agricultural landscape.

12.20 A comparison of the historical Ordnance Survey maps with the current site and through analysis by site visits, it is evident that there has been little change to the application site to the west of the R120 in recent times. The perimeter hedgerows reflect historic field patterns as recorded in the historic '6 inch' maps, however several of the internal hedgerows in the southern section of the wider lands no longer exist. The hedgerow along the western and southern boundary of the overall site is also a historic townland boundary marking the boundary of the Ballymakaily townland.

12.21 The landscape of the subject lands has no inherent aesthetic qualities of note. In the context of the surrounding landscape, landscape sensitivities and views the southern section of the lands would be considered of little aesthetic value. The northern section of the lands does hold some more aesthetic value in the context of the canal and its local environment. The aesthetic qualities provided are limited to the hedgerows and trees around the canal and partial views of the fields.

Existing views and visibility

12.22 The location from which the site is most visually prominent is from the R120 to the east of the lands. Due to the recent road works the roadside hedgerows have been removed from the majority of this boundary and the site is open to views from the east. From this section of the R120 the site forms part of the foreground of the view. The site is visually prominent due to the sites proximity to the viewpoint, the local topography and the recent removal of the boundary hedgerow vegetation to facilitate the R120 upgrade works. The views from the R120 are expansive including a wide sweep of the local landscape in which the pylons on the site are prominent features. Due to the flat nature of the topography the subject lands form a small section of the wider view. However, the expansive nature of this view is temporary as the tree planting associated with the R120 upgrade, once established, will start to form a visual screen. The Dublin Mountains are partially visible from this location and form part of the ridgeline of the views to the south.

12.23 The overall site is also visible from the Green Route of the Grand Canal Way at the lock gate and the towpath directly to the north of the lands on both sides of the canal. The hedgerows, trees and buildings on the most northern section of the lands form part of this view. In parts where the hedgerow vegetation is thinner, partial glimpsed views further into the site are possible.

12.24 The subject lands and vegetation are visible from the residential properties along the R120 on the eastern side of the road. Due to the recent removal of the roadside vegetation the view from these properties is quite extensive over the site and landscape. However, this is a temporary view as the tree planting associated with the R120 works, once established will start to form a visual screen.

12.25 The site is not visible from locations in the wider landscape due to the flat nature of the topography, the scale of the local built development and the significant number of trees in the area.

Landscape planning

12.26 Within the South County Dublin Development Plan 2022-2028 there is one 'Specific Local Objective' (Economic Development and Employment) that relates to the 12th lock and its environs which includes the north eastern section of the subject lands.

- *EDE4 SLO1: To investigate the full potential for the 12th Lock lands as centrally located within growing employment and residential areas, with tourism and active travel potential along the Grand Canal and have cognisance of the potential for the lands and associated heritage buildings to become a hub supporting the surrounding land uses while protecting the natural environment.*

12.27 Within the South County Dublin Development Plan 2022-2028 there are no specific landscape objectives that apply to the subject lands. There are a number of objectives that apply to the general environs of the site most notably to the Grand Canal (Proposed Natural Heritage Area).

Green infrastructure objectives

- *Policy GI1: Overarching 'Protect, enhance and further develop a multifunctional GI network, using an ecosystem services approach, protecting, enhancing and further developing the identified interconnected network of parks, open spaces, natural features, protected areas, and rivers and streams that provide a shared space for amenity and recreation, biodiversity protection, water quality, flood management and adaptation to climate change.'*

- GI1 Objective 1 states: *'To establish a coherent, integrated and evolving GI Network across South Dublin County with parks, open spaces, hedgerows, trees including public street trees and native mini woodlands (Miyawaki-Style), grasslands, protected areas and rivers and streams and other green and blue assets forming strategic links and to integrate and incorporate the objectives of the GI Strategy throughout all relevant land use plans and development in the County.'*

- GI1 Objective 4 states: *'To require development to incorporate GI as an integral part of the design and layout concept for all development in the County including but not restricted to residential, commercial and mixed use through the explicit identification of GI as part of a landscape plan, identifying environmental assets and including proposals which protect, manage and enhance GI resources providing links to local and countywide GI networks.*

- *Policy GI2: Biodiversity 'Strengthen the existing GI 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.'*

- GI2 Objective 1 states: *'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.'*

- GI2 Objective 2 states: *'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.*

- GI2 Objective 4 states: *'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 13 Implementation and the policies and objectives of this chapter.*

- GI2 Objective 5 states: *'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.*

- GI2 Objective 6 states: *'To continue to support and expand the County Pollinator Plan through the management and monitoring of the County's pollinator protection sites as part of the Council's commitment to the provisions of the National Pollinator Plan 2021-2025.*

- GI2 Objective 7 states: *'To enhance the biodiversity value of publicly owned hard infrastructure areas by incorporating the planting of new trees, grasses and other species, thereby integrating this infrastructure into the overall GI network*.

- *Policy GI14: Sustainable Urban Drainage Systems: 'Require the provision of Sustainable Urban Drainage Systems (SUDS) in the County and maximise the amenity and biodiversity value of these systems.'*

- GI4 Objective 1 states: '*To limit surface water run-off from new developments through the use of Sustainable Urban 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 Systems (SuDS) Explanatory, Design and Evaluation Guide.'*

- *Policy GI15: 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'.*

- GI5 Objective 1 states: *Protect and enhance the rich biodiversity and ecosystems in accordance with the ecosystem services approach to development enabling mitigation of climate change impacts, by absorbing excess flood water, providing a buffer against extreme weather events, absorbing carbon emissions and filtering pollution.*

- GI5 Objective 3 states: '*To ensure compliance with the South Dublin Climate Change Action Plan and the provisions of the Council's Tree Management Strategy'.*

  - *Increase the County's tree canopy cover by promoting annual planting, maintenance preservation and enhancement of trees, woodlands and hedgerows within the County using locally native species and supporting their integration into new development.*
  - *Identify suitable sites for new urban trees including Miyawaki style mini woodlands, where feasible.*
  - *Support the implementation of a co-ordinated regional approach to the maintenance of trees and support the work of the Regional Steering Group on Tree Management to which South Dublin County Council is a participant.*
  - *Promote the establishment of tree trails in public parks across the County.*
  - *Promote the planting of new woodlands and forestry within appropriate open space and park locations within the County.*
  - *To plant "pocket forests" in tracts of open grassland to act as an oasis for biodiversity.*
  - *The Council recognises the value of mature trees in terms of carbon sequestration and amenity over saplings*.

- GI5 Objective 4 states: *'To implement the Green Space Factor (GSF) for all the qualifying development comprising 2 or more residential units and any development with a floor area in excess of 500 sq m. Developers will be required to demonstrate how they can achieve a minimum Green Space Factor (GSF) scoring requirement based on best international standards and the unique features of the County's GI network. Compliance will be demonstrated through the submission of a Green Space Factor (GSF) Worksheet (see Chapter 12: Implementation and Monitoring, Section 12.4.2)*

- *Policy GI16: Human Health and Wellbeing: 'Improve the accessibility and recreational amenity of the County's GI in order to enhance human health and wellbeing while protecting the natural environment within which the recreation occurs.*

- GI6 Objective 5 states: '*To support the provision of new walkways and cycleways in suitable locations to improve the recreational amenity of GI corridors in a manner that does not compromise the ecological functions of the corridors.'*

- *Policy GI17: Landscape, Natural, Cultural and Built Heritage: 'Protect, conserve and enhance landscape, natural, cultural and built heritage features, and support the objectives and actions of the County Heritage Plan.*

- GI7 Objective 1 states: '*To protect, conserve and enhance natural, built and cultural heritage features and restrict development that would have a negative impact on these assets in accordance with the provisions of Chapter 3 Natural, Cultural and Built Heritage of this Development Plan.*'

- GI7 Objective 2 states: '*To protect and enhance the landscape character of the County by ensuring that development retains, protects and, where necessary, enhances the appearance and character of the landscape, in accordance with the provisions of South Dublin's Landscape Character Assessment and the provisions of Chapter 3 Natural, Cultural and Built Heritage of this Development Plan.'*

GI Strategic Corridor 3: Grand Canal Corridor

- *To protect and enhance the Grand Canal as an ecological green corridor, recognising its role as a national/regional corridor for wildlife and some ecosystem services.*
- *Identify suitable sites for new urban trees including Miyawaki style mini woodlands, where feasible.*
- *To ensure that development along and adjacent to the Grand Canal, including the sensitive provision of amenity and recreational facilities, recognises the Canal's ecological status, avoiding areas and features of biodiversity and heritage sensitivity, and that appropriate set-back distances or buffer areas are identified and included.*
- *To engage with stakeholders along the Grand Canal to achieve shared objectives for this GI feature, without negatively impacting on the Canal's natural ecosystem services. To improve permeability and access to the Grand Canal for residents and visitors in a manner that does not cause habitat fragmentation*
- *To ensure that the design of recreational and amenity facilities along the Grand Canal Corridor will enhance and protect the character of the landscape through which it passes (see Appendix 9 South Dublin County Landscape Character Assessment, for landscape character details)..*

Natural Heritage Objectives

- *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.'*

- *NCBH4 Objective 1 states: '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'*

- *NCBH4 Objective 2 states: '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 NCBH9: Grand Canal: 'Protect and promote the Grand Canal as a key component of the County's Green Infrastructure and ecosystem services network, and protect and enhance the visual, recreational, environmental, ecological, industrial heritage and amenity value of the Grand*

Canal, recognising its sensitivities as a proposed Natural Heritage Area with adjacent wetlands and associated habitats.'

- *NCBH9 Objective 1 states*: *'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'*

- *NCBH9 Objective 2 states*: *'To facilitate the appropriate development of the Grand Canal as a recreational route for walking, cycling, nature study and water-based activities including fishing, canal boating, rowing, paddle boarding and canoeing/kayaking, subject to environmental safeguards and assessments'*

- *NCBH9 Objective 3 states*: *'To ensure that development along or adjacent to the Grand Canal contributes to the creation of an integrated network of appropriately designed walking and cycling routes connecting with the Grand Canal Way Green Route and which takes due cognisance of the sensitive nature of this national ecological corridor'*

- *NCBH9 Objective 4 states*: *'To ensure that development along and adjacent to the Grand Canal protects and incorporates natural heritage features including watercourses, wetlands, grasslands, woodlands, mature trees, hedgerows and ditches and includes an appropriate set-back distance or buffer area from the pNHA boundary to facilitate protected species and biodiversity and a fully functioning Green Infrastructure network'*

- *NCBH9 Objective 5 states*: *'To ensure that development along or adjacent to the Grand Canal protects, incorporates and enhances built and industrial heritage features, particularly historic canal and mill buildings, and also sets out to protect the setting of such built heritage features*'

- *Policy NCBH11: Tree Preservation Orders and Other Tree 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.'*

- *NCBH11 Objective 3 states*: *'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'*

- *NCBH11 Objective 4 states*: '*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*'

12.28 There are no protected trees or tree groups within the subject lands listed in the South County Dublin Development Plan 2022-2028.

12.29 There are no views or prospects that include the subject lands listed in the South County Dublin Development Plan 2022-2028.

12.30 In the Landscape Character Assessment of South Dublin County Council (Appendix 6, South Dublin County Development Plan 2022-2028), the subject lands are designated as being in the 'Urban Fringe/ Peri-urban Character Area'. This area is listed as being low/none in terms of landscape sensitivity.

Characteristics of the Proposed Development

12.31 The development will consist of the construction of two no. adjoined single storey data centres with associated office and service areas with an overall gross floor area of 15,274sqm that will comprise of the following:

- Construction of 2 no. adjoined single storey data centres with a gross floor area of 12,859sqm that will include a single storey goods receiving area / store and single storey office area (2,415sqm) with PV panels above, located to the east of the data centres as well as associated water tower, sprinkler tank, pump house and other services;
- The data centres will also include plant at roof level; with 24 no. standby diesel generators with associated flues (each 25m high) that will be located within a generator yard to the west of the data centres;
- New internal access road and security gates to serve the proposed development that will provide access to 36 no. new car parking spaces (including 4 no. electric and 2 no. disabled spaces) and sheltered bicycle parking to serve the new data centres;
- New attenuation ponds to the north of the proposed data centres; and
- Green walls are proposed to the south and east that will enclose the water tower and pump house compound.

12.32 The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042.

12.33 The permitted landscape scheme including earth berms, woodland, a native wetland and wildflower meadows (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948) will be modified to increase the extent of habitat creation.

12.34 The only material change in the characteristics of the overall development is the provision of a new hedgerow to the immediate west and south of the proposed development from that applied for under the original application.

Potential impact of the Proposed Development

Construction phase

12.35 The change of use of part of the site from its current state to that of a construction site has the potential to result in the following impacts:

- visual impacts due to the introduction of new structures, access roads, machinery, materials storage, associated earthworks, car parking, lighting and hoarding;
- change of character due to the change in use; and
- visual impacts due to change in ground levels and earthworks.

Operational phase

12.36 The proposed works as described in the 'Characteristics of the Proposed Development' has the potential to result in the following impacts:

- visual impacts due to the introduction of new buildings and built structures;
- visual impacts due to the introduction of new roads, mechanical plant and lighting;
- change of character due to the change in use;
- visual impact of landscape proposals – earth modelling, hard surfaces etc; and
- landscape and visual impacts due to the installation of trees and vegetation.

Remedial and mitigation measures

12.37 The mitigation of potential negative landscape and visual impacts has influenced the design and layout of the scheme from the beginning of the design process. As a result, the following landscape design mitigation measures have been made:

- earth modelling and large tree planting reinforced with woodland whip planting in belts is proposed to provide a high level of visual screening of the most sensitive views of the development;
- the creation of a wetland and woodland habitat in a buffer zone between the canal and the built development and provision of public access to some of these habitats;
- the colour palette chosen for the building aims to further reduce any visual impact of the building; and
- Green walls are proposed to the south and east that will enclose the water tower and pump house compound.
- the planting of a native hedgerow along the southern and western site boundaries to connect to the woodland belt in permitted development (SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948)

Predicted impact of the Proposed Development

Impact on Landscape Character

Construction phase

12.38 As described under potential impact of the proposed development above, the initial construction operations created by the clearance of the greenfield sections of the site and the construction of the buildings and plant will give rise to temporary or short-term impacts on the landscape character, through the introduction of new structures, machinery etc. and the removal of vegetation. The conversion of part of the site from an agricultural field landscape type to a building site, to build the data centres and associated development, is likely to be perceived in the ***short-term*** as a ***negative*** 'loss' of landscape character, particularly by sections of the local community closest to it.

12.39 The introduction of the elements described under potential impact of the proposed development will have an impact on the amenity value of the adjacent surrounding area. The construction compounds, temporary car parking and storage facilities etc. will be located sensitively to avoid any visually sensitive areas. The activities that will cause the most significant visual impact are not close to the most sensitive views along the canal. Furthermore, as the site is located within an overall site with an extant permission for a similar type and scale of development. The lands are also adjacent to an existing business park with recent built developments and developments currently under construction, and the recent R120 upgrade works on the east perimeter of the lands, the visual elements associated with construction would be considered part of the existing urban landscape.

12.40 When the above is considered the negative visual impact on the landscape character during construction would be considered ***moderate*** in magnitude and ***short-term*** in its duration.

Operational phase

12.41 As described under potential impact of the proposed development above, the operational phase of this development will give rise to a noticeable change in the landscape character particularly in the western section of the site. The development will not have a negative impact on any of the more sensitive aspects of the landscape character, the hedgerows, trees and field boundaries near the canal.

12.42 The initial removal of a section of the agricultural field landscape to be replaced with built development would be considered a negative impact on the landscape character. However, the landscape measures proposed with this development and the previously permitted schemes on the overall site, will significantly improve the quality of the landscape character in this area. The native woodland, scrub, wetland and grassland habitats to be created would have a very positive impact on the landscape character of this area and the wider environment of the canal and canal walks. Part of the wetland and woodland areas that are already permitted will be publicly accessible expanding the public amenity of the area. The initial impact of the built development on the landscape character could be perceived as negative in the short-term due to the change in type from a field to a built structure. In the long-term as the habitats establish, and the impact of the change in the landscape is reduced, the impact on the landscape character of this area would be considered positive in nature.

12.43 The site is specifically zoned for this type of development and there have been recent built developments of a larger scale in the local vicinity. Many of these built developments are dominant in views from the site. In this context the proposed development would be considered a continuation of existing trends in the local area.

12.44 The overall impact on the landscape character would therefore be considered ***positive*** due to the level of landscape and ecological enhancement proposed as part of the development of the overall site, and restricting the built development, as already permitted phases of the development of the site, to an area set-back a distance from the canal and its immediate environs.

Impact on landscape planning

12.45 The Green Infrastructure policies and objectives that apply to the site and its environs, described under section 11.26 and onwards above, are mostly general objectives aimed at the protection of the existing green infrastructure network and strengthening ecological links in the wider landscape. The proposed landscape combined with that permitted under the extant planning permissions will create significant belts of native woodland linking the existing hedgerows and trees into a much larger ecological habitat. In the north eastern corner of the site an additional large wetland habitat will be established, adjacent to that currently permitted. This combined wetland, meadow and woodland habitat will be an extremely positive contribution to the local biodiversity. The level of tree cover and woodlands proposed will significantly increase the ecological value of the lands and create strong ecological corridors through the overall site and connecting to the canal as well as lands and existing biodiversity corridors to the west and south. The proposal would be considered in accordance with these policy objectives.

12.46 The heritage policies and objectives that apply to the site and its environs, described under section 11.26 and onwards above, are mostly aimed at the protection of the character, heritage value, visual amenity value and the biodiversity of the Grand Canal and its surrounding landscape corridor. The proposed landscape, combined with that permitted under the extant planning permission, includes native wetland, woodlands, hedgerow scrub and meadows that will contribute positively to the landscape corridor of the canal and the biodiversity of the wider environs. The proposed development will therefore be in accordance with these policy objectives.

Visual impact assessment from specific locations

12.47 The photomontages assessed in this chapter are, as well as being included within this chapter are included in a separate A3 document by Digital Dimension Ltd. and this assessment considers two scenarios that are shown from each viewpoint. The images shown below are merely for illustrative purposes.

Photomontage 1 - The existing scenario.
Photomontage 2 - The proposed and permitted development on day one of operations. Where the proposed built elements are not visible a red line indicates the outline of the proposed development. The permitted built elements are indicated with a red line.

