Intended for
Vantage Data Centers DUB11 Limited

Date
March 2022

Project Number
1620012232

VANTAGE DUBLIN DATA CENTER
VOLUME 1: MAIN ENVIRONMENTAL IMPACT ASSESSMENT REPORT

RAMBOLL

Volume 1: Main Environmental Impact Assessment Report
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PREFACE

Background

1.1 A planning application (the 'application') was submitted by Vantage Data Centers DUB11 Limited (the 'Applicant') in August 2021 under application reference SD21A/0241 for the demolition of the abandoned single storey dwelling and associated outbuilding at the site and the construction of 2 no. two storey data centers with plant at roof level of each facility and associated ancillary development on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22.

1.2 The application was accompanied by an Environmental Impact Assessment Report (the 'August 2021 EIAR') prepared by Ramboll UK Ltd ('Ramboll') and a team of technical specialists, which comprised the following documents:

- Non-Technical Summary (NTS);
- Volume 1: Main Environmental Impact Assessment Report;
- Volume 2: Landscape and Visual Impact Assessment (LVIA) and Cultural Heritage Assessment; and
- Volume 3: Technical Appendices.

1.3 On 26 October 2021 SDCC responded to the planning application requesting additional information (AI) to be submitted.

1.4 As a result, the design of the proposed development has evolved to respond to the items raised by SDCC.

1.5 As such, the Applicant will now submit a new EIAR to accompany the planning application previously submitted. Accordingly, the design drawings and other supporting documents have been updated and have been used to inform the EIAR.

1.6 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 INTRODUCTION

Introduction

1.7 This Environmental Impact Assessment Report (EIAR) has been prepared for Vantage Data Centers DUB11 Limited (the 'Applicant') – in accordance with the statutory procedures set out in the Planning and Development Act 2000 (as amended)[1] (the 'Act') and the Planning and Development Regulations 2001 (as amended)[2] (the 'Regulations') – to accompany an Additional Information response that is being made following a request for Additional Information from SDCC in relation to the application (the 'application') made on the 31 August 2021 under Planning reference SD21A/0241. The application, and this AI response, seeks permission (also known as 'full permission') for the demolition of the abandoned single storey dwelling and associated outbuilding at the site and the construction of 2 no. two storey data centers with plant at roof level of each facility and associated ancillary development on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22.

1.8 The proposed development is not listed under Annex I of the EIA Directives[3,4] and the site is below the 15 hectare (ha) threshold under Part 2, Schedule 5 of the Regulations at 8.7 ha in size. However, the Applicant has recognised that the scale and nature of the proposed development has the potential for significant effects on the environment and therefore commissioned an environmental impact assessment (EIA) for the proposed development, the findings of which are presented within this EIAR.

1.9 The EIAR comprises the following:

- Non-Technical Summary (NTS);
- Volume 1: Main Environmental Impact Assessment Report (this document);
- Volume 2: Landscape and Visual Impact Assessment (LVIA) and Cultural Heritage Assessment; and
- Volume 3: Technical Appendices.

1.10 EIA is a formal process in which the likely significant effects of certain types of development projects on the environment are identified, assessed and reported upon. For certain types of development, the process must be followed in order for such effects to be taken into account before a decision is made on whether planning permission should be granted.

1.11 This EIAR presents the results of the EIA that has been undertaken of the proposed development as amended under the Additional Information response. In accordance with the Regulations, the EIAR reports on the potential environmental impacts and likely significant environmental effects of the proposed development during the demolition and construction stage and completion and operational stage.

1.12 The EIA has taken into account mitigation measures that are being proposed by the Applicant, including those measures that have been integrated into the planning and design of the proposed development (i.e. 'embedded mitigation') and 'additional mitigation' to prevent and, where prevention is not possible, reduce and/or mitigate likely significant adverse effects. It then evaluates the significance of the residual effects.

1.13 Further information on how the scope of the EIA was formulated and on the structure of this EIAR, is provided in Chapter 2: EIA Process and Methodology of this Volume.

1.14 SDCC is the 'relevant planning authority' for the purposes of the Regulations and will determine the application taking into account the likely significant environmental effects of the proposed development as determined through the EIA process.

1.15 This chapter provides a general description of the site, the relevant planning context, planning application and additional information response details, as well as the content and structure of the EIAR. More detailed information on the application site is provided in the technical assessment chapters (6-15) of this Volume, as well as the landscape, visual and heritage assessments in Volume 2.

1.16 A description of the proposed development is provided in Chapter 4: Proposed Development Description and details of the demolition and construction works are provided in Chapter 5: Demolition and Construction Environmental Management of this Volume.

Development Context

Site Location and Context

1.17 The site is located at Irish grid reference O 03687 30780, within Profile Park, as shown in Figure 1.1.

1.18 Geographically, the site is located in Profile Park, approximately 10 kilometres (km) to the south-west of Dublin city centre, within South Dublin County.

1.19 The site's surrounding context is predominantly industrial to the north and west, agricultural to the south and west, with commercial and residential properties to the east and the Grange Castle Golf Club to the south-east (refer to Figure 1.2).