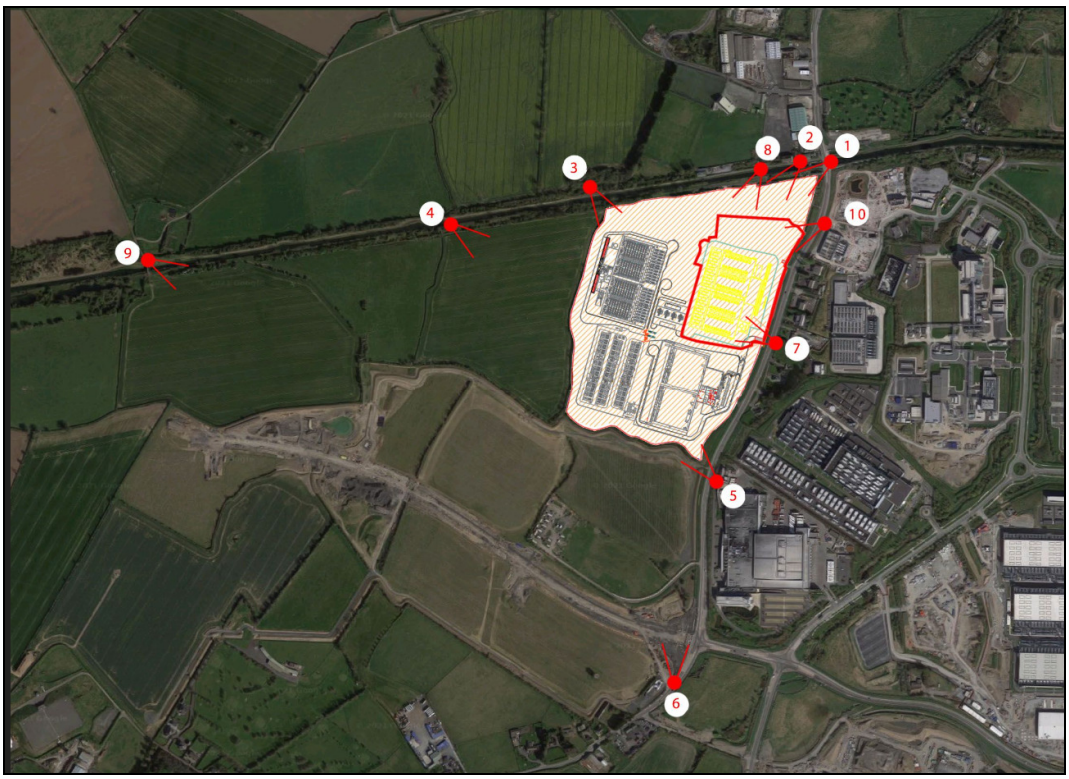


Figure 11.1 View locations

View 1 – From the bridge at the 12th Lock, Grand Canal and the R120 public road

Existing view

12.48 The northern edge of the subject lands is 33m from this view location and the closest point of the proposed buildings is 262m from this view location on the canal bridge crossing. Views of value in this vicinity are the long vista offered along the canal towards the west within the visual frame created by the vegetation on each side. A view is also offered to the south towards the Wicklow Mountains however, there are many visual elements intruding into this view. In this view the subject lands are partially visible in the centre of the view, however, the house and vegetation in the foreground do provide some screening. The buildings under construction on the eastern side of the R120 are also visible on the left side of the view.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 1 Existing	04-02-2021	73°	24mm	44m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.2 Existing view 1 from bridge over the canal to the north-east of the site

Visual impact of proposed development during construction

12.49 The proposed development will not result in any significant impact on this view during construction. The construction process, machinery, storage of materials, built structures will not be prominent in this view as most of the earthworks and tree planting will already be in place under the extant planning permissions that have been granted on site. Some of the visual elements associated with the building process will result in some minor visual intrusion into this view. However, the distance from the viewpoint will limit the level of visual impact. No sensitive aspects of the view would be obstructed and the level of impact would be reduced due to the distance and small scale of the visual intrusion in the context of a wide expansive view. The impact of the proposal during construction on the view from this location would be considered ***negative*** but of '***not significant***' magnitude, and ***temporary*** in duration.

Visual impact of proposed development during operation

12.50 The nature of the proposed development will result in a minor alteration to the existing view, on the presumption that the currently permitted development is in place. The photomontage (View 1 Proposed in the Photomontage document by Digital Dimension Ltd. and replicated on the following page) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed buildings are screened from view by the proposed earth berms and tree planting proposed as part of the scheme and under the previously permitted schemes. The visual screening provided by the permitted and proposed trees and berms will screen the buildings from view. The residence in the foreground of the view will also screen the proposed development from view. The visual impact would reduce over time as the trees mature. With this considered the impact of the proposals on the view from this location would be considered ***negative***, ***not significant*** and ***medium-term*** in duration.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 1 Proposed	04-02-2021	73°	24mm	44m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.3 Proposed view 1 from bridge over the canal to the north-east of the site

View 2 – From the proximity of the protected structure at the 12th Lock to the south-west

Existing view

12.51 The northern edge of the subject lands is 41m from this view location and the closest point of the proposed buildings is 216m from this view location adjacent to the Mill buildings that are a protected structure. Views of value in this vicinity are the long vistas offered along the canal towards the west and east, within the visual frame created by the vegetation on each side. A view is also offered to the south towards the Wicklow Mountains, however, there are many visual elements intruding into this view. The northern edge of the subject lands are visible in the foreground of the view most notable the buildings and associated garden trees and hedgerows. The large electricity pylon and lines are also prominent in this view.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 2 Existing	04-02-2021	73°	24mm	39m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.4 Existing view 2 from the north of the canal to the north of the site

Visual impact of proposed development during construction

12.52 The proposed development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials and built structures will mostly be screened in this view as most of the earthworks and tree planting will already be in place under the extant planning permissions. Some elements of the construction process will be visible over the woodland screening while the highest parts of the building are under construction. No sensitive aspects of the view would be obstructed, and the level of impact reduced due to the distance and small scale of the visual intrusion in the context of a wide expansive view. The impact of the proposals during construction on the view from this location would be considered ***negative***, ***slight*** in magnitude, and ***temporary*** in duration.

Visual impact of proposed development during operation

12.53 The nature of the proposed development will result in a slight alteration to the existing view on the presumption that the currently permitted development is in place. The photomontage (View 2 Proposed in the Photomontage document by Digital Dimension Ltd. and on the following page) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data centre is screened from view by the earth berms and tree planting within the site, as permitted in the previous applications and as proposed in this application. Any views of the building would be of the flues in the northern section of the development. The flues from this distance only register as exceedingly small visual elements protruding over the tree line. The visual impact would reduce over time as the trees mature. With this considered the impact of the proposed development on the view from this location would be considered ***negative***, ***not significant*** and ***medium-term*** in duration.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 2 Proposed	04-02-2021	73°	24mm	39m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.5 Proposed view 2 from the north of the canal to the north of the site

View 3 – From the Grand Canal Way, Green Route to the south

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 3 Existing	04-02-2021	73°	24mm	106m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.6 Existing view 3 from the north of the canal to the north-west of the site

Existing view

12.54 The north-eastern edge of the subject lands is 98m from this view location and the closest point of the proposed buildings is 256m from this view location. Views of value in this vicinity are the long vista offered along the canal towards the east and west within the visual frame created by the vegetation. In this view the electricity pylon and the top of the western boundary hedgerow are the only parts of the of the subject lands that are visible. The canal and vegetation along the banks are the prominent visual elements in this view.

Visual impact of proposed development during construction

12.55 The proposed development ***will not result in a noticeable visual impact on this view*** during construction. The construction process, machinery, storage of materials, built structures will be screened from view by the existing vegetation, and local topography.

Visual impact of proposed development during operation

12.56 The proposed development ***will not result in any visual impact on this view*** during its operational phase. The building and associated development will be completely screened from view by existing vegetation, and local topography.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 3 Proposed	04-02-2021	73°	24mm	106m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.7 Proposed view 3 from the north of the canal to the north-west of the site

View 4 – From the Grand Canal Way, Green Route to the south east

Existing view

12.57 The north-eastern edge of the subject lands is 380m from this view location and the closest point of the proposed buildings is 640m from this view location. Views of value in this vicinity are the long vista offered along the canal towards the east and west within the visual frame created by the vegetation. Some restricted views to the south towards the mountains are possible between the blocks of vegetation. In this view the electricity pylon and the top of the western boundary hedgerow are the only parts of the of the subject lands that are visible. The canal the vegetation along the banks are the prominent visual elements in this view.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 4 Existing	04-02-2021	73°	24mm	395m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.8 Existing view 4 from the north of the canal to the north-west of the site

Visual impact of proposed development during construction

12.58 The proposed development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials will be visible as very small and distant elements in the view. The magnitude of this impact will be further reduced due to the significant screening provided by existing and proposed earthworks and vegetation and the permitted built development. The impact will be further mitigated by the distance to the contraction activities from this location. The impact of the proposals during construction on the view from this location would be considered ***negative***, ***imperceptible*** in magnitude, and ***temporary*** in duration

Visual impact of proposed development during operation

12.59 The nature of the proposed development will result in a very slight alteration to the existing view on the presumption that the currently permitted development is in place. The photomontage (View 4 Proposed in the Photomontage document by Digital Dimension Ltd.) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data hall building is screened from view by the buildings, earth berms and tree planting within the site, as permitted in the previous application. The impact will be further mitigated by the distance to the development from this location. Any views of the building would be of the very tops of the most northern flues only. The flues from this distance only register as exceedingly small visual elements protruding over the tree line. This visual impact would reduce over time as the trees on the berms mature. With this considered the impact of the proposals on the view from this location would be considered negative, imperceptible and medium-term in duration.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 4 Proposed	04-02-2021	73°	24mm	395m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.9 Proposed view 4 from the north of the canal to the north-west of the site

View 5 – From the R120 public road in the proximity of a cluster of residences towards the north-west

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5 Existing	04-02-2021	73°	24mm	48m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.10 Existing view 5 from the south-east of the overall site from the R120

Existing view

12.60 The eastern edge of the subject lands is 17m from this view location and the closest point of the proposed buildings is 310m from this view location. This view is an expansive view over the mainly flat agricultural landscape to the east of the R120. There are no prominent features other than the small hedgerows and trees crisscrossing the landscape. The expansive nature of this view is temporary, and the roadside vegetation has been cleared as part of the R120 upgrade works. This will be re-established over the next few seasons.

Visual impact of proposed development during construction

12.61 The proposed development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials will be visible from this location. Some of the visual elements associated with the building process will result in a visual intrusion into this view and will alter the visual ridgeline. However, the magnitude of this impact will also be mitigated due to the construction works being located close to recently constructed large buildings and public road works where similar construction activities were recently part of the visual landscape. The construction process will be mostly screened from view by the earth berms and woodland tree planting installed as part of the permitted developments on the overall lands. The impact of the proposals during construction on the view from this location would be considered ***negative***, ***slight*** in magnitude, and ***temporary*** in duration.

Visual impact of proposed development during operation

12.62 The proposed development ***will not result in any visual impact on this view*** during its operational phase on the presumption that the currently permitted development is in place. The building and associated development will be completely screened from view by the permitted development and vegetation, and proposed earth berms and woodland planting.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 5 Proposed	04-02-2021	73°	24mm	48m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.11 Proposed view 5 from the south-east of the overall site from the R120

View 6 – From the R120 to the north across fields to the south of the application site.

Existing view

12.63 The southern edge of the overall site is 482m from this view location and the closest point of the proposed buildings is 750m from this view location. There are no views of value in this vicinity. The recently upgraded R120, new construction of the Grange Castle West access road, boundary walls and large buildings in the Grange Castle Business Park are prominent features of the view. The subject lands are not visible form this location.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 6 Existing	04-02-2021	73°	24mm	446m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.12 Existing view 6 from the R120 / Nangor Road and Grange Castle West access road

Visual impact of proposed development during construction

12.64 The proposed development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials will be visible from this location. Some of the visual elements associated with the building process will result in a visual intrusion into this view and will alter the visual ridgeline. However, the magnitude of this impact will be greatly reduced due to the significant screening provided by existing and proposed earthworks and vegetation. The impact will be further mitigated by the distance to the construction activities from this location. The impact of the proposals during construction on the view from this location would be considered ***negative***, however '***not significant***' in magnitude, and ***temporary*** in duration

Visual impact of proposed development during operation

12.65 The nature of the proposed development will result in a slight alteration to the existing view on the presumption that the currently permitted development is in place. The photomontage (View 6 Proposed in the Photomontage document by Digital Dimension Ltd. and on the following page) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed buildings are screened from view by the earth berms and tree planting within the site, as permitted in the previous application and as proposed in this application. The impact will be further mitigated by the distance to the development from this location. The only views of the building would be of the flues in the southern section of the development. The flues from this distance only register as exceedingly small visual elements protruding over the tree line. This visual impact would reduce over time as the trees on the berms mature. With this considered the impact of the proposals on the view from this location would be considered ***negative***, ***not significant*** and ***medium-term*** in duration.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 6 Proposed	04-02-2021	73°	24mm	446m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.13 Proposed view 6 from the R120 / Nangor Road and Grange Castle West access road

View 7 – From the R120 public road towards the west

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 7 Existing	04-02-2021	73°	24mm	26m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.14 Existing view 7 from the R120 to the east of the site

Existing view

12.66 The eastern edge of the subject lands is 10m from this view location and the closest point of the proposed buildings is 65m from this view location. This view is an expansive view over the mainly flat agricultural landscape to the east of the R120. There are no prominent features other than a group of hedgerow trees in the foreground. The expansive nature of this view is temporary, and the roadside vegetation has been cleared as part of the R120 upgrade works. This will be re-established over the next few seasons.

Visual impact of proposed development during construction

12.67 The proposed development ***will not result in any visual impact on this view*** during its operational phase. The building and associated development will be completely screened from view by the permitted development and vegetation, and proposed earth berms and woodland planting

Visual impact of proposed development during operation

12.68 The nature of the proposed development ***will not result in a noticeable visual impact on this view*** during the operational phase on the presumption that the currently permitted development is in place. The development will be screened from view by the previously permitted development and associated earth berms and trees.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 7 Proposed	04-02-2021	73°	24mm	26m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.15 Proposed view 7 from the R120 to the east of the site

View 8 – From the tow path on the canal, west of the 12th Lock, to the south-west

Existing view

12.69 The northern edge of the subject lands is 40m from this view location and the closest point of the proposed buildings is 196m from this view location, 100m west of the mill buildings that are a Protected Structure. Views of value in this vicinity are the long vistas offered along the canal towards the west and east, within the visual frame created by the vegetation on each side. A view is also offered to the south towards the Wicklow Mountains, however, there are many visual elements intruding into this view. The northern edge of the subject lands are visible in the foreground of the view most notably the buildings and associated garden trees and hedgerows. The large electricity pylon and lines are also prominent in this view.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 8 Existing	05-07-2021	73°	24mm	38m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.16 Existing view 8 from the canal west of the 12th Lock

Visual impact of proposed development during construction

12.70 The proposed development will result in a visual impact on this view during construction. The construction process, machinery, storage of materials and built structures will mostly be screened in this view as most of the earthworks and tree planting will already be in place under the extant planning permissions. Some elements of the construction process will be visible over the woodland screening while the highest parts of the building are under construction. No sensitive aspects of the view would be obstructed, and the level of impact reduced due to the distance and small scale of the visual intrusion in the context of a wide expansive view. The impact of the proposals during construction on the view from this location would be considered ***negative***, ***slight*** in magnitude, and ***temporary*** in duration.

Visual impact of proposed development during operation

12.71 The nature of the proposed development will result in alterations to the existing view. The photomontage (View 8 Proposed in the Photomontage document by Digital Dimension Ltd. and on the following page) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data centre is substantially screened from view by the earth berms and tree planting within the site, as permitted under the previous applications and as proposed in this application. Any views of the building would be of the flues and a limited section of the building that will be visible through a small gap in the berms. The flues from this distance only register as slight, narrow visual elements protruding over the tree line. The visual impact would reduce over time as the trees mature.

12.72 The current partial and distant view to the Wicklow mountains will be obscured by this development. However, the view is offered from many other locations along the towpath where there is less intrusion by buildings and other features. The visual obstruction will be primarily woodland which would be considered a positive alteration to the view. With this considered the impact of the proposals on the view from this location would be considered ***negative***, ***moderate***, and ***medium-term*** in duration.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 8 Proposed	05-07-2021	73°	24mm	38m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.17 Proposed view 8 from the canal west of the 12th Lock

View 9 – From Gollierstown Bridge along the Grand Canal Way, Green Route

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 9 Existing	05-07-2021	73°	24mm	928m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.18 Existing view 9 from the canal at Gollierstown Bridge

Existing view

12.73 The north eastern edge of the subject lands is 1km from this view location and the closest point of the proposed buildings is 1.28km from this view location. Views of value in this vicinity are the long vista offered along the canal towards the east and west within the visual frame created by the vegetation. Some restricted views to the south towards the mountains are possible between the blocks of vegetation. In this view the electricity pylon and the top of the western boundary hedgerow are the only parts of the of the subject lands that are visible. The canal the vegetation along the banks are the prominent visual elements in this view.

Visual impact of proposed development during construction

12.74 The proposed development ***will not result in a noticeable visual impact on this view*** during construction. The construction process, machinery, storage of materials, built structures will be screened from view by the existing vegetation, and local topography.

Visual impact of proposed development during operation

12.75 The proposed development ***will not result in any visual impact on this view*** during its operational phase. The building and associated development will be completely screened from view by existing vegetation, and local topography.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 9 Proposed	05-07-2021	73°	24mm	928m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.19 Proposed view 9 from the canal at Gollierstown Bridge

View 10 – From the R120 public road

Existing view

12.76 The eastern edge of the subject lands is 28m from this view location and the closest point of the proposed buildings is 148m from this view location. This view is an expansive view over the mainly flat agricultural landscape to the east of the R120. There are no prominent features other than a group of hedgerow trees in the foreground. The expansive nature of this view is temporary, and the roadside vegetation has been cleared as part of the R120 upgrade works. This will be re-established over the next few seasons.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 10 Existing	07-07-2022	73°	24mm	29.6m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.20 Exiting view 10 from the north-east along the R120

Visual impact of proposed development during construction

12.77 The proposed development will not result in any significant impact on this view during construction. The construction process, machinery, storage of materials, built structures will not be prominent in this view as most of the earthworks and tree planting will already be in place under the extant planning permission. Some of the visual elements associated with the building process will result in some minor visual intrusion into this view. No sensitive aspects of the view would be obstructed, and the level of impact reduced due to the small scale of the visual intrusion in the context of a wide expansive view. The magnitude of this impact will also be mitigated due to the construction works being located close to recently constructed large buildings and public road works where similar construction activities were recently part of the visual landscape. The impact of the proposals during construction on the view from this location would be considered ***negative*** but of '***not significant***' magnitude, and ***temporary*** in duration.