1.20 In terms of public transport, the closest railway station to the site is at Clondalkin/Fonthill approximately 3 km to the north-east from which frequent commuter services to/from Dublin city centre can be accessed. Citywest Campus Luas Tram Stop is approximately 4 km to the south-east of the site from which frequent tram services to Dublin city and beyond can be accessed.

1.21 Bus stops are located in east and west within 600 metres (m) of the site from which frequent routes operate between the site and Dublin city centre.

1.22 The pedestrian and cycle environment in the vicinity of the site is of a high standard, with wide, well-lit lengths of dedicated and segregated off-road cycle and pedestrian routes.

[1] Government of Ireland, 2000. Planning and Development Act 2000 (as amended). ISB. S.I. No. 30/2000.
[2] Government of Ireland, 2001-2019. Planning and Development Regulations 2001 (as amended). S.I. No. 600 of 2001. ISB.
[3] European Union, 2011. Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance Official Journal of the European Union. Document 32011L0092.
[4] European Union, 2014. Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance. Official Journal of the European Union. Document 32014L0052.

Figure 1.1: Site Location

Figure 1.2: Surrounding Land Uses Plan

Site Description

1.23 The site boundaries are defined by:

- New Nangor Road (R134) to the north, beyond is an industrial park;
- Agricultural fields to the east, beyond which is Profile Park Road and Grange Castle Golf Club;
- Profile Park Road and roundabout to the south; and
- A data center development on agricultural fields and Bolands Car Garage to the west.

1.24 The site is an irregular parcel of land and covers a total area of approximately 8.7 ha and lies at an elevation between approximately 71.47 and 76.11 m Above Ordnance Datum (m AOD).

1.25 As shown in the representative photographs of the site (Figure 1.3), the site currently comprises a single storey residential dwelling and agricultural fields. The existing Baldonnel steam runs through the site in a south-east to north-west direction, flowing towards the north-west.

1.26 The site is accessed from two access/egress point from Falcon Avenue to the south, which leads to a roundabout on the R134 New Nangor Road.

Figure 1.3: Representative Photographs of the Site (left upper image looking north at residential dwelling onsite, left lower image looking north along Baldonnel Stream, centre looking south and right looking southeast at site boundaries)

Environmental Sensitivity

1.27 The environmental sensitivity's surrounding the site are presented in Figure 1.4.

1.28 The site is located within an established mixed-use area, comprising both industrial and agricultural land uses. The proposed development would be built upon agricultural land. Under the South Dublin County Development Plan 2016-2022 the site is allocated within Zone EE: Enterprise and Employment. The stated aim is to provide for enterprise and employment related uses. The proposed use is a permitted use under this zoning. Significant precedent exists for the establishment of this use on other EE zoned lands in the area. EE zoned areas are established economic industrial areas running essentially in an arc northward from City West to Grange and Grange Castle.

1.29 The site benefits from good road network structure within Profile Park connecting to the local road network. The site is directly bordered to the north by New Nangor Road and to the east by Profile Park road and roundabout to the south.

1.30 The nearest surface water feature is the Baldonnel stream, located within the site. The proposed development as amended under the AI response would be oriented to allow the alignment of the Baldonnel Stream to remain as existing (refer to Chapter 4: Proposed Development Description for more details).

1.31 The Grand Canal is located approximately 2 km directly north of the site and is classified as a proposed Natural Heritage Area (NHA). No other ecologically protected sites (such as Special Protection Areas (SPA), Special Areas of Conservation (SAC), National Parks or Nature Reserves) are located within 1 km of the site.

1.32 There are no structures included in the statutory Register of Protected Structures or assets on the Record of Monuments and Places or the Register of Historic Monuments within the site. The closest statutory designated heritage asset is Grange Castle (RPS, RM) on the edge of the study area to the north.

1.33 The location of the site within a range of land types which contributes to its fragmented character. Its proximity to the urban area of Dublin gives the area an 'urban fringe' or 'transitional' character as you move from the urban to limestone farmland character type.

1.34 The surrounding landscape context is predominantly industrial to the north and west, agricultural to the south and west, with commercial and residential properties to the east and the Grange Castle Golf Club to the south-east.