Visual impact of proposed development during operation

12.78 The nature of the proposed development will result in a minor alteration to the existing view on the presumption that the currently permitted development is in place. The photomontage (View 10 Proposed in the Photomontage document by Digital Dimension Ltd.) demonstrates accurately the extent of the alteration of the view on day 1 of operations. The proposed data hall building is substantially screened from view by the earth berms and tree planting within the site, as permitted in the previous application and as proposed in this application. Any views of the building would be of a small section of the building that will be visible through a small gap in the berms. This is a very limited view through a gap in the berms that will only be possible from this part of the public road. The building will be fully screened from view to the north or south of this viewpoint.

12.79 The level of the visual impact will decrease as the trees mature and fill the gap in the berms. The magnitude of the ***negative*** visual impact on this view would be considered ***slight*** and ***medium-term*** in duration.

Location	Date	Field of view	35mm equivalent	Distance to site	Camera model
View 10 Proposed	07-07-2022	73°	24mm	29.6m	Canon EOS 5DS

Project: KFLA Dub 06

digital dimensions
architectural visualisation

Figure 12.21 Proposed view 10 from the north-east along the R120

12.80 **'Do nothing' scenario**
In the event of this scenario the lands would continue to be left in the 'transition state' as it is currently, for a period. Without proper management of the landscape it would go into decline as the field reverts to scrub areas. As the area is zoned for development it is likely that the site would be developed in the future in a similar scale and type as is currently proposed

Monitoring

12.81 Contracts will ensure good working practices to reduce any negative impacts arising from construction to the lowest possible level and to ensure that all machinery operates within clearly defined construction areas. Storage areas will be located to avoid impacting on sensitive views, trees, hedgerows, drainage patterns etc. and such areas will be fully re-instated prior to, and at the end of the construction contract. The works will also have continuous monitoring so as to ensure adequate protection of areas outside of the construction works.

Reinstatement

12.82 On completion of sections of the proposed scheme, side slopes including cuttings and embankments, verges and other soft areas will be prepared for soil, top-soiled and planted using appropriate native tree and hedgerow species.

13. TRAFFIC AND TRANSPORTION

13.1 This chapter of the EIAR assesses the likely effects of the Proposed Development in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the Proposed Development.

13.2 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 proposed development on the local road network; and the remedial or reductive measures required to prevent, reduce or offset any significant adverse effects.

13.3 The rationale for the car parking strategy is set out within the Traffic and Transport Assessment that accompanies the application.

Methodology

13.4 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 methodology has been adopted for this assessment:

- Environmental Protection Agency (EPA) Guidelines on the information to be contained in the EIAR;
- Transport Infrastructure Ireland (TII) (Formerly National Roads Authority) Traffic and Transportation Assessment Guidelines.
- Traffic and Transport Assessment Guidelines' (May 2014) National Road Authority;
- 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003);
- 'Guidelines for Traffic Impact Assessments' The Institution of Highways and Transportation;
- The Traffic Management Guidelines;
- Guidance on Transport Assessment;
- Design Manual for Urban Road and Streets;
- South Dublin County Development Plan 2022 - 2028;
- GDA Cycle Network Plan - National Transport Authority;
- Review of relevant available information including where available Development Plans, existing traffic information and other relevant studies;
- Site visit to gain an understanding of the site access and observe the existing traffic situation;
- 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;
- 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
- 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.

Receiving environment

13.5 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.

13.6 The application site of 5.14ha. is located within the administrative area of South Dublin County Council approximately 13km west of Dublin City Centre, and around 4km west of Clondalkin Village, immediately south of the Grand Canal. The site is adjacent to the Grange Castle Business Park and is bounded to the north by planting and the Grand Canal; the R120 to the east; agricultural land to the south and west. The location of the site is shown on the map extract at Figure 13.1 below.

Figure 13.1 Site Location (Source: Google Maps)

Local road network

13.7 Grange Castle Business Park is accessed from a roundabout junction on the R136 Grange Castle Road. Access to the business park from this junction consists of a wide dual carriageway road, with a 1.5m cycle track and 1.5m footpath set back from the carriageway on either side. The internal Grange Castle Business Park road network provides access to the eastern edge of the site via the roundabout on the R136 Grange Castle Road on to the realigned R120.

13.8 The business park is also accessed via a 9m wide single carriageway road which forms a roundabout with the R134 Nangor Road. The roads and services of the business park were constructed in the late 1990's. The site location and local road network are shown on Figure 13.1 above.

13.9 There was previously access through the site off the R120 but this has now been closed with the exception of facilitating local access to the property to the immediate south of this former access. Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme involves re-alignment of the existing Adamstown (R120) and Nangor (R134) Regional Roads, immediately adjacent to Grange Castle Business Park. These works are complete.

13.10 The R136 forms a grade separated junction with the N4 approximately 3km north of its roundabout junction with Grange Castle Business Park, as well as the N7 approximately 3km to the south. The site is also well served by the R120 and R134 regional roads, forming the primary routes from Grange Castle to Adamstown and Clondalkin respectively.

13.11 The M50 is located approximately 5km to the east of the site, and forms an orbital motorway ring road around Dublin. The M50 is intersected by the principal radial routes, including the N4 at Junction 7, and the N7 at Junction 9, also known as the Red Cow Interchange. It is concluded that the site is strategically situated to facilitate trips by vehicles, with road infrastructure in place and built to a high standard.

Baseline traffic data

13.12 The Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme is substantially complete. It is proposed that the subject site will be accessed via the already permitted access off the R120. 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 in May 2022 at the following junction locations:

Site 1 – Site Access

13.13 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 were not affected by Covid 19 lockdowns.

13.14 The results of the traffic surveys are also set out in Appendix A of the Transport Statement by Pinnacle Consulting Engineers that accompanies this application. The locations of the surveys are each pertinent to the proposal in terms of being at key nodes in the road network that would be affected by traffic assignment and distribution of flows associated with the development site. The location of the survey point is depicted below at Figure 13.2.

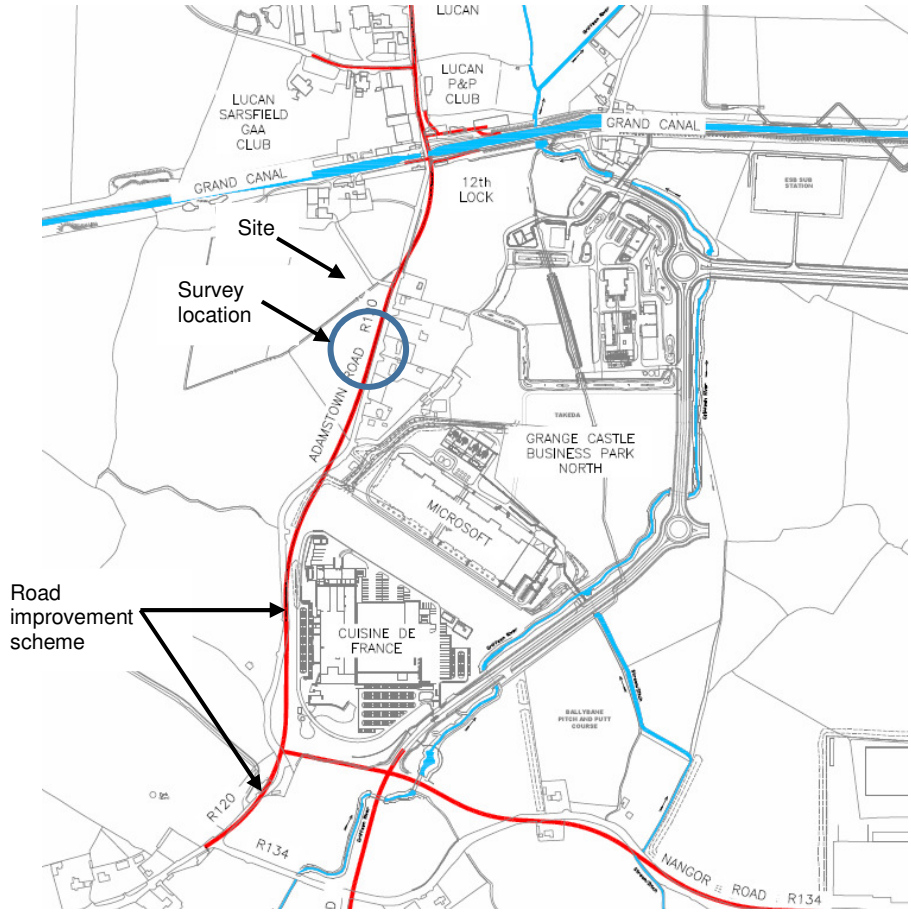


Figure 13.2 Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme (Source: South Dublin County Council)

13.15 The Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme is substantially complete. The Adamstown Road (R120) and Nangor Road (R134) Improvement was designed to take into account the predicted level of traffic based local zone land use. Including the site in question. A summary of the survey results are illustrated below.

Table 13.1 Summary of R120 Survey Results

R120 Survey Results		
	AM	PM
North Bound	346	506
South Bound	535	222
Two-way	881	728

Pedestrian and cycling facilities

13.16 The realignment of the R120 created cycle paths on either side of the road that will connect into other cycle paths along the realigned R134. There is a current planning application proposed to the north of the canal to the immediate north of the site by South Dublin County Council to extend the greenway to the west of the 12th lock and bridge. A cycle greenway already runs along the Royal Canal with access on to the R136. In addition, pedestrian and cycleways are available on all internal roads within Grange Castle Business 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 13.3 below.

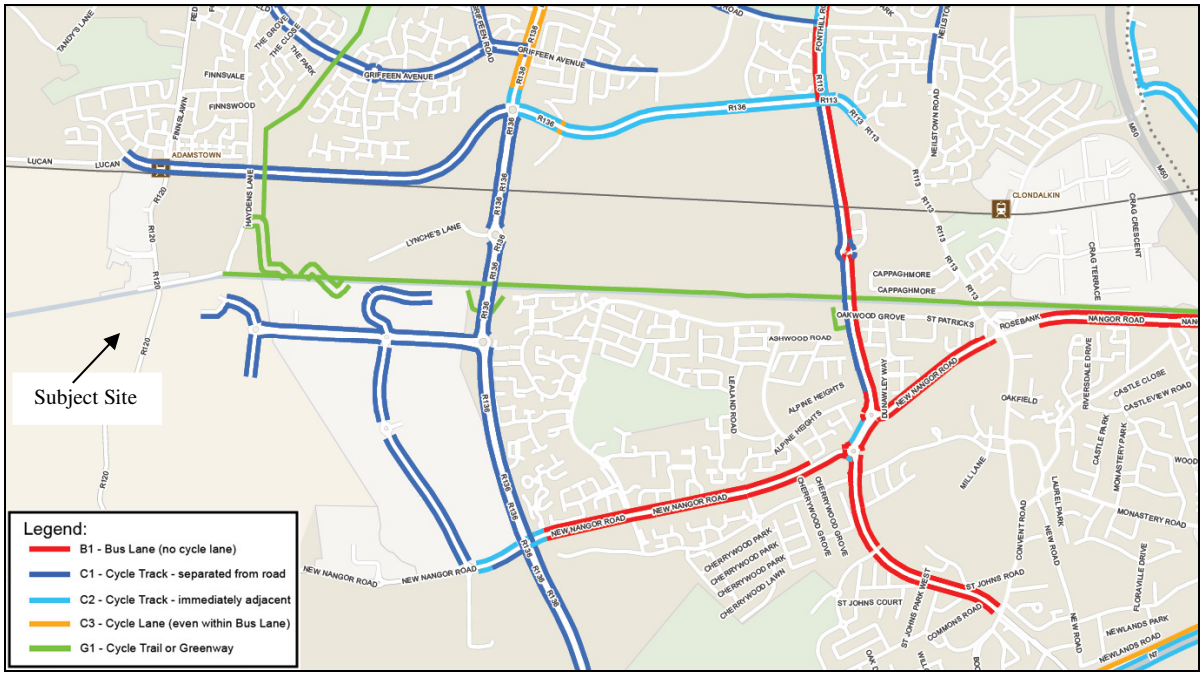


Figure 13.3 Existing cycle routes (Source: NTA)

13.17 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.

Proposed cycle improvements

13.18 Under the National Transport Authority's Cycle Network Plan for the Greater Dublin, the Dublin South West Sector extends outwards 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.

13.19 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 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 Cross Roads 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 rejoin 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.

13.20 The proposed cycle routes are illustrated in Figure 13.4 below.

Figure 13.4 Proposed cycle routes (Source: NTA)

Public transport accessibility

Bus

13.21 There are a number of bus stops within 700-800m walking distance of the application site. The nearest stops are on route no. 68 that connects Newcastle with the city centre. These stops are some 700m to the south of the subject site. The bus stops within the Grange Castle Business Park, such as those serving the no. 13 and 151 buses also have the ability to serve the site and contain stops within 800m of the site. 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 13.2 illustrates local bus routes.

Table 13.2 Local Bus Routes

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 – Grange Castle Business 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

13.22 Dedicated bus lanes are provided in both directions on the R136 Outer Ring Road and the R134 Nangor Road east of the Grange Castle Business Park roundabout. These routes are part of Dublin's Quality Bus Corridor (QBC) network.

Rail

13.23 The nearest stations are Adamstown, approximately 2.4km to the north-west of the site and Clondalkin-Fonthill approximately 6km to the east of the site. These stations are served by around 20 suburban commuter trains in each direction during weekdays.

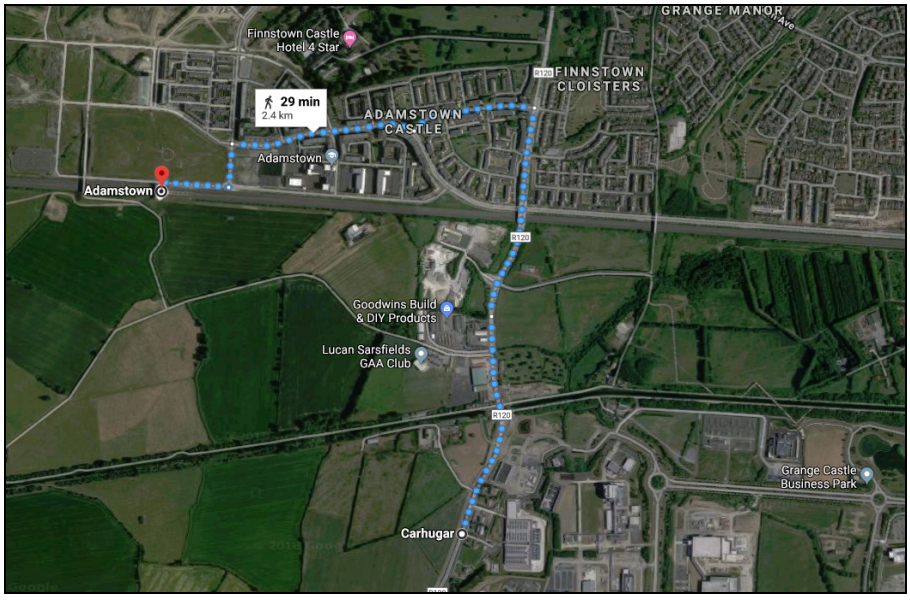


Figure 13.5 Route to Adamstown Rail Station (Source: Google Earth)

Characteristics of the Proposed Development

13.24 The proposed development comprises the construction of two no. single storey data centres with associated office and service areas. See Chapter 2 for a comprehensive description of the development.

Physical infrastructure

13.25 The proposed access into the site will be off the western side of the as permitted under South Dublin County Council Reg. Ref SD19A/0042 / An Bord Pleanála Reg. Ref. PL06S.305948. The permitted new access will serve as the sole vehicular access into the site both for this and the already permitted development on the site. These permissions have already been granted to close the vehicular access to the abandoned farm buildings that sits some 180m to the north of the permitted access into the overall site.

13.26 The proposed new internal access will provide access initially for construction traffic and car parking within the construction compound to the immediate north of the permitted entrance off the R120, and in the longer term to facilitate employees accessing the Phase 1 (DUB04) and Phase 2 (DUB05) parts of the development.

13.27 This new internal access road will create a loop around the data centres and back-up generators. 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, and set-back from the new internal junction. It is proposed to provide 36 car parking spaces comprising 30 standard, 4 EV and 2 no. disabled space on site for all employee and visitor parking requirements under this final phase of the overall development of the site. Provision for sheltered cycle parking will also be made to the south of the western line of car parking. Provision will also be made for a 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.

Servicing

13.28 An AutoTrack analysis has been carried on the internal service access to demonstrate its capability to cater for staff, visitors and service vehicles such as delivery vans. The results of this analysis show that the proposed development can accommodate the anticipated service vehicles that will serve the proposed development.

Trip generation – Including Cumulative Assessment

13.29 In order to understand the expected trip generation of the data centre assumptions have been made on the level of staff associated with the proposed development, based on information provided by EdgeConnex. 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.

13.30 The site will employ 100 people working in 3 shifts as follows:

- 08:00-16:00 - 40 Employees
- 16:00-00:00 - 40 Employees
- 00:00 – 08:00 – 20 Employees

13.31 The proposed peak hour trip rates are shown in Table 13.3 below.

Table 13.3 Predicted staffing requirements for proposed development

Weekday Trip Generation	AM Peak (08:00 – 09:00)		PM Peak (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
Staff	40	20	0	0
Two Way Trips	60		0	

Traffic generation

13.32 Due to the shift patterns of the site, the AM Peak hour will have 40 arrivals and 20 departures resulting in a total of 60 two-way trips. The shift change occurs at 16:00 which would be outside the traditional PM Peak between 17:00 and 18:00. It is therefore assumed that the development will have no impact on the PM Peak. 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.

13.33 A small number of deliveries such as post, couriers, IT equipment and general office supplies as well as service staff 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.

13.34 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.

Potential impact of the Proposed Development

Construction phase

13.35 The 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. Nevertheless, based upon the experience of similar projects and estimation has been made on the construction impact. At the peak of construction, it is anticipated that there will be a requirement for approximately c.100-120 construction workers, which with an allowance for shared journeys could equate to a maximum of around 60-80 arrivals and departures per day. This will vary over the lifetime of the project.

13.36 Where possible, construction workers will use shared transport. On-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 16:00. A number of the construction traffic movements will be undertaken by heavy goods vehicles.

13.37 The site has the potential to generate c. 11,300m^3 of topsoil that, subject to the suitability for it to be used elsewhere, will be used in the construction of berms on site and other landscaping features that have already been permitted under the previous permissions on site. In addition to the removal of topsoil, a 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. In addition to the top soil it is anticipated that up to. 18,800m^3 of sub-soil will be generated on the site. This give a total of c. 30,100m^3 of cut to be potentially taken off site. At a rate of 30m^3 per truck, it is anticipated that the ground works have the potential to generate c. 1000 HGV trips.

13.38 The cut and fill exercise is expected to take up to 6 months to complete. This equates to, on average, 10 soil removal related trips per day/20 two-way trips or 1000 HGV trips over the 6month 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.

13.39 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.

13.40 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. 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 construction related heavy goods vehicle movements to and from the application site will be approximately 10 arrivals and departures during the first 5-6 months of works and decreasing to 3 to 5 thereafter.

Demolition and Construction Waste

13.41 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 construction 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.

Site Clearance/Proposed Material Deliveries Storage Yard/Site Compound

13.42 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 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. The proposed development is expected to be phased as follows:

- Application for planning permission – Q3, 2022;
- Commence site construction works for the proposed data centres (subject to grant of planning permission) – Q1, 2023; and
- Complete construction works of Data Centres – Q3, 2024;

13.43 The above is indicative and subject to planning, detailed design and market conditions. 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.

13.44 Vehicles will access the road network to/from the construction site using the R120 via the M50. 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.

13.45 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 R120 and along the remainder of the haul route. A description of the haulage routes are offered below:

From M50 to Proposed Development site ~ 9 km, 10 minutes

13.46 Take Exit 6 of M50, Redcow -> Continue onto N7 -> Continue straight onto Naas Rd/N7 -> 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/R134 -> Turn right onto R120 and enter site.

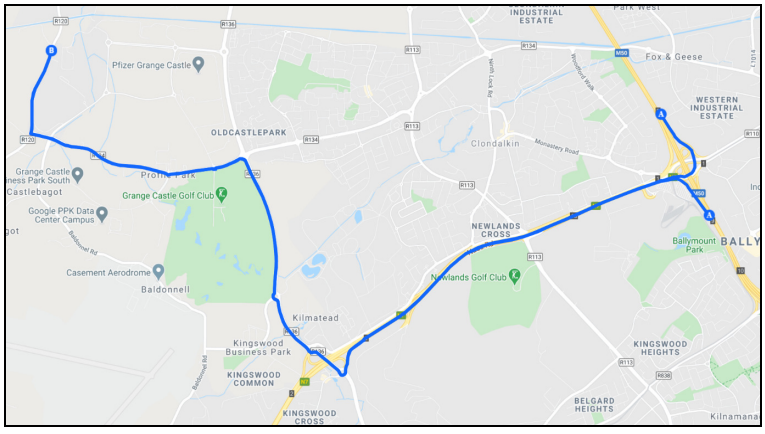


Figure 13.6 Haul Route to site

From Proposed Development site to M50 ~ 9 km, 10 minutes

13.47 Starting at R120, Apartment 7, Head south on R120 toward New Nangor Road/R134 -> Turn left onto New Nangor Road/R134 -> Turn right onto R136 -> At the roundabout, take the 2nd exit and stay on R136 -> At the roundabout, take the 3rd exit onto the N7 ramp to Dublin ->Merge onto Naas Rd/N7 ->Keep right to stay on Naas Rd/N7Continue to follow N7 -> Merge onto M50

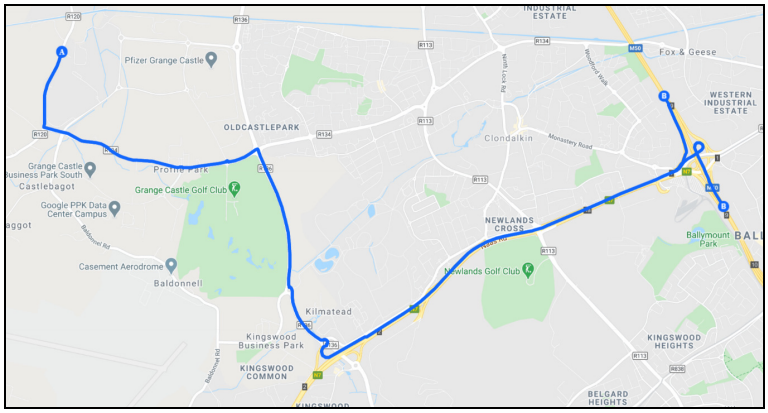


Figure 13.7 Haul Route from site

13.48 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.

Operational phase

Traffic capacity

13.49 The existing background traffic flows and predicted operational phase vehicular trip generation have been set out in earlier sections of this chapter. Table 13.4 below indicates the percentage impact of the additional traffic upgraded Adamstown Road (R120).

Table 13.4 Percentage impact of data centre traffic on the new R120

Condition	No. of Two-Way Trips
Base Flow	881
SD19A/0042 / SD21A/0042	77
Updated Base Flow	958
Current Application (AM Peak Flow)	60
Percentage Impact	6.26%

13.50 The impact of traffic associated with the proposed overall development is approximately 6.26% of the estimated flow for the upgraded Adamstown Road (R120). As the traffic dissipates throughout the network this impact will lessen on adjoining roads/junctions. These criteria are widely considered to be best practice in determining the scope for road capacity impacts.

13.51 In relation to the capacity of the road network, and increases in the number of vehicles using the network, the Transport Infrastructure Irealnd (TII) suggests the following thresholds for Traffic and Transport Assessments:

- traffic to and from the development exceeds 10% of the traffic flow on the adjoining road;
- traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive;
- industrial development in excess of 5,000sqm;
- distribution and warehousing in excess of 10,000sqm; and
- 100 trips in / out combined in the peak hours for the proposed development.

13.52 These criteria are widely considered to be best practice in determining the scope for road capacity impacts. At a maximum of 60 two-way trips in each of the peak hours for the overall development, the proposed development has a traffic generation less than the first criterion of 10% set out above.

Additionally, the proposed development is forecast to have a maximum percentage impact of around 2.1% at junctions in the vicinity of R120 and R136 (currently under construction), which is again less than the criteria set out by TII. As a result, it is not considered necessary to undertake any further junction assessment.

Car parking provision

13.53 Provision is made for 36 car parking spaces under this application. This level of parking is sufficient for all employee and visitor parking requirements. Provision for cycle parking will also be made.

Walking, cycling and public transport

13.54 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 Grange Castle Business Park and the Adamstown Road (R120) and Nangor Road (R134) Improvement Scheme is sufficient to make this mode a viable alternative for future staff at the EdgeConnex data centre.

"Do-nothing" scenario

13.55 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. Given the location and zoning of the subject site, 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.

Remedial or reductive measures

Construction phase

13.56 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 overall site access.
- 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.
- 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.

13.57 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; and
- 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.

13.58 It is anticipated that the generation of HGV's during the construction period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods.

Operational phase

13.59 The Adamstown Road (R120) and Nangor Road (R134) 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 at the data centre are made aware of potential alternatives including information on walking, cycle routes and public transport.

13.60 A number of walking and cycling connection points are proposed within the development. These connection points will provide access for pedestrians and cyclists onto the R120. 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.

13.61 It is proposed to provide car parking that will meet the expected-on site demand. The marketing of new pedestrian & cyclists routes along with public transport information will further reinforce the efforts been made towards a modal shift away from car-based trips.

13.62 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. A Travel Plan is submitted as part of the AI request in accordance with section 12.7.3 of the County Development Plan and the applicant has committed to implementing a Mobility Management Plan will be developed and implemented within six months of the commencement of the operation of the proposed development. This should be undertaken collaboratively with the permitted data centres already granted on this site. 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.

Predicted impact of the Proposed Development

13.63 When considering a development of this nature, the potential 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.

Construction phase

13.64 All construction activities will be governed by the Construction and Environmental as well as the Traffic Management Plan (CTMP), and an outline Construction and Environmental Management Plan (CEMP) is included with this application and the details of which will be agreed with the local authority prior to commencement of construction on site.

13.65 These documents address 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.

13.66 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.

13.67 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.

13.68 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.

13.69 The site has the potential to generate c. 31,100m^3 of soil consisting of 11,300m^3 of topsoil and 18,800m^3 of sub soil. However, it is expected that the topsoil, subject to confirmation of suitability, will be used elsewhere on the site such as in the construction of berms and in landscaping features. This would reduce the quantity of soil to be taken off site to c. 18,800m^3. This is expected to take up to 3-4 months to complete. This equates to, on average, 10 soil removal related trips per day/20 two-way trips or 626 HGV trips over the 3-4-month period.

13.70 Similarly, the average employment will be c. 150 increasing to a maximum of 250 for a short period), which with an allowance for shared journeys could equate to a maximum of around 120-150 arrivals and departures per day. A construction car park for workers immediately adjacent to the new access from Grange Castle Business Park will be created on the start of works by the laying of a temporary surface for vehicles. This number of construction vehicle movements is 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.

13.71 Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles. It is likely that construction will have a negligible impact on pedestrian and cycle infrastructure.

Operational phase

13.72 The predicted impact of the operational phase has been assessed in relation to the existing and permitted transportation schemes. A desktop study was conducted of planning applications in the vicinity of the subject development on the SDCC planning database to assess the base line traffic flows impacts from granted or committed applications close to the subject scheme; as well as traffic

generated by schemes permitted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042.

13.73 The permitted schemes will be added to the survey flows to form the baseline flows as illustrated in the table below.

Table 13.5 Baseline flow

Condition	No. of Two-Way Trips
Survey Flows	881
SD19A/0042/ SD21A/0042	77
Base Flow	958

13.74 The number of trips generated by the proposed development, based on the number of staff/visitors to the site, is illustrated in the table below.

Table 13.6 Predicted trip rates for proposed development

	AM Peak Hour (08:00 - 09:00)			PM Peak Hour (17:00 - 18:00)		
	Arrivals	Departures	Two-way	Arrivals	Departures	Two-way
Staff	40	20	60	0	0	0

13.75 Based on the number of trips generated by the development and base flow conditions, the development impact on the surrounding network has been calculated. This is illustrated in the figure below.

Table 13.7 Predicted trip rates for proposed development in relation to baseline

Condition	No. of Two-Way Trips
Base Flow	958
Current Application (AM Peak Flow)	60
Percentage Impact	6.26%

13.76 The impact of traffic associated with the proposed overall development is approximately 6.26% of the estimated hourly flow capacity for the upgraded Adamstown Road (R120). As the traffic dissipates throughout the network this impact will lessen on adjoining roads/junctions. These criteria are widely considered to be best practice in determining the scope for road capacity impacts.

13.77 At a maximum of 60 two-way trips in each of the peak hours for the overall development, the proposed development has a traffic generation less than the first criterion of 10% set out above. Additionally, the proposed development is forecast to have a maximum percentage impact of around 6.26% at junctions in the vicinity of R120 and R136 which is again less than the criteria set out by TII. As a result of the above, it is concluded that the proposed development will have a minor impact on junctions in the vicinity of the site. Therefore, it is not considered necessary to undertake any further junction assessment.

Cumulative impact

Construction phase

13.78 The subject site is Phase 3 of a development that includes similar schemes granted under South Dublin County Council Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042. These schemes will be built sequentially. Peak traffic generation during the construction phase will occur at the start of the project carrying out demolition, groundworks etc. The final stages of the development will include the fit out of the units will minimal HGV movements generated at this time.

13.79 Given the sequential nature of the construction phase, the peak cumulative impact during the construction phase will be similar to that of the predicted impact i.e. on average, 10-12 HGV movements one-way/20-24 HGV movements two-ways per day.

Operational phase

13.80 Potential cumulative impacts have been assessed in relation to the existing and permitted transportation schemes. The traffic modelling undertaken includes growth in background traffic flows which accounts for other developments in the area. A desktop study was conducted of planning applications in the vicinity of the subject development on the SDCC planning database to assess any cumulative impacts from granted or committed applications close to the subject scheme.

13.81 The cumulative trip generation for permitted developments under SDCC Planning Ref. SD19A/0042 / An Bord Pleanála Ref. PL06S.305948; and Ref. SD21A/0042 as well as the proposed development the proposed scheme is shown in Table 13.8.

Table 13.8 Predicted trip rates for proposed development

Condition	No. of two-way trips
Base flow	881
SD19A/0042 / SD21A/0042	77
Updated base flow	958
Current application (am peak flow)	60
Percentage impact	6.26%

13.82 The impact of traffic associated with the proposed overall development is approximately 6.26% of the estimated hourly flow capacity for the upgraded Adamstown Road (R120). As the traffic dissipates throughout the network this impact will lessen on adjoining roads/junctions. These criteria are widely considered to be best practice in determining the scope for road capacity impacts.

13.83 At a maximum of 77 two-way trips in each of the peak hours for the permitted development, the proposed development has a traffic generation less than the first criterion of 10% set out above. Additionally, the proposed development is forecast to have a maximum percentage impact of around 2.1% at junctions in the vicinity of R120 and R136 (currently under construction), which is again less than the criteria set out by TII.

13.84 As a result of the above, it is concluded that the proposed development will have a minor impact on junctions in the vicinity of the site. Therefore, it is not considered necessary to undertake any further junction assessment.

Monitoring

13.85 During the construction stage, the following monitoring exercises are proposed:

- Compliance with construction vehicle routing practices;
- Compliance with construction vehicle parking practices;
- Internal and External road conditions; and
- Timings of construction activities.

Reinstatement

13.86 Not applicable in respect of traffic and transport.

14. CULTURAL HERITAGE

14.1 The following is an assessment of archaeological, architectural and cultural heritage impacts of a proposed data centre development on lands in the townland of Ballymakaily (DUB06) to the west of the Newcastle Road (R120), Lucan, Co. Dublin. The site is located to the west of Grange Castle Business Park and to the south of the Grand Canal.

Methodology

14.2 For the purpose of setting the site within its wider archaeological, architectural and cultural heritage landscape, a desk-based assessment utilising sources including the Record of Monuments and Places, the National Museum of Ireland topographical files, the database of licensed excavations, the Record of Protected Structures included in the South Dublin County Council Development Plan 2022-2028, the National Inventory of Architectural Heritage, documentary and cartographic sources was undertaken. The desk-based assessment was supplemented by a full site survey, a geophysical survey undertaken by Joanna Leigh of JML Surveys in December 2018 (Licence No. 18R0257), archaeological testing and excavation undertaken by AMS Ltd in 2019 (License No. 19E0038).

Recorded Archaeological Monuments and Places

14.3 The Record of Monuments and Places was consulted for the relevant parts of the county. This is a list of archaeological sites known to the National Monuments Service (see www.archaeology.ie). The relevant files for these sites contain details of documentary sources and aerial photographs, early maps, OS memoirs, OPW Archaeological Survey notes and other relevant publications. The list of National Monuments in State Ownership or State Guardianship, the Register of Historic Monuments, the Sites and Monuments Record and monuments covered by Preservations Orders were also assessed. All sites within c. 1km of the development were identified and are listed in Appendix 14.1 (see Figure 1, Appendix 14.5 for locations).

Recorded archaeological finds

14.4 The topographical files in the National Museum of Ireland were consulted to determine if any archaeological artefacts had been recorded from the area. This is the national archive of all known finds recorded by the National Museum. It relates primarily to artefacts but also includes references to monuments and has a unique archive of records of previous excavations. Other published catalogues of prehistoric material were also studied: Raftery (1983 - Iron Age antiquities), Eogan (1965; 1993; 1994 - bronze swords, Bronze Age hoards and goldwork), Harbison (1968; 1969a; 1969b - bronze axes, halberds and daggers) and the Irish Stone Axe Project Database (School of Archaeology, U.C.D.). Finds from townlands in the study area are listed in Appendix 14.2.

Previous excavations

14.5 The Excavations bulletin website (www.excavations.ie) was consulted to identify excavations that may have been carried out within or in the vicinity of the development. This database contains summary accounts of excavations carried out in Ireland from 1970 to 2021. The study area has been subject to a number of licensed excavations during the development of the Grange Castle Business Park and during improvements to the R120 Adamstown Road and summaries of these are listed in Appendix 14.3.

Cartographic sources

14.6 Reference to cartographic sources provides information on the development of the area. Manuscript maps consulted included the Down Survey Barony map of Newcastle and Uppercross, c. 1656 (see Figure 2, Appendix 14.5), Rocque's map of 1760 and Taylor's map of Dublin County (see Figure 3, Appendix 14.5). Ordnance Survey maps consulted included 6" maps, first and second editions and the Ordnance Survey 25" maps (see Figures 4-5, Appendix 14.5).

Architectural Heritage

14.7 The National Inventory of Architectural Heritage (NIAH) is a systematic programme of identification, classification and evaluation of the architectural heritage of the State. The Minister for the Culture, Heritage and the Gaeltacht is currently using the Inventory as the basis for making recommendations for the inclusion of structures in the Record of Protected Structures (RPS). The South County Dublin Development Plan 2022 – 2028 consulted. The plan includes policy objectives for the protection of the county's architectural heritage through their inclusion in the Record of Protected Structures (RPS) or in Architectural Conservation Areas (ACA). The RPS is a list of every structure which is of special architectural, archaeological, artistic, cultural, scientific, social or technical interest within the council's functional area. No structures included in the NIAH or in the RPS are located within the site. All sites within c. 1km of the development were identified and are listed in Appendix 14.4 (see Figure 1, Appendix 14.5 for locations).

Site assessment

14.8 The site was visited on a number of occasions between December 2018 and August 2019, prior to any development at the site (see Figure 6, Appendix 14.5 for field locations). The site assessments involved the examination of recorded archaeological, architectural and cultural heritage constraints and the identification of previously unrecorded features of archaeological, architectural and cultural heritage interest within the site.

Geophysical survey of site

14.9 A geophysical survey was conducted by Joanna Leigh of JML Surveys as part of the archaeological impact assessment undertaken of the proposed development by CRDS Ltd. The aim of the geophysical survey was to locate and identify any responses of potential archaeological interest within the site. The geophysical survey comprised of a detailed gradiometer survey throughout. This was conducted under Licence No. 18R0527, issued by the Department of Culture, Heritage and the Gaeltacht (see Figure 7, Appendix 14.5).

Archaeological testing and excavations

14.10 Archaeological testing was undertaken at the site under Licence No. 19E0038 (also Detection License No. 19R0086) by AMS Ltd, issued by the Department of Culture, Heritage and the Gaeltacht. The aim of the testing was to assess the potential features identified in geophysical survey and sample the remaining areas. A number of archaeological features were identified (to the south and southwest of the current proposed development site). Archaeological excavation of the identified features was undertaken under the same license following consultation with the Department (see Figures 8-10, Appendix 14.5).

Receiving environment

14.11 The study area, which comprises a buffer of approximately 1km from the proposed development, is characterised by upstanding archaeological monuments dating to the medieval period. Archaeological excavations in the area have also uncovered a number of prehistoric sites. All recorded archaeological monuments and features noted below are located outside the site boundary.

14.12 The earliest evidence for settlement consists of the remains of a Neolithic house excavated in the townland of Kishoge to the north-east of the site. The house was roughly rectangular in shape and measured 6.05m in length by 4.5m in width. The walls comprised a foundation trench supporting oak posts and planking and it may have been subdivided internally. Domestic activity in the vicinity of the dwelling comprised pits and charcoal and a number of artefacts were recovered from these features including scrapers, waste flint and a single sherd of prehistoric pottery. Radiocarbon dates from the site indicate a Neolithic date between 3941 and 3659 BC (Excavation ref. no. 01E0061, see Appendix 14.3). A stone axehead, made from porcellanite, also of Neolithic date, was found during the excavations at the site (License No. 19E0038; see below).

14.13 Excavations in the townland of Kilmahuddrick to the south-east of the proposed development revealed the remains of a ploughed-out ring-barrow. Ring-barrows are generally characterised by a low, artificial mound, sometimes with an encircling ditch and bank. The excavation at Kilmahuddrick revealed a large ditch and a series of cremated bone deposits at its centre (Doyle 2005, 43). The site

had been intensively ploughed in the past and no trace of the raised central mound was present. Radiocarbon dates indicated that the site originated in the early Bronze Age but its use continued into the later Bronze Age and Iron Age (Doyle 2001, 17). The site was later enclosed within a field system of early medieval date (see below). A series of cremated human deposits were uncovered within the interior of the barrow ditch associated with finds including undecorated pottery and a small black glass bead (Doyle 2001, 18).

14.14 A number of fulacht fiadh have also been revealed within the townlands of Nangor and Grange. Fulacht fiadh or burnt mounds comprise mounds of charcoal rich soil, heat-fractured stones accompanied by a trough sometimes lined with wooden planks, stone slabs or even clay (Waddell 2000). They are generally located close to water sources including streams, rivers, lakes or marshy ground. The exact use of these sites is still somewhat ambiguous with their traditional interpretation as cooking places coming into question in recent years. They date predominantly to the Bronze Age but date ranges from the Mesolithic period to the medieval period have been returned.

14.15 The remains of a field system were found enclosing a prehistoric ring-barrow in the townland of Kilmahuddrick (Doyle 2005, 43). The field system was represented by a series of linear features on the western and southern sides of the ring-barrow. Radiocarbon dates from deposits of animal bone indicated that the field system dated to the early medieval period (Doyle 2005, 52). A further series of pits and ditches of early and later medieval date were revealed during excavations in the townland of Nangor (Doyle 2002).

14.16 The place name Kilmahuddrick provides an additional indicator of early medieval activity in the vicinity of the proposed development. The place name contains the element 'Kil' an Anglicisation of Cell or Cill generally signifying an early medieval church (Doyle 2005, 45). The church of Kilmahuddrick was dedicated to St. Cuthbert and consists of a nave-and-chancel church situated in a disused burial ground (Ní Mharcaigh 1997, 270).

14.17 Ringforts, the characteristic settlement site of the early medieval period, generally consist of a circular area surrounded by a bank or fosse, or simply by a rampart of stone. Ringforts are usually interpreted as being defended farmsteads. Many ringforts have been partially or completely destroyed since the 1960s and often the only indication of the former presence of a ringfort is preserved in townland name elements such as Dún, Rath, Cashel or Lios. However, monuments which have experienced above-ground disturbance continue to be of archaeological interest due to the potential for subsurface remains to exist at their locations. The term 'enclosure' is applied to monuments that cannot be classified more accurately without archaeological assessment but were identified as enclosures during fieldwork or through the study of aerial photography or other sources. There are four enclosures within the study area including one in the townland of Gollierstown (DU017-093----), one in the townland of Kilmactalway (DU021-112----) and two in the townland of Ballybane (DU021-108---- and DU021-109----). The sites of the two enclosures in Ballybane were subject to archaeological test excavation in 2016 (Excavation ref. no. 16E0531, see Appendix 14.3). AH1 (DU021-108----) comprised internal and external ditched enclosures with internal linear features and pits, likely representing an early medieval settlement site. AH5 (DU021-109----) measured c. 44m in diameter and comprised a single-ditched circular enclosure, a possible ringfort. Curvilinear responses forming a sub-circular pattern indicative of an enclosure were identified during geophysical survey of the subject site (see Appendix 14.5). The responses measured c. 30m in diameter and were enclosed within a series of fainter curvilinear trends measuring c. 70m in diameter. Archaeological test excavation is planned to determine the archaeological significance of these features and to determine if further archaeological mitigation is required (see Appendix 14.1 for further details).

14.18 There is extensive archaeological and documentary evidence for the later medieval settlement of the study area. Records show that the Cistercian abbey of St. Mary's held lands in the vicinity of Clondalkin, including the townlands of Ballymacheilmer and Kilmacuddrick (now Kilmahuddrick) from the 12th century. The name Kilmahuddrick is derived from Cell Mo-Chudric or the church of St. Cuthbert. The lands may have come into the abbey's possession before the arrival of the Normans but the possession of Ballymacheilmer was confirmed to the abbey in two charters of Henry II dating to 1174 and 1197. John Comyn, Archbishop of Dublin confirmed the lands, chapel and titles in 1186.

14.19 At the time of the dissolution the 'Grange of Balichelmer' and the 'vil of Kilmacodryke' were still listed as part of the abbey's landholdings. The Grange of Balichelmer is likely to correspond with the modern townland of Grange. One hundred and fifty-two acres at Grange were listed in the monastic possession at the time of the dissolution of the monasteries c. 1540-41. In 1641 Grange was in the hands of the Fagan of Feltrim, an Irish Papist (Simington 1945, 304). In 1650 Grange was occupied by a farmer called Nicholas Wolverston and twenty other persons, including a weaver and a 'greymerchant'. The 'vil of kilmacodryke' corresponds with the townland of Kilmahuddrick to the immediate south-east of the proposed development. At the time of the dissolution the holding at Kilmahuddrick comprised 51 acres. In 1641 Kilmacuddrick was held by Mr Aylmer an Irish Papist (Simington 1945, 304). In 1666, the lands of Kilmahuddrick were held by Patrick Thunder (Ball 1906, 71).

14.20 Several tower houses were constructed in the study area in the later medieval period including one in the townland of Grange (DU017-034----) and one in the townland of Adamstown (DU017-029----). Tower houses are small, fortified residences which were constructed following a period of unrest in the fourteenth century. Tower houses have various defensive features including thick walls, battlements and narrow windows. As time progressed and the requirement for defence lessened tower houses were replaced by hall houses and fortified residential houses. Residential extensions were also added to existing tower houses to provide more comfortable accommodation for the occupiers.

14.21 The upstanding remains of Grange Castle (DU017-034----) are located c. 1km to the east of the proposed development and consist of a rectangular, three-storey structure with plastered walls. Grange Castle is shown on the Down Survey map (see Figure 2, Appendix 14.5). An early description by Cooper in 1780 describes the castle as a 'neat well-built castle inhabited by a farmer and kept in very good repair'. The castle is uninhabited and had fallen into disrepair but is currently subject to a programme of conservation by South Dublin County Council. Archaeological excavation undertaken adjacent to the castle in 1997 revealed a curving ditch containing charcoal, mortar, flint and animal bones. Finds including a decorated bone comb, stick-pin and knife provided a twelfth to thirteenth century date. Preliminary works undertaken in 2016 in advance of planned conservation works revealed that the tower house and later Georgian house possess shallow foundations. (Excavation ref. no. 97E0116ext and 16E0510 see Appendix 14.3). The Down Survey map of the area shows a castle, most likely to be Grange Castle (see Figure 2, Appendix 14.5).

14.22 In the mid-eighteenth century a group of noblemen and merchants decided to form a company to undertake the construction of a canal aimed initially at providing fresh water for Dublin City and a water-borne transport system to the countryside west of Dublin. Work began on the Grand Canal and the canal was opened for traffic in February 1779 (Delaney 1995, 21). The Grand Canal forms the northern boundary of the site and the 12th Lock and associated bridge are located immediately to the north-west of the site. The site of the proposed development is located immediately to the south of the 12th Lock. A complex of canal related structures was constructed including the 12th Lock itself, the lock keeper's house built to the designs of the Grand Canal Company's engineer Thomas Omer and Leck Bridge which has been widened to facilitate modern traffic requirements. A number of industrial buildings were constructed alongside the canal including two nineteenth century mill buildings.

14.23 The area is depicted as being in agricultural land on the 1760 map of the area surveyed by Rocque (see Figure 3, Appendix H.5). On the 1st edition Ordnance Survey 6" map the site is shown as pastureland, with a number of internal field boundaries which have since been removed (see Figure 4, Appendix 14.5). It is bounded to the north by the Grand Canal and to the east by the Adamstown Road. The 12th Lock (NIAH ref. no. 11204053 / RPS 125) and an associated canal bridge named Leck Bridge (NIAH ref. no. 11204052 / RPS 127) are located to the north of the site. A complex of farm buildings is noted to the north of the site. A large quarry is recorded to the north-west of the site, likely associated with the construction of the Grand Canal and its associated lock and bridge. There is little change in the landscape evident on the second edition Ordnance Survey map, surveyed in the 1910s (see Figure 5, Appendix 14.5).

14.24 Recent aerial photography of the area indicates that there has been extensive development of the area, but where development has not occurred, the field layout is as it was from at least the middle of the 19th century (see Figure 6, Appendix 14.5). The area has been subject to intensive farming

practices, and it is likely that this has resulted in the destruction of the above ground expression of other sites.

Results of site assessment

14.25 The site was visited on several occasions between December 2018 and August 2019, prior to any development at the site (see Figure 6, Appendix 14.5 for field locations). The site assessments involved the examination of recorded archaeological, architectural and cultural heritage constraints and the identification of previously unrecorded features of archaeological, architectural and cultural heritage interest within the site.

14.26 The site is located within the townland of Ballymakaily. The 1st edition Ordnance Survey 6" map indicate that the site was once subdivided into a number of smaller fields; these former division are not in evidence on the ground. The field has historically been in agricultural use, with both grazing and tillage in evidence. A 110kv electricity line, erected c. 2000, crosses the northern portion of the site, running in an east-west direction.

14.27 The site is located on the western side of the R120 (Adamstown Road) which was under redevelopment at the time of the survey. It is bounded to the north by the Grand Canal with the 12th Lock, lock bridge, lock keeper's cottage located to the north-east of the site. A complex of mill buildings is located to the north of the site on the north bank of the canal. The western and southern boundaries include earthen banks covered in mature hedgerow and trees.

14.28 Field 1 is a relatively flat field in tillage. The internal field boundaries evident on the 1st edition Ordnance Survey 6" and the 25" Ordnance Survey maps have been removed. Some of the removed boundaries are evident on aerial photographic coverage of the site as linear crop marks. The field is bounded to north-east by wet ditch covered in mature hedgerow with a slight bank to north. A concrete bridge over the ditch in the northern corner allows access to Field 5. It is bounded to the east by a timber post fence with a recent drainage channel along the interior. The local road to the east of the boundary has recently been improved. The field is bounded to the south by townland boundary between Ballymakaily and Grange. This boundary comprises a wet ditch/small stream to the south and a slight earthen bank measuring between 0.2-0.5m in height with some evidence of stone facing particularly at the western end. The field is bounded to the west by the townland boundary between Ballymakaily and Gollierstown. This boundary comprises an earthen bank, c. 0.3m in height, covered with mature hedgerow and trees with a deep, wet ditch to the west. The proposed data centre is located in the south-eastern corner of the field.

14.29 Field 2 is located to the north of Field 1. It is in rough pasture and there is an ESB pylon in the north-western corner. The northern boundary of the field runs along the south bank of the Grand Canal. The field is bounded to the west by the townland boundary between Ballymakaily and Gollierstown. This boundary comprises an earthen bank, c. 0.3m in height, covered with mature hedgerow and trees with a deep, wet ditch to the west.

14.30 Field 3 is a gently undulating field in pasture. A quarry is shown in the north-west corner of the field on the 1st edition Ordnance Survey 6" map and the 25" Ordnance Survey map. It is likely that the quarry was opened during the construction of the Grand Canal. A large grassed over earthen bank survives on the site of the former quarry. The eastern boundary comprises a wet ditch to the west with an earthen bank covered in trees to the east. The southern boundary comprises an earthen bank to the north, between 0.3 and 1m in height, and a ditch to the south. There is a concrete drinking trough in the south-west corner of the field. The western boundary comprises a slight bank with some stone facing to the east and a ditch to the east. The proposed ESB substation is located in the south-east corner of the field.

14.31 Field 4 is a gently undulating field in rough pasture. There is an ESB pylon in the north-east corner. The laneway leading to the complex of farm buildings runs along the north-eastern boundary of the site.

14.32 Field 5 is a relatively flat field in tillage. It is bounded to the north-west by a ditch with a flowing stream in the base and a slight bank to the south side. A flat-arched concrete bridge crosses the stream in the western corner allowing access to Field 1. The field is bounded to the east by a timber

post fence with a drainage channel along its interior which was inserted as part of the local road improvement works. The field is bounded to the south-west by a wet ditch with slight bank to north.

14.33 Field 6 is located in the north-eastern corner of the site and comprises a wet field in rough pasture. The remains of a partially demolished complex of farm buildings and agricultural yards survives in the north-west corner of the field. The farmhouse is a mid-twentieth century structure and replaced the building shown on the 1st edition Ordnance Survey map. A three-bay single-storey with loft outbuilding of early nineteenth century date survives to the north of the farmhouse. An early nineteenth century cottage stands outside the north-eastern boundary of the field. There is a large earthen embankment located along the laneway leading to the farm complex.

14.34 A group of structures located on the northern bank of the Grand Canal and outside the boundary of the proposed development are included in the Record of Protected Structures or National Inventory of Architectural Heritage for South County Dublin. These include Leck Bridge (RPS ref. no. 127/ NIAH ref. no. 11204052), the 12th Lock (RPS ref. no. 125 / NIAH ref. no. 11204053), the two-storey former mill building (RPS ref. no. 118 / NIAH ref. no. 11204054), the Lock Keeper's House (RPS ref. no. 119 / NIAH 11204056) and a mill building (NIAH ref. no. 11204055). While the upper elements of the data centres will be visible from these structures, proposed landscaping along the northern site boundary will ameliorate any significant visual impacts (see Appendix H.4 for full descriptions).

Results of geophysical survey

14.35 The survey area totals c. 20 hectares and is contained within six fields (see Figure 7, Appendix 14.5). The north-eastern field comprised of rough ground and vegetation and was not suitable for survey. Detailed gradiometer survey was conducted through the remaining five fields. There are no recorded monuments within the application area.

Field 1

14.36 A series of linear responses (A) throughout Field 1 are typical of former field boundaries. Many of these are depicted in historic mapping. In the centre of Field 1, there are clear responses (B) which appear to form a sub-circular pattern. These measure c. 30m in diameter. Although in places the responses have a diminished magnetic signal, the sub-circular form of the response is clearly visible and is interpreted as of archaeological potential. The plough damaged remains of an enclosure may be represented here. Faint curvilinear responses (C) enclose the probable enclosure (B). Although the trends are barely discernible in the data, they are considered to be of interest, possibly representing an external boundary feature or annex of the enclosure, with a diameter of c.70m around the enclosure. In the north of Field 1, there are a series of responses (D) that appear to form a vague rectilinear pattern. The responses appear to be perpendicular to the existing field boundary. Although it is possible that these are of archaeological interest, it is equally possible that these represent the remains of a former farm building or result from more recent agricultural activity. An archaeological interpretation is cautious. In the east of Field 1 there is a cluster of isolated responses (E). It is possible that these represent pit-type features or an area of burnt material. However, no further responses of interest are located in the vicinity and it is possible that more deeply buried ferrous debris is located here. Responses (F) form a linear pattern and are typical of a former field division. Although these may be similar to (A), it is possible that they represent an older boundary and may be of archaeological interest. This is speculative. In the northwest of Field 1 there is an area of increased magnetic response (G). The possible origin of this is unclear. It may represent more recent ground disturbance. However, it is equally possible that a ploughed out spread of archaeological burnt material is represented here. Archaeological interpretation is tentative but must be considered.

Field 2

14.37 Field 2 is dominated in the north by modern magnetic disturbance. This is thought to be from recent ground disturbance and modern activity. A clear rectilinear area of disturbance (H) is unusual and perhaps marks the former location of a building. This is most likely modern in origin and not considered to be of archaeological interest. Broad amorphous responses (I) appear to be associated with curvilinear ploughing trends. These are unusual in form and interpretation is tentative. These are considered to represent more recent activity and no clear archaeological interpretation can be provided.

Field 3

14.38 A rectilinear area of magnetic disturbance (J) is similar in shape and for to (H) in Field 2. This may represent the former location of a building and is considered to be modern in origin. Faint linear trends orientated north to south are indicative of ploughing activity. An area of increased response (K) has no clear pattern and may represent modern activity. Faint linear trends (L) in proximity to (K) suggest possible former field divisions. In the south of Field 2 there is another area of increased response (M). There are associated isolated responses and it is possible that a spread of archaeological burnt material is represented here. This response may equally be associated with the rectilinear response (D), located 40m to the south. Although interpretation is unclear, an archaeological interpretation must be considered.

Field 4

14.39 Field 4 comprises of numerous modern ferrous responses. No clear responses of archaeological potential were recorded.

Field 5

14.40 No clear responses of interest were recorded. A linear trend (N) is most likely agricultural in origin. Associated responses are ferrous in nature and suggest a modern origin.

Field 6

14.41 Geophysical survey was not possible in this field.

Results of Archaeological Testing and Excavation

14.42 Archaeological testing was undertaken at the site under Licence No. 19E0038 (also Detection License No. 19R0086) by AMS Ltd, issued by the Department of Culture, Heritage and the Gaeltacht. The aim of the testing was to assess the potential features identified in geophysical survey and sample the remaining areas. A number of archaeological features were identified (to the south and southwest of the current proposed development site). Archaeological excavation of the identified features was also undertaken under the same license following consultation with the Department (see Figures 8-10, Appendix H.5).

14.43 This work revealed the buried remains of a significant archaeological complex that was thought at the time to comprise a long-running ditch, suggested to form part of an ancient field system (Area 1); a small spread of burnt stones of potential prehistoric date (Area 2); and a large, circular enclosure, seemingly defined by two, widely-spaced concentric ditches (Area 3) (see Figure 9, Appendix 14.5).

14.44 Archaeological excavations were undertaken by AMS Ltd over a 16-week period, from May to September 2019. It includes the completed specialist reports relating to the artefactual, environmental and faunal evidence recovered from the site, as well as the results of 16 radiocarbon dates.

14.45 Full excavation of these areas revealed an impressive array of features associated with multi-phase settlement and agricultural activity possibly extending from early prehistoric to modern times (see Figure 10, Appendix 14.5). The principal remains were identified in Area 3 and comprise two successive phases of enclosure. The earliest phase comprised a large, circular enclosure defined by two, widely spaced concentric ditches and associated with several possible radial ditches. This was followed by the construction at the same location of a large, sub-circular ditched enclosure. Both enclosures produced evidence for internal occupation, while their enclosing ditches were likely originally accompanied by internal earthen banks.

14.46 The enclosures, which represent impressive examples of the widespread ringfort (or ráth) monument type, appear to have enjoyed a measure of long-term continuity of use from the sixth- to eleventh-centuries AD. They likely functioned as enclosed settlements or farmsteads of the upper echelons of early Irish society. The investigations also produced limited evidence for pre-enclosure, prehistoric, activity in Areas 2 and 3, mostly in the form of pits filled with burnt material. A number of prehistoric artefacts, most notably a polished stone axehead and a leaf-shaped flint arrowhead, may also be indicative of early prehistoric activity in the locality, though the possibility that these are curated objects cannot be dismissed. Evidence for medieval and post-medieval agricultural activities is also

represented by a network of linear and curvilinear ditches and drains; the long-running linear ditch identified in Area 3 probably relates to post-medieval agriculture.

Characteristics of the Proposed Development

14.47 The development will consist of the construction of two no. single storey data centres with associated office and service areas (see Figure 11, Appendix 14.5).

14.48 Ancillary site works will include connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042.

Potential impacts of the Proposed Development

Construction phase

14.49 The development site has been subjected to substantial archaeological investigation, including desk-based research, a site walkover, geophysical survey and archaeological testing, which identified a number of archaeological features. These have been excavated under license. There is a potential for discrete archaeological features to be encountered during the construction phase in areas not subjected to intensive testing.

Operational phase

14.50 The operational phase of the project will have no impact on archaeological, architectural and cultural heritage.

'Do-nothing' scenario

14.51 The 'do-nothing' scenario will have no impact on archaeological, architectural and cultural heritage.

Remedial and mitigation measures

Construction phase

14.52 A programme of licensed archaeological monitoring will be agreed with the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht, for areas not previously subjected to archaeological testing.

14.53 A report outlining the results of the programme of archaeological monitoring will be prepared and will include a detailed method statement for any archaeological excavation of features identified, agreed in advance with the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht. The report will include a schedule of works detailing timeframes, personnel and logistical requirements.

14.54 Any areas that require archaeological excavation will be cordoned off to facilitate the archaeological team to carry out the excavations. A buffer zone will be agreed with National Monuments Service and no construction works will be undertaken in these areas until archaeological excavations have been completed.

14.55 Provision has been made for all costs associated with archaeological testing, any required excavations and reporting of the results to the standards required by the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht. The remedial or reductive mitigation measures outlined here are subject to the approval of the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht.

Operational phase

14.56 No remedial or reductive measures are considered necessary during the operational phase of the

proposed development, as the operational phase will not give rise to any adverse impacts.

Predicted impact of the Proposed Development

Construction phase

14.57 The construction phase of the proposed development will not impact directly on any sites included in the Record of Monuments and Places. Geophysical survey and testing identified a number of archaeological features which were subsequently excavated. Should any further sub-surface archaeological features survive in areas not already subjected to testing, the ground disturbance phase of the proposed development would impact negatively on them.

Operational phase

14.58 The operational phase of the proposed development is not predicted to have any impact on archaeological, architectural and cultural heritage.

'Worst case' scenario

14.59 Not applicable in the case of archaeological, architectural and cultural heritage.

'Do nothing' scenario

14.60 In a do-nothing scenario development will not occur on the site and no potential subsurface archaeological features will be impacted.

Monitoring

14.61 No further archaeological monitoring will be required once construction is completed.

Reinstatement

14.62 Not applicable in respect of archaeological, architectural and cultural heritage.

Cumulative impacts of the Proposed Development

14.63 The development context is provided in Chapter 2 of this EIA report.

Construction phase

14.64 Previous developments in the area, including those undertaken within the proposed development site boundary, have identified previously unrecorded archaeological features. These sub-surface features would not have been known had development not occurred and the excavation of these features, although resulting in their removal, has added to the academic understanding of the history of the area through archaeological research and reporting.

14.65 As archaeological assessment will be completed in advance of development and there are no operational impacts, the cumulative impact of the proposed development and surrounding developments is deemed to be neutral and not significant.

Operational phase

14.66 No cumulative impacts on archaeological, architectural and cultural heritage are expected as a result of the operational phase of the proposed development.

15. WASTE MANAGEMENT

15.1 This Chapter evaluates the potential environmental impacts associated with waste generation and management during the construction and operational phases of the proposed data centre development located within the townland of Ballymakaily to the west of the Newcastle Road (R120), Lucan, Co. Dublin.

15.2 A site-specific Resource and Waste Management Plan (RWMP) has been prepared to deal with waste generation during the construction phase of the Proposed Development and is included as Chapter 15 - Appendix 15.1 of the Appendix document.

15.3 The RWMP along with the mitigation measures in Section 15.52 -15.60 will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

Methodology

15.4 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 (as set out in Sections 15.10 – 15.19 of this Chapter), 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. A summary of the documents reviewed, and the relevant legislation is provided in Appendix 15.1 of the Appendix document.

15.5 This Chapter is based on the Proposed Development, as described in Chapter 2 (Description of the Proposed Development) and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation, excavation and levelling); and
- Operational phase.

15.6 A desk study was carried out which includes the following tasks:

- 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.

15.7 Estimates of construction waste generation during the construction phase 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, other available research sources and waste collection data from the existing neighbouring development.

15.8 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 Sections 15.52 – 15.60 of this Chapter.

15.9 A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 7 - Land, Soils, Geology and Hydrogeology. Chapter 7 of the EIA Report also discusses the environmental quality of soils which will have to be excavated to facilitate construction of the Proposed Development.

Legislation and Guidance

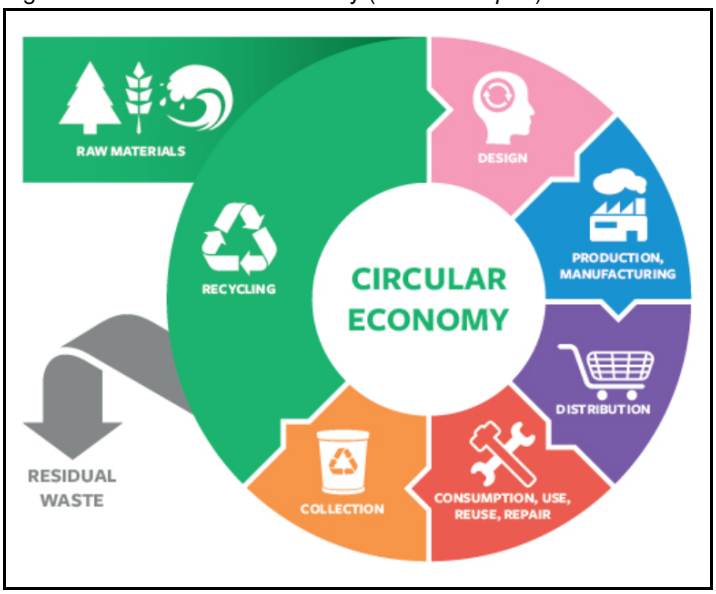
15.10 Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU

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 15.1).

Figure 15.1 Waste Hierarchy (*Source: European Commission*)

15.11 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 15.2).

Figure 15.2 Circular Economy (*Source: Repak*)



15.12 In addition, 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 2012.

15.13 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.

15.14 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.

15.15 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), South Dublin County Council Household & Commercial Waste Bye-Laws (2018), the EPA National Waste Database Reports 1998 – 2019 and the EPA National Waste Statistics Web Resource.

Terminology

15.16 Note that the terminology used herein is 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.

Receiving environment

15.17 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 2022) and the Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland.

15.18 The waste management plan sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; 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.

15.19 The Regional 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. Ireland achieved 84 per cent material recovery of such waste in 2019, and therefore surpassed the 2020 target and is currently surpassing the 2025 target. The National Waste Statistics update published by the EPA in November 2021 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 51% however they are currently not in line with the 2025 target (55%).

15.20 The *South Dublin County Council Development Plan 2022 – 2028* sets out a number of objectives and actions for the South Dublin area in line with the objectives of the waste management plan.

15.21 Waste objectives and actions with a particular relevance to the Proposed Development are as follows:

Policies:

- **Policy IE7**

Implement European Union, National and Regional waste and related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes.

Objectives:

- **IE6 Objective 1**

To encourage a just transition from a waste management economy to a green circular economy to enhance employment and increase the value, recovery and recirculation of resources through compliance with the provisions of the Waste Action Plan for a Circular Economy 2020 – 2025 and to promote the use of, but not limited to, reverse vending machines and deposit return schemes or similar to ensure a wider and varying ways of recycling.

- **IE7 Objective 2**

To support the implementation of the Eastern Midlands Region Waste Management Plan 2015-2021 or as amended by adhering to overarching performance targets, policies and policy actions.

- **IE7 Objective 4**

To provide for and maintain the network of bring infrastructure (e.g. civic amenity facilities, bring banks) in the County to facilitate the recycling and recovery of hazardous and non-hazardous municipal wastes.

- **IE7 Objective 7**

To require the appropriate provision for the sustainable management of waste within all developments, ensuring it is suitably designed into the development, including the provision of facilities for the storage, separation and collection of such waste.

- **IE7 Objective 8**

To adhere to the recommendations of the National Hazardous Waste Management Plan 2014-2020 and any subsequent plan, and to co-operate with other agencies including the EPA in the planning, organisation and supervision of the disposal of hazardous waste streams, including hazardous waste identified during construction and demolition projects.

15.22 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. 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.

Characteristics of the Proposed Development

15.23 The Proposed Development is described in detail in Chapter 2 (Description of the Proposed Development) of this EIA Report. It proposes the construction of two no. single storey data centres with associated office and service areas.

15.24 The aspects relevant to this chapter are described in the following sections.

Demolition phase

15.25 There will no demolition required to facilitate construction of the proposed development. The proposed development is to be located on an undeveloped portion of an existing data centre campus.

Construction phase

15.26 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. The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

15.27 There will be soil excavation works required during the construction phase to facilitate site levelling, foundation construction, service trenches and access routes. It is anticipated that excavated soils/stones will be inert/non-hazardous material suitable for re-use on site. The project engineers (Pinnacle) have estimated that c. 11,300m^3 of topsoil and 18,800m^3 of subsoil will be excavated. It is currently proposed that all of this excavated material will be reused on site for berms and other landscaping purposes, wherever possible, and if not it will be exported to a suitable waste facility. These estimates will be refined prior to commencement of construction.

15.28 As detailed in Chapter 7 (Land, Soils, Geology & Hydrogeology) a site investigation was completed in March 2018 by Causeway Geotec (Report No. 18-0827) to determine the presence of any historic contamination on the application and overall site. No significant contamination has been identified during these investigations; this would be expected due to the historic agricultural use of the site. As such, it is unlikely any contaminated material will be encountered during construction of the proposed development.

15.29 In the event that there are excess soils that are not required and/or suitable for reuse on-site, and if it is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 15 (previously Article 27) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020. For more information in relation to the envisaged management of by-products, refer to the RWMP (Appendix 15.1).

15.30 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. 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. It is anticipated that the surplus 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.

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

15.32 Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP included as Appendix 15.1 of the Appendix document included with the EIA Report. The RWMP provides an estimate of the main waste types likely to be generated during the construction phase of the proposed development and these are summarised in Table 15.1.

Table 15.1 Estimated off-site reuse, recycling and disposal estimates for construction waste

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	299.9	10	30.0	80	239.9	10	30.0
Timber	254.5	40	101.8	55	140.0	5	12.7
Plasterboard	90.9	30	27.3	60	54.5	10	9.1
Metals	72.7	5	3.6	90	65.4	5	3.6
Concrete	54.5	30	16.4	65	35.4	5	2.7
Other (includes cabling, ducting, conduits, packaging and plastics)	136.3	20	27.3	60	81.8	20	27.3
Total	908.8		206.3		617.1		85.4

15.33 It should be noted that until final materials and detailed construction methodologies have been confirmed it is difficult to predict with a high level of accuracy the construction waste that will be generated from the construction of the proposed development as the exact materials and quantities may be subject to some degree of change and variation during the construction process. However, the above estimates are considered to be the worst-case scenario.

15.34 An outline Construction Environmental Management Plan (CEMP) has been prepared to accompany the planning application by Winthrop Engineering and Contracting Limited. The appointed main contractor will be required to prepare a detailed CEMP prior to commencement of construction which may refine the above waste estimates.

Operational phase

15.35 The proposed development will give rise to a variety of waste streams during the operational phase, i.e. when the project is completed, and fully operational. The majority of waste will be generated from packaging for equipment deliveries to the facility which is likely to be at its peak in the early months of operation but will reduce as the data halls are filled with servers and other equipment. Waste will also be generated from the occupants of the building during operations. These waste types will mainly be non-hazardous. The main non-hazardous and hazardous waste expected to be generated from the operational phase is summarised below.

Segregation of waste materials onsite

15.36 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 in accordance with the South County Development Plan 2022 – 2028. Table 15.2 below summarises the anticipated management strategy to be used for typical wastes to be generated at the data storage facilities.

Table 15.2 Anticipated onsite waste management

Waste Type	Hazard Y/N
Packaging Waste	N
Office Waste	N
General Non-Hazardous Waste	N
Empty Containers	N
Canteen Waste	N
Kitchen Waste	N
Non-hazardous WEEE	N
Landscaping waste	N
UV & Fluorescent Tubes	Y
Waste Oil	Y
Waste sludge from oil separator	Y
(Wet) Batteries	Y
(Dry) Batteries	Y
Electronic Equipment (Servers Hard Drives)	N
Electrical Equipment (Cabling)	N
Refrigerant Gas from chillers	Y

Management of wastes moving offsite

15.37 All waste leaving site will be recycled or recovered, with the exception of those waste streams where appropriate recycling facilities are currently not available. All waste leaving the site will be transported by suitably permitted contractors and taken to suitably licensed or permitted facilities. All waste leaving the site will be recorded and copies of relevant documentation maintained on site.

Hazardous waste

15.38 Hazardous waste may be generated from batteries, contaminated chemical drums and other packaging. If the packaging contains residues of or if it is contaminated by dangerous substances, it may be classed as a hazardous waste (depending on the volume and concentration of contaminants). If the drums are found to be unsuitable for re-use, they will be classed as a waste. Any waste classed as hazardous will be stored in a designated area (suitably bunded, where required) and will be removed off site by a licensed hazardous waste contractor(s).

15.39 Hydrocarbon interceptors will require cleaning at stages throughout the lifetime of the facility. This should be undertaken by a licenced contractor and all wastes are to be transported offsite and disposed of appropriately. All relevant documentation will be made available to the proposed facility operator.

Potential impacts of the Proposed Development

15.40 This section details the potential waste impacts associated with the Proposed Development.

Construction phase

15.41 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 and on adjacent developments. The indirect effect of litter issues is the presence of vermin within the development and the surrounding areas. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, not significant*** and ***negative***.

15.42 The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and result in indirect negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, slight*** and ***negative.***

15.43 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 Eastern Midlands region which can accept hazardous and non-hazardous waste materials and acceptance of waste from the proposed development 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, not significant*** and ***negative.***

15.44 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 7 (Land, Soils, Geology & Hydrogeology). It is anticipated that c. 11,300m^3 of topsoil and 18,800m^3 of subsoil will be generated from the construction works. It is currently proposed that all of the excavated topsoil and subsoil will be reused on site, wherever possible, and within the overall data centre campus for berms and other landscaping purposes. 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. As the material has already been sampled and classified and the likelihood that contaminated material will be encountered is low, the effect on the local and regional environment is likely to be ***short-term, not significant*** and ***negative.***

15.45 The overall potential impact of waste generation and management on the local and regional environment during the construction phase, in the absence of mitigation, is likely to be ***negative, not significant-slight,*** and ***short term***.

Operational phase

15.46 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, not significant*** and ***negative.***

15.47 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).

15.48 If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the development and the surrounding areas. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, not significant*** and ***negative.***

15.49 Waste contractors will be required to service the Proposed Development on a scheduled 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, not significant*** and ***negative.***

15.50 The overall potential impact of waste generation and management on the local and regional environment during the operational phase, in the absence of mitigation, is likely to be ***negative, not significant*** and ***long-term***.

Remedial and mitigation measures

15.51 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.

15.52 The concept of the 'waste hierarchy' 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.

Construction phase

15.53 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 15.1. 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 15.1) 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.

15.54 The project engineers (Pinnacle) estimated that c. 11,300m^3 of topsoil and 18,800m^3 of subsoil will be excavated. It is currently proposed that all of this excavated material will be reused on site, wherever possible, for berms and other landscaping purposes. Surplus material that is not required for reuse onsite, will be reused or recovered off-site insofar as is reasonably practicable. Where there is no suitable reuse or recovery option available, it will be disposed of at an authorised facility.

15.55 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; (alternatively, the waste will be sorted for recycling, recovery or disposal);
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

15.56 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 15 (previously Article 27) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020. EPA approval will be obtained prior to moving material as a by-product.

15.57 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.

Operational phase

15.58 All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas on the site. In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Dry Mixed Recyclables;
  - Organic food/green waste;
  - Mixed Non-Recyclable Waste;
  - Batteries (non-hazardous and hazardous);
  - Waste electrical and electronic equipment (WEEE) including computers, printers and other ICT equipment; and
  - Cleaning chemicals (solvents, pesticides, paints, adhesives, resins, detergents, etc.).
- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly labelled with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

15.59 These mitigation measures will ensure the waste arising from the development 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.

Predicted impacts of the Proposed Development

15.60 The implementation of the mitigation measures outlined 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.

Construction phase

15.61 A carefully planned approach to waste management as set out in Sections 15.53 – 15.57 and adherence to the RWMP during the construction phase will ensure that the predicted effect on the environment will be ***neutral***, ***imperceptible,*** *and* ***short-term.***

Operational phase

15.62 During the operational phase, a structured approach to waste management as set out in Sections 15.58 – 15.59 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 ***neutral***, ***imperceptible,*** and ***long-term.***

Residual impacts of the Proposed Development

15.63 The implementation of the mitigation measures outlined in Section 15.53 -15.59 will ensure that the high rate of reuse, recovery and recycling is achieved at the development during the excavation and construction phases as well as during the operational phase. 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.

Monitoring and/or reinstatement

Construction phase

15.64 The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the construction phase where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The RWMP specifies the need for a waste manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste, as required. Where targets are not being met, the waste manager should identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

Operational phase

15.65 During the operational phase, facility management personnel should monitor waste generation volumes against the predicted waste volumes outlined earlier. There may be opportunities to reduce the equipment and number of bins required for the development where estimates have been too conservative. Reductions in equipment/bin requirements will reduce waste contractor costs. Waste legislation and SDCC Waste Bye-Laws should also be consulted on a regular basis in case of any changes which may impact on waste management procedures.

Reinstatement

15.66 In the event that the proposed data centre development is discontinued, there is not likely to be any significant impacts on waste management at the site. Where contaminated soil is encountered and excavated at the site with the intention of removal from site for off-site treatment or disposal, a management plan should be put in place in the event that the work is stopped and the contamination is left exposed to the public and the environment.

Cumulative Effects

15.67 The anticipated cumulative effect of the Proposed Development with any/all relevant other planned developments as outlined in Chapter 2 or permitted developments as outlined in Chapter 3 are discussed in below for construction and operational phases respectively. In particular this consideration has included the permitted data centres and gas generation plant (South Dublin County Council Reg. Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042) on the overall data centre campus site.

Construction phase

15.68 The construction of the proposed development and other permitted developments will require site clearance, excavations and levelling, which will generate a requirement for soil removal and/or import. Works on these sites occurring concurrently will also generate additional C&D Waste in the local area. An increased density of construction activities in the short term will impact in respect to waste on increased traffic from waste contractors, but overall is likely to provide an improvement in the efficiencies of waste collections in the area and will be short term.

15.69 Provided mitigation measures set out in the planning permissions / EIA Reports for these developments are implemented during construction of the proposed development, the cumulative effect will be ***neutral, imperceptible,*** and ***short-term****.*

Operational phase

15.70 The waste quantities to be generated from the operation of the proposed developments within the overall landholding are anticipated to be relatively small for the scale of development.

15.71 There are existing residential properties close by, along with similar data centre developments on neighbouring sites and these developments will generate similar waste types. 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 to provide an improvement in the efficiencies of waste collections in the area.

15.72 The proposed development and 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 effects associated with waste generation and waste management. As such it is considered that the cumulative effect relating to waste management will be ***neutral***, ***imperceptible,*** and ***long-term****.*

16. MATERIAL ASSETS

16.1 This chapter provides a description of factors likely to be affected by the Proposed Development. The chapter will identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the Proposed Development on material assets as required under Article 3(1) of the 2014 EIA Directive and Annex IV of the 2014 EIA Directive.

16.2 The chapter includes a description of the forecasting methods or evidence used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

16.3 In 2011, EIA Directive (2011/92/EU), material assets included architectural and archaeological heritage. In accordance with the 2014 EIA Directive, those heritage aspects are dealt with as components of cultural heritage (which are addressed in Chapter 13 of this EIA Report). The EPA EIA Report Guidelines 2022 (Table 3.1) state that material assets are now taken to mean built services and infrastructure, roads and traffic as well as waste management. In this EIA Report, the impacts on some of the material assets described above have been considered in the following chapters:

- Chapter 5, Population and Human Health;
- Chapter 10, Air Quality
- Chapter 11, Climate;
- Chapter 13, Traffic & Transportation; and
- Chapter 15, Waste Management.

16.4 The European Commission Guidance on Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2022) refers to a number of examples of material assets including buildings, other structures, mineral resources and water resources. The impacts on mineral resources and water resources have been considered in the following chapters of this EIA Report:

- Chapter 7, Land, Soils, Geology & Hydrogeology; and
- Chapter 8, Hydrology.

16.5 This chapter assesses ownership and access (including buildings and other structures), built services and infrastructure, which have not already been addressed elsewhere in this EIAR. The potential impacts on built services and infrastructure, if any, are assessed in terms of the following:

- Power and Electricity supply;
- Telecommunications;
- Surface water infrastructure;
- Foul drainage infrastructure; and
- Water supply.

16.6 The Proposed Development will not impact on any other structures. Assessment of impact on utilities has been undertaken by confirmation of supply with the various key utility suppliers of South Dublin County Council (SDCC), Eirgrid, ESB Networks, and Irish Water (IW). Mitigation measures are proposed where required.

16.7 As there is no published or formalised technical guidance relating to the assessment of material assets effects, professional judgement, experience, and best practice methods have been drawn upon to assess the significance of the potential effects of the proposed development. The assessment has also taken account of applicable legislation, guidance, and policy, and the AI request from the Planning Authority.

16.8 The proposed drainage infrastructure has been described in Chapter 2 (Description of the Proposed Development) and Chapter 8 (Hydrology). Detailed water supply and drainage design information is provided in the stand alone Engineering Planning Report, prepared by Pinnacle, Consulting Engineers, which accompanies the planning application. The associated built services and infrastructure in the vicinity of the site are summarised in the following sections. These have informed the baseline material assets conditions in the study area, and relevant data was reviewed and assessed.

Assessment criteria

16.9 The criteria used to assess whether an effect is significant or not, are given in the EPA Guidelines 2022, and are set out in Chapter 1 of this EIAR. The significance of effects is determined by consideration of the sensitivity of the receptor, the magnitude of impact and scale of the effect. In assessing the significance of an effect, consideration has been given to the quality, duration, probability and type of the effect, and its geographical extent, and the application of professional judgement. There is some flexibility based on professional judgement to take account of any particular value a heritage asset or receptor may have because of its use or presentation for public amenity and tourism or education.

16.10 Based on professional judgement, effects of moderate significance and above are considered significant in EIA terms. The assessment has relied on data pertaining to existing licences or as-built infrastructure supplied by others. It has been assumed that these datasets have been reported correctly.

Receiving environment

Ownership and access

16.11 The Proposed Development site is a material asset as described in Chapter 1 and 2 of this EIA Report is owned by a sister company of the applicant. The Proposed Development site is primarily greenfield and is bound by greenfield land to the west and south.

16.12 The wider site includes an abandoned and former residential property and other buildings that are permitted to be demolished under previous permissions granted on the wider site.

16.13 Access to the site will be via the permitted access road off the R120 that is permitted to provide access to a proposed purpose built access road that will provide independent access to the proposed data centre on the application site. The permitted and proposed access road will not provide access to the surrounding lands given the location in such close proximity to the R136 extension road that will open up Grange Castle West to the south and west of the site. The Proposed Development site will be fully secured with a high security fence, CCTV and surveillance systems that will be located inside the surrounding berms and landscaping. There is good visibility on approach to the permitted access point and the proposed access to the Proposed Development is set back far enough from the junction to ensure no impact on the public road, as detailed in Chapter 12 of this EIA Report relating to Traffic and Transportation.

Power and electrical supply

16.14 The availability of power is a key consideration in site selection. The main power supply to the proposed development is from the ESB national grid. This power network is known to be constrained in terms of providing electrical grid power to the area. The permanent power solution for the proposed development and the adjacent permissions granted under Planning Ref. SD19A/0042 and SD21A/0042 would be provided by the EirGrid connection. To increase resilience of the power network and ensure power supply for the proposed development, and the already permitted developments on site (Planning Ref. SD19A/0042 and SD21A/0042) they will all also connect to the permitted three power plants that were granted under Planning Ref. SD21A/0042 that are located to the south-west of the overall site.

16.15 The power requirements for the proposed development would be provided via a connection to the 110 kV Kilmahud substation. The transmission lines that will connect this substation to the wider

power network are subject to an SID application that is currently with ABP for determination (ABP Ref. VA06S.314567. The already permitted substation would then provide a medium voltage connection throughout the site to the proposed development and permitted developments.

16.16 The permitted Power Plants would have the capacity to provide equal energy to the amount consumed by the Proposed Development and the already permitted data centres on the overall site. The Power Plants have capacity to dispatch energy equivalent to or greater than the permitted and Proposed Developments demand into the national grid and would be called upon for use on the local network drops in response to EirGrid's Data Centre Connection Offer Policy and Process (DCCOPP) regulations. Once the Eirgrid connection is realised the permitted Power Plant will only ever be utilised to reinforce the national grid. In that scenario the plant is only envisaged to run at the request of Eirgrid in response to a grid event as per their flexible demand policy. The plant will therefore provide security of supply to the national grid as a whole by providing additional capacity under the terms of the flexible connection agreement.

Gas

16.17 The Business Park is served by the Gas Networks Ireland (GNI) network, which is a natural gas network. Supply is understood to not be constrained in the area.

Telecommunications

16.18 Multiple connection service lines currently exist along the Newcastle Road (R120) adjacent to the site. There is sufficient capacity in the network for the Proposed Development.

16.19 A fibre optic cable distribution network will be installed within the site to serve the permitted development and will be extended within the site to serve the Proposed Development. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator.

Surface water infrastructure

16.20 It is proposed that surface water will be directed into an onsite reticulation system before being discharged to two attenuation ponds to the north of the site. The ponds have been sized to accommodate the predicted storm water volumes generated during a 1-in-100 year storm event, increased by 20% for the predicted effects of climate change. Both attenuation ponds will drain to the north-east and outfall into an existing storm sewer that was installed as part of the R120 upgrade works to the east of the Proposed Development site. The Pinnacle Consulting Engineers, Flood Risk Assessment and the Engineering Planning Report, submitted as part of the planning application, review the existing and proposed surface water environment and accompanies the planning application for the Proposed Development.

Foul drainage infrastructure

16.21 The Proposed Development will discharge via a 225mm gravity sewer to the existing 450mm connection granted under SDCC Reg. Ref. SD19A/0042 / An Bord Pleanála Ref. ABP-305948-19 and Ref. SD21A/0042 and then into a 450mm spur connection located along the eastern boundary of the site. This sewer then connects into the Grange Castle Business Park pumping station; and from there into 3 no. rising mains into the local infrastructural network.

16.22 All foul effluent generated is directed via gravity and regional pumping stations to the regional Wastewater Treatment Plant at Ringsend in Dublin for ultimate disposal. All foul drainage infrastructure is under the administrative control of Irish Water. It is noted that separate foul and storm water drainage systems service the Proposed Development site. Further detail in relation to wastewater discharge is presented in the Pinnacle Consulting Engineers, Engineering Planning Report, and Chapter 8 Hydrology.

16.23 A pre-connection enquiry (PCE) form was submitted to Irish Water (Ref. CDS21000754) which addressed water demand for the development only. The waste water infrastructure that will connect into the Grange Castle pumping station will demonstrate that the arterial infrastructure are in

compliance with requirements of Irish Water Code of Practice and Standard Details and in adequate condition and capacity to cater for additional load from the Proposed Development.

Water supply

16.24 The Proposed Development site will be supplied from the mains water supply from the previously granted 150 mm Ø network within the site as permitted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 and Ref. SD21A/0042. This is fed from the existing 400mm Ø trunk main located along the R120 to the east of the site.

16.25 A completed Pre-Connection Enquiry form was submitted to Irish Water (Ref. CDS21000754). Potable water resources are under the administrative control of Irish Water who have been consulted and are continuing to be engaged with in terms of water supply to ensure that suitable measures are discussed and agreed with them to maintain adequate water supply.

Potential impacts of the Proposed Development

Construction phase

Power and Electrical Supply

16.26 During construction, contractors will require power for heating and lighting of the site and their facilities. Some on site equipment/plant will also require power and a construction compound and temporary power supply would be installed for the demolition and construction stage, however it is likely that that the construction compound would be facilitated within the overall site.

16.27 An existing 110kV overhead power line traverses the northern part of the site, as illustrated on the drawings prepared by Henry J Lyons Architects which accompanied the planning application. This power line will be unaffected by the Proposed Development. Any diversion of other existing electrical services will be carried out in consultation with ESB Networks to ensure there is no impact on existing users.

16.28 Power and electrical supply receptors are of high sensitivity as the development is located in what is noted as a constrained area in terms of electrical grid capacity. The potential impact associated with power and electrical supply for the construction phase will be a ***short to medium term, neutral and imperceptible*** in terms of EIA.

Gas Supply

16.29 There is currently no gas supply to the site and supply is not anticipated to be required during the demolition and construction stage. Overall, effects during the construction stage are considered to be **Temporary**, **Imperceptible** and **Neutral** i.e. **Not Significant** in terms of EIA.

Telecommunications

16.30 Telecommunications including fibre required during the construction phase will be provided via a temporary mobile connection. A fibre optic cable distribution network will be installed within the site for the entire Proposed Development. The installation of a new fibre optic cable network on the site will be carried out in accordance with best practice standards. The connection into the wider telecommunications network will be undertaken by a statutory telecommunications operator. The potential impact associated with telecommunications for the construction phase will be a ***short to medium term, neutral and imperceptible***.

Surface water infrastructure

16.31 The Proposed Development site does not contain any existing surface water drains and currently drains into the field drains and drains along the R120 Adamstown Road. Above ground surface water attenuation ponds would be constructed as part of the proposed development meaning they would be in place during the majority of the construction stage.

16.32 As with all construction projects, there is potential for surface water runoff to become contaminated with pollutants associated with the demolition and construction works. Contaminated water which arises from construction sites can pose a risk to surface water quality within the stream. The potential main contaminants include:

- Increase in suspended solids due to muddy water with increase turbidity, arising from excavation and ground disturbance;
- Spills and releases of cement and concrete causing an increase turbidity and pH arising from the use of these construction materials;
- Spills and releases of wastewater (nutrient and microbial rich) arising from poor on-site toilets and washrooms.

16.33 There also is a risk of accidental pollution incidences from the following sources:

- spillage or leakage of temporary oils and fuels stored on-site;
- spillage or leakage of oils and fuels from construction machinery or site vehicles;
- spillage of oil or fuel from refuelling machinery on site; and
- run-off from concrete and cement during pad foundation construction.

16.34 With consideration of the embedded mitigation measures outlined above and within the various chapters of the EIAR, the potential effects on surface water for the construction phase is ***short to medium term, neutral*** and ***imperceptible*** i.e., **Not Significant** in terms of EIA.

Foul drainage infrastructure

16.35 Welfare facilities (canteens, toilets etc.) will be required for the construction compound and workers on site. Portable toilets will be provided onsite for construction staff. A temporary connection to the local foul water drainage network may also be required to accommodate the site welfare facilities during construction. It is understood that the foul water drainage network has sufficient available capacity for the wastewater discharges for the temporary demolition and construction stage.

16.36 The permanent foul connection to the wider network in Profile Park would be undertaken in consultation with Irish Water to ensure there is no impact on the network when the connection is made. Accordingly, foul drainage effects on the public sewerage network during the demolition and construction stage are considered to be ***short to medium term, neutral*** and ***imperceptible*** ie. ***Not significant*** in terms of EIA.

Water supply

16.37 Welfare facilities (canteens, toilets etc.) will be required for the construction staff. This will be provided by a temporary connection into the existing watermain along the eastern boundary of the site, which is fed from the public supply. The demand during the construction phase will not be significant enough to affect existing pressures and from discussions with the SDCC it is understood that there is adequate capacity within the existing watermain network to supply the proposed development.

16.38 Effects associated with water supply for the construction phase is ***short to medium term, neutral*** and ***imperceptible*** ie. ***Not significant*** in terms of EIA.

Operational phase

16.39 Prior to operation of the proposed development, a comprehensive set of operational procedures would be established which would include site-specific mitigation measures and emergency response measures.

16.40 The primary potential impact on surface water infrastructure relates to a failure or accidental spill of diesel fuel which is stored and used on-site for back-up power generation. The proposed development has been designed with the potential to connect to a local heat network in the future, as part of an external off-site district heating scheme developed by others, should there be a local demand. To ensure that the heating system of the proposed development has the flexibility to

connect into such a system whilst also maintaining a live data centre, valved, and capped off connections would be provided on return water risers, ready for future connection to a district heating network.

16.41 Whilst the proposed development has been designed to incorporate a future district heating scheme, this has not been considered as embedded mitigation in the assessment of effects as a district heating scheme within reasonable proximity to the site is yet to be established. On this basis district heating has not been considered further in this chapter.

Power and electrical supply

16.42 The power requirements for the proposed development would be provided via a connection to EirGrid via a 110 kV EirGrid substation, which is subject to a SID application to ABP (due to be decided). The proposed development would also connect to the permitted power plants. The EirGrid connection is secured through an existing connection agreement with EirGrid. The Proposed Development will have a maximum operational electrical demand of 30MW.

16.43 As outlined above, the proposed development would be powered via a grid connection and the on-site Power Plant. The power network is known to be constrained in terms of providing electrical grid power to the area and therefore the proposed development would also connect to the Power Plant through an internal connection within the site, which forms part of the permitted development as granted under Planning Ref. SD21A/0042.

16.44 Eirgrid have stipulated under the Data Centre Connection Policy 2019 that in order for the data centre to receive a firm grid connection, it must install on-site generation to match its load that have already been permitted on the overall site under Planning Ref. SD21A/0042. In the event of an emergency scenario of grid failure the Power Plant would also power the proposed development with a further back-up using emergency generators for power supply.

16.45 By making high efficiency flexible gas generation available at scale at the immediate point of demand, this reduces the requirement for future grid reinforcements and relieves congestion in the locality, thus reducing cost to consumer through lower transmission reinforcement costs. The Climate Action Plan also recognises the need for a diversified portfolio of generation up to 2030 and beyond in order to deliver grid stability and system services arising from increasing renewable energy penetration. High efficiency gas engines, along with storage and interconnection are recognised as contributing to this solution and facilitating greater levels of intermittent renewables.

16.46 By bringing new flexible generation to the point of demand, not only does this ease grid constraints, it will also provide much needed flexible capacity on the grid to facilitate the increased level of renewables aspired to in the Climate Action Plan 2021.

16.47 Photovoltaic panels would be installed at the site to comply with Part L of the building regulations, above the admin / office space.

16.48 Due to the secured EirGrid connection agreement and the resilience to the network the permitted Power Plant provides, the effects on power and electrical supply are considered to be ***long-term, neutral, moderate*** ie***. not significant*** in terms of EIA.

Gas Supply

16.49 No gas supply is required as part of the proposed development (as gas supply to the Power Plant is already permitted as part of the consented scheme under Planning Ref. SD21A/0042). As such, it is considered there is ***no effect*** on gas supply.

Telecommunications

16.50 Multiple connection service lines currently exist along the R120 and there is understood to be sufficient capacity available in the network to supply the proposed development with telecommunications. As such, effects associated with telecommunications during the operation stage are considered to be ***long-term, Imperceptible,*** and ***Neutral*** i.e., **Not Significant** in terms of EIA.

Surface water infrastructure

16.51 Surface water from the proposed development has been designed in accordance with the Greater Dublin Strategic Drainage Strategy under Best Management Practice. The site is currently largely greenfield, with development having recently commenced under Planning Ref. SD19A/0042 and the proposed surface water measures incorporate SuDs and are aimed at improving the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge to the existing surface water network.

16.52 If the surface water runoff is not attenuated to acceptable flows, there is potential for an increase in surface water flow offsite due to the higher runoff generated following development of the site. The allowable discharge rate is 6.6l/s as determined in the Engineering Planning Report by Pinnacle Consulting Engineers. This runoff rate will not be exceeded, as addressed in Chapter 8 (Hydrology) and the Engineering Planning Report.

16.53 It is proposed to collect the surface water runoff from the Proposed Development and discharge an attenuated flow via the proposed attenuation ponds to the existing surface water drainage network.

16.54 The potential impact associated with surface water for the operational phase is ***long term, neutral*** and ***imperceptible***. i.e. **not significant** in terms of EIA.

Foul drainage infrastructure

16.55 The proposed development would lead to an increase in foul water discharge from the site. It is proposed to collect the foul sewerage from the Proposed Development and discharge via a 225mm pipe into the existing 450mm connection into the Grange Castle Pumping Station. The wastewater discharged from the Pumping Station will ultimately discharge to the Ringsend WWTP and will not materially impact on its capacity.

16.56 It is understood that the foul water drainage network has sufficient available capacity for the wastewater discharges during operation. As such the foul drainage effects on the foul drainage network for the operational phase are considered ***long term, neutral*** and ***imperceptible.*** i.e. ***not significant*** in terms of EIA.

Water Supply

16.57 The water supply will be sourced from mains water supply via a 150mm connection from the already permitted connection of the Permitted Development to serve the Proposed Development site. The design requires a peak water demand of up to 0.43 litres per second (l/s). Where water demand is required during a short term drought, additional supply can be provided from an alternative source such as tanker supply.

16.58 The potential impact associated with water supply for the operational phase is ***long term, neutral*** and ***imperceptible*** i.e. ***not significant*** in terms of EIA.

Additional mitigation

16.59 No additional mitigation measures are proposed and no enhancements aside from those to Biodiversity and Landscape as discussed in Chapter 6 and Chapter12 of the EIAR.

Predicted (residual) impacts of the Proposed Development

Construction phase

16.60 The residual construction effects remain as reported in the assessment of effects section:

- ***short to medium term***, ***neutral*** and ***imperceptible*** effects on power and electrical supply;
- ***temporary, imperceptible and neutral effects*** on gas supply; and
- ***short to medium term, neutral*** and ***imperceptible*** effects on surface water infrastructure, foul drainage infrastructure, water supply and telecommunications.

16.61 These are not significant in terms of EIA.

Operational phase

16.62 The residual operational phase effects remain as reported in the assessment of effects section, as being:

- ***long-term, neutral, moderate*** effect on power and electrical supply;
- no effect on gas supply;
- ***long term, neutral and imperceptible*** effects on surface water infrastructure, foul drainage infrastructure, water supply and telecommunications.

16.63 These are not significant in terms of EIA.

Cumulative effects

Intra-project effects

16.64 Intra-project effects are considered and explained within Chapter 2 of this EIAR

Inter-project effects

16.65 Table 16.1 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 16.1 Inter-project effects

	Construction		***Operational***	
Cumulative development	***Cumulative effects likely?***	***Reason***	***Cumulative effects likely?***	***Reason***
SD7A/0632 - Microsoft *SD11A/0211 – Microsoft* *SD14A/0194 – Microsoft* *SD15A/0034 – Interxion* *SD15A/0133 - Microsoft* *SD15A/0343 - Microsoft* *SD16A/0088 – Microsoft* *SD16A/0214 – Edgeconnex* *SD16A/0345 - Edgeconnex* *SD17A/0141 – Edgeconnex* *SD17A/0392 - Edgeconnex* *SD18A/0298 – Edgeconnex* *SD18A/0034 – Interxion* *SD20A/0121 - UBC* SD20A/0058 – Data & Power SD20A/0283 - Microsoft SD20A/0324 - Data & Power	No	*There is some potential for overlap of construction stages within the overall site, and other sites within 1km such as UBC Properties.* *However, during the construction stage the demand on the network would be predominantly for minor temporary connections for welfare facilities and plant or would be provided by mobile connections.* *The permanent connections to the wider network would be undertaken in consultation with statutory consultees to ensure there is no impact on the network when connections are made.*	No	*The design of the proposed development is such that cumulative effects are unlikely. In particular the applicant has secured a connection agreement for the proposed development's permanent electrical connection from EirGrid, with a gas connection agreed with GNI. When connected natural gas would be supplied through a commercial provider.* *The proposed development would be powered via a grid connection and Power Plant consented as part of the permission granted under SD21A/0042 and as amended under SD22A/0105.* *The permitted Power Plant increases resilience of the power network as it would have the capacity to provide equal energy to the amount consumed on site and consumed through the two permitted data centres and the current proposal.* *The Power Plant would also be called upon for use if the local network drops in response to EirGrid's Data Centre Connection Offer Policy and Process (DCCOPP) regulations. Due*

				to this reliance provided to the network it is considered unlikely that the proposed development would result in cumulative effects to material assets.
SD19A/0042 - Edgeconnex SD21A/0042 - Edgeconnex SD22A/0105 - Edgeconnex	No	*The permanent electrical connection to the substation would occur before the proposed development is operational, and the connection would be undertaken in consultation with ESB to ensure there is no impact on the network when connections are made*	No	*When operational the EirGrid substation will provide power to the site with power demand offset by the Power Plant within the overall site.* *The transmission line connection to the EirGrid substation is subject to a separate SID application to ABP (due to be decided).*

Construction cumulative effects

16.66 Cumulative effects during the demolition and construction stage of the proposed development are unlikely for material assets and effects are considered to be **Temporary, Imperceptible and Neutral**.

Operational cumulative effects

16.67 Cumulative effects during the operation stage of the proposed development are unlikely for material assets and effects are considered to be **Long-term, Imperceptible, and Neutral.**

16.68 Interactions are addressed in Chapter 17 of this EIA Report.

17. INTERACTIONS

17.1 This chapter of the EIA Report addresses potential interactions and inter-relationships between the environmental factors discussed in the preceding chapters. This covers both the construction and operational phase of the Proposed Development.

17.2 As a requirement of the EIA Directive, the *Guidance on the preparation of the Environmental Impact Assessment Report (EU, 2017); Advice Notes on Current Practice in the Preparation of Environmental Impact Statements* Draft September 2015 (Environmental Protection Agency); and *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports 2022* (Environmental Protection Agency) not only are the individual significant impacts required to be considered when assessing the impact of a development on the environment, but so must the interrelationships between these factors be identified and assessed.

17.3 In the main, the majority of EIA Report chapters have already included and described assessments of potential interactions between aspects however this section of the assessment presents a summary and assessment of the identified interactions. These interactions have been identified and considered by the various specialists contributing to this impact assessment.

17.4 The Project 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.

DISCUSSION – POSITIVE IMPACTS

17.5 Interactions that are considered to have a positive effect (i.e. a change which improves the quality of the environment) are outlined in this section.

Planning and Alternatives on:

Population and Human Health

17.6 The Proposed Development will create up to 150 no. permanent full-time jobs (excluding maintenance contractors and visitors) and up to 250 temporary jobs during the construction phase, which will have a ***long-term***, ***positive and short – medium term*** effect on employment in the west Dublin and wider area.

Landscape and Visual on:

Biodiversity

17.7 The construction of the Proposed Development will involve the removal of some of the existing hedgerows within the site. However, this will be replaced by other already permitted suitable landscaping treatments and overall will have a ***long-term, slight*** and ***positive*** impact.

DISCUSSION – NEUTRAL IMPACTS

17.8 Interactions that are considered to have a neutral effect (i.e. no effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error) is outlined in this section.

Land, Soils, Geology and Hydrogeology on:

Population and Human Health

17.9 There will be a loss of soil available for agricultural use due to the development. However, within the overall context of Ireland's available farmland, and locally available farmland, the loss is considered negligible. In addition, the employment created by the construction and operation of the Proposed Development counterbalances this economic loss and so the impact is ***long-term, imperceptible*** and ***neutral***.

Hydrology

17.10 The main potential impact of the construction works proposed is on surface water quality (due to sediment laden run-off, material spillages) and groundwater quality (due to removal of protective soil) in the environs of the construction area; however, the implementation of a CEMP as detailed in Chapter 2 (Description of the Proposed Development) and Chapter 8 (Hydrology) will ensure the effect will be ***short to medium term, imperceptible*** and ***neutral***.

Biodiversity

17.11 The local loss of agricultural land as a result of site development, which is considered to be of no significant ecological value, is negligible.

Air Quality and Climate

17.12 There is a potential for the construction activity to impact on air quality in terms of dust generated but mitigation measures outlined in both Chapter 7 (Land, Soils, Geology & Hydrogeology) and Chapter 10 and 11 (Air Quality & Climate) of this EIA Report, implemented through the CEMP, will ensure a ***short to medium term, not significant*** and ***neutral*** effect.

Cultural Heritage

17.13 Archaeological assessment and investigation of the Proposed Development site has identified features of archaeological interest on the site. The Proposed Development has the potential to impact on unidentified archaeological features during construction works. However, mitigation measures detailed in Chapter 14 (Cultural Heritage) will ensure that the effect is ***long-term, imperceptible*** and ***neutral***.

Waste Management

17.14 As detailed in Chapter 15 (Waste Management), c. 30,100m^3 of excavated soil and sub-soil may be generated from the site preparation, excavations and levelling works required to facilitate construction. It is anticipated that where possible this soil and sub-soil will be reused on site. Any spoil which cannot be reused on site will be removed off site for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 15 and the requirements of the C&D Waste Management Plan (included as Appendix 15.1), will ensure the effect is ***long-term, imperceptible*** and **neutral.**

Hydrology on:

Population and Human Health

17.15 The Proposed Development will generate wastewater emissions (foul water) from the site. This will discharge via a new connection to the Grange Castle Pumping Station and ultimately discharge to the Local Authority wastewater treatment plant (WWTP) at Ringsend in Dublin. The effect is considered to be ***long-term, imperceptible*** and ***neutral***.

Land, Soils, Geology and Hydrogeology

17.16 As there is potential for direct run-off to a watercourse to off the site via local drainage ditches, mitigations will be put in place to manage run-off during the construction phase. Surface water during the construction phase of the Proposed Development will be contained on site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds) (please refer to Chapter 8 (Hydrology)). Any surface water run-off will be attenuated to the greenfield runoff rate for the site. The effect will be ***short to medium term***, ***imperceptible*** and ***neutral***.

Biodiversity

17.17 The Proposed Development will result in increased surface water run-off. Any surface water run-off will be attenuated to the existing greenfield runoff rate and will be discharged offsite via the proposed 1 no. attenuation ponds and associated other measures with both the proposed and permitted attenuation ponds draining to the east into an existing culvert. The hydrocarbon interceptors, attenuation storage and flow control device ensure emissions are controlled. The nearest European designated site is located c. 5km north-west of the Proposed Development site. A tributary of the Griffeen River, the Baldonnel Stream, flows east-west through the Proposed Development site and connects it to European sites in Dublin Bay c. 17km to the east via the surface water network. These and other sites are considered to fall well outside the zone of influence of the Proposed Development due to the lack of source-pathway-receptor links. The predicted effect will be ***long-term*** and ***neutral***.

Waste Management

17.18 Hydrocarbon sludge waste and debris will be generated in the hydrocarbon interceptors which will treat the surface water run-off from the Proposed Development during the operational phase. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 15 such that the effect of the waste generation will be ***neutral, imperceptible,*** and ***long-term.***

Air Quality and Climate on:

Hydrology

17.19 Mitigation measures implemented during the construction phase will ensure that the deposition of dust is minimised and therefore the predicted effect from air (including dust) on the water environment during construction is ***short to medium term, imperceptible*** and ***neutral***. The operational procedures and other general site maintenance regime in accordance with the Environmental Safety and Health Management System for the facilities will ensure that the impact of the facility complies with all ambient air quality legislative limits and therefore the predicted impact from air (including dust) on the water environment is ***long term, imperceptible*** and ***neutral***.

Biodiversity

17.20 Mitigation measures during the construction phase of the Proposed Development will ensure that dust generation is minimised and the effect on biodiversity will be ***short to medium term***, ***imperceptible*** and ***neutral***. Results from the modelling of air emissions including emissions from back-up generators during the operational phase show that the emissions from the facility will comply with the relevant air quality legislative limits, and as such there will be a ***long-term, imperceptible, neutral*** effect on biodiversity.

Noise and Vibration on:

Population and Human Health

17.21 The potential impact of noise and vibration on the local population is discussed in Chapter 5 (Population and Human Health) and Chapter 9 (Noise & Vibration). Due to the distance between the site and the nearest sensitive locations, vibration impacts generated during construction are expected to be ***negative*** but ***short-term***. The noise levels that are encountered at the nearest noise sensitive locations are predicted to be within relevant noise criteria that have been adopted for the operation of the proposed data centre facilities and associated infrastructure. These criteria have been selected with due consideration to human health, and as such there will be a ***long term, not significant***, ***neutral*** effect on human health as a result of the operation phase of the Proposed Development.

Waste Management on:

Population & Human Health

17.22 The potential impacts on human beings in relation to the generation of waste during the construction and operational phases are that incorrect management of waste could result in littering which could

cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific RWMP and the mitigation measures outlined in chapter 15, will ensure appropriate management of waste and avoid any negative impacts on the local population is ***neutral, imperceptible*** and ***long-term.***

Land, Soils, Geology and Hydrogeology

17.23 Excavated soil and stone will be generated from the site preparation, excavations and levelling works required to facilitate construction. Any spoil which cannot be reused on site will be removed off site for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 15 and the requirements of the Resource and Waste Management Plan (included as Appendix 15.1) to ensure that soils take from site are reused appropriately, will ensure the effect is ***neutral, imperceptible,*** and ***short-term.***

Hydrology

17.24 Hydrocarbon sludge waste and debris will be generated in the hydrocarbon interceptors which will treat the surface water run-off from the Proposed Development during the operational phase. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 16 such that the effect of the waste generation will be long-term, imperceptible and neutral.

Traffic

17.25 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 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 and has been addressed in Chapter 13 Traffic and Transportation. Provided the mitigation measures detailed in Chapter 123 are adhered to, the effects should be short to ***neutral, imperceptible,*** and ***long-term.***

Traffic on:

17.26 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

17.27 The Air Quality and Climate Chapters 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.

17.28 The interaction between Land and Soils Chapter considers the import and export of construction materials. It is noted that the designs have been developed to achieve an improved balance of the cut and fill materials on site, which minimise construction related traffic. This may be possible to further improve if the quality of the subsoil material allows. The associated construction traffic has been considered in the construction stage impacts and Construction Management Plan included with the application.

17.29 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.

Human Health

17.30 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. 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.

17.31 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. There will be a slight increase in traffic on the local road network.

Material Assets on:

Population and Human Health

17.32 The Proposed Development will have an impact on material assets such as surface water drainage, water supply, wastewater drainage, power supply and road infrastructure. The individual chapters of this EIA Report (Chapter 13 Traffic and Transportation and Chapter 16 Material Assets) have assessed the capacities of the available infrastructure to accommodate the Proposed Development and the implementation of the mitigation measure proposed in each of these chapters will ensure there are no residual negative impacts on the local population. The predicted effect is therefore ***imperceptible*** to ***not significant*** and ***neutral***.

Hydrology

17.33 The Proposed Development will result in changes to surface water drainage, water supply and wastewater networks. However, a combination of mitigation measures to be implemented as detailed in Section Chapter 8 (Hydrology), as well as the capacity already built into these networks, will ensure that these changes will result in a ***long-term, imperceptible*** and ***neutral*** impact.

DISCUSSION – NEGATIVE IMPACTS

17.34 The interactions that are considered to have a negative effect (i.e. a change which reduces the quality of the environment) is outlined in this section.

Noise on:

Biodiversity

17.35 Noise generated during the construction phase of the Proposed Development will have a ***short to medium term negative*** impact on fauna which are likely to be displaced during construction works.

Air Quality and Climate on:

Landscape

17.36 The Proposed data centre will include a series of generator flues that will be grouped in eight groups of three attached along its western elevation. The uppermost part of the flues of the Data Centre, at 25m in height, will extend above each facility, and will be visible– either against the sky or against a backdrop of landscape depending on the relative elevation of the vantage point.

17.37 The site is part of a suitably zoned commercial/industrial area, the flues have been designed as an integral part of the overall architectural design. The development, including the flues, will be consistent with the emerging landscape character of the area and will be minimal. The residual impact will not be significant and will generally range from ***imperceptible/not significant*** and ***negative*** / ***neutral*** from the surrounding area.

Population and Human Health

17.38 The mitigation measures set out in Chapters 10 and 11 (Air Quality and Climate) that will be put in place at the proposed facility will ensure that the impact of the facility complies with all ambient air

quality legislative limits and therefore the predicted impact is ***long term, imperceptible*** *to* ***slight*** and ***negative.***

Land, Soils, Geology and Hydrogeology on:

Noise

17.39 Impacts associated with excavation works will be transient in nature and have a short to medium term impact on the noise environment, which will be mitigated by the implementation of the construction noise and vibration management plan outlined in Appendix 9.3. The effect will be ***slight, negative*** and ***short to medium term*** in duration***.***

Landscape and Visual on:

Population and Human Health

17.40 The predicted impact of the Proposed Development on the landscape is described in Chapter 11. The Proposed Development includes architectural and landscape proposals that will ensure the development is integrated into its setting, including the use of landscaped berms and planting which will provide visual screening. Residual landscape and visual effects from the wider locality arising from the Proposed Development will not be significant, and will generally range from ***not significant*** to ***moderate***, and ***negative*** but in accordance with emerging trends in the area.

SUMMARY

17.41 In summary, the interactions between the environmental factors and impacts discussed in this EIA Report have been assessed and the majority of interactions are ***long-term*** and ***neutra***l.

Table 17.1 Overview of potential interactions

Interaction	Planning and alternatives	Population and human health	Biodiversity	Land, Soils, Geology and Hydrogeology	Hydrology	Noise & vibration	Air Quality & Climate	Landscape and visual impact	Traffic	Cultural Heritage	Waste Mgmt	Material assets
Planning and alternatives		✓	x	x	x	x	x	x	x	x	x	x
Population and human health			✓	✓	✓		✓	✓	✓	x	✓	✓
Biodiversity				✓	✓	✓	✓	✓	x	x	x	x
Land, Soils, Geology and Hydrogeology					✓	✓	✓	x	x	✓	✓	x
Hydrology						x	✓	x	x	x	✓	✓
Noise & vibration							x	x	x	x	x	x
Air Quality & Climate								✓	✓	x	x	x
Landscape and visual impact									x	x	x	x
Traffic										x	✓	x
Cultural Heritage											x	x
Waste management												x
Material Assets												

✓ - positive interactions between factors ✓ - negative interactions between factors

✓ - neutral interactions between factors X – no interaction of note

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