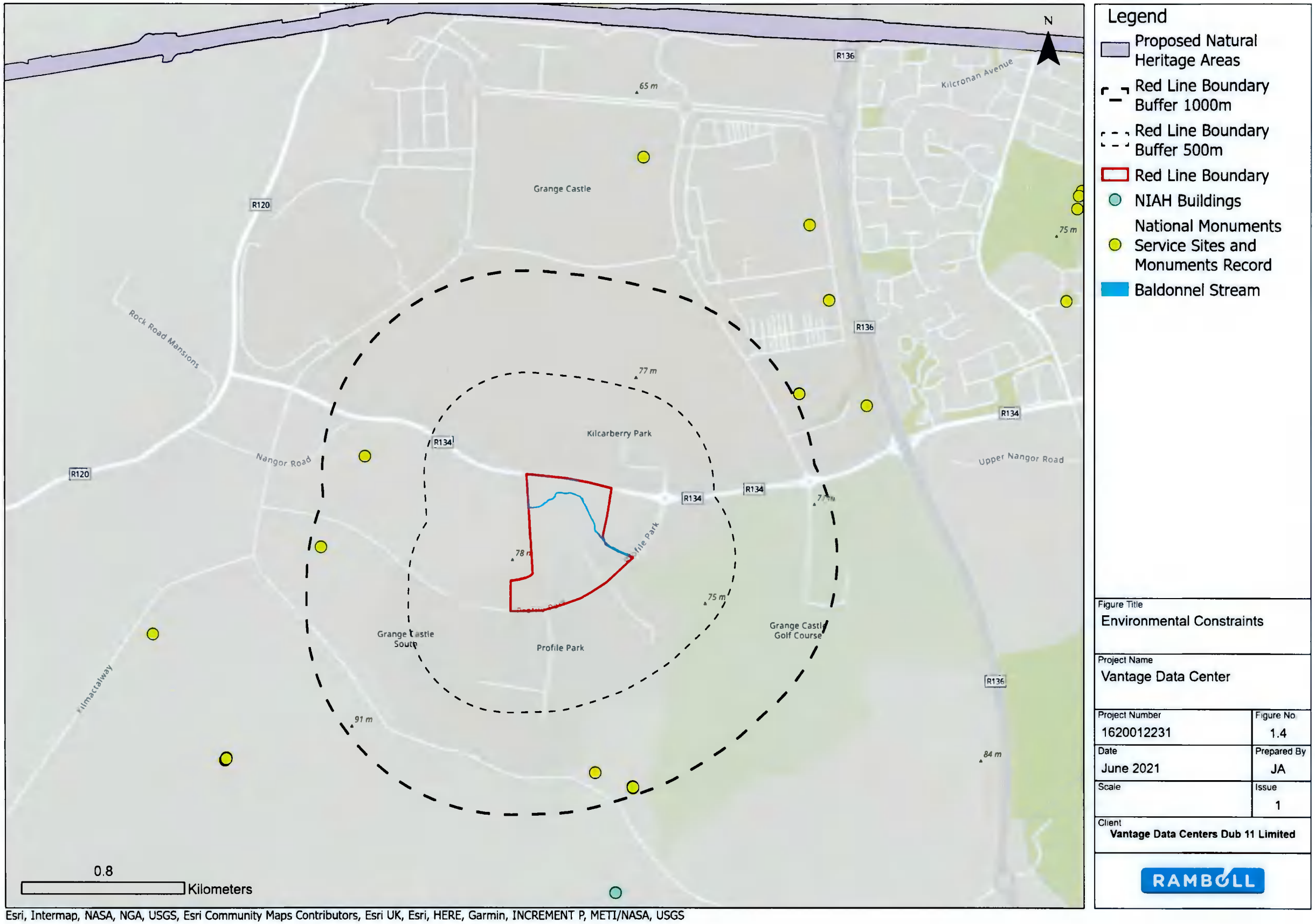


Figure 1.4: Environmental Constraints

Planning Context

Planning Policy Context

1.35 It is necessary to consider the proposed development against relevant policies and guidance at national, regional and local levels.

National Planning Policy

National Planning Framework (2018)

1.36 At the national level, planning policy is contained within the National Planning Framework (NPF) 2018[5]. The Department of Housing Planning and Local Government, on behalf of the Government of Ireland, published the NPF in February 2018 and is the Government's high-level strategic plan for shaping the future growth and development of our country out to the year 2040.

National Development Plan 2018-2027 (2018)

1.37 Additionally, the National Development Plan 2018-2027 (NDP)[6] sets out the investment priorities that will underpin the implementation of the NPF, through a total investment of approximately €116 billion.

1.38 Finalisation of the NPF alongside the ten-year NDP will culminate one plan to guide strategic development and the infrastructure investment at the national level.

National Climate Action Plan 2021

1.39 The National Climate Action Plan[7] for Ireland published in November 2021 is materially relevant to this EIAR and is considered within the relevant technical assessments.

Regional Planning Policy

Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly (2019)

1.40 The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Regional Assembly (EMRA)[8] 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."*

1.41 The site is therefore considered to be an appropriate location for the development of data centres under this Strategy.

Local Planning Policy

South Dublin County Council Corporate Plan 2020-2024

1.42 The SDCC Corporate Plan 2020-2024[9] identified SDCC's objectives and strategies for each of the councils principal activities. The plan builds in flexibility to meet the demands of a changing environment over the plan period.

South Dublin County Council Development Plan 2016-2022 (2016)

1.43 The relevant statutory development plan for the site is the SDCC Development Plan 2016-2022[10], adopted in May 2016. The core strategy, included within the Development Plan, provides an overarching strategy for the spatial development of the County over the medium to longer term and will form the basis for policies and objectives throughout the Development Plan. It translates the strategic planning framework set out in the NSS and the Regional Planning Guidelines for the Greater Dublin Area (2010), to County level.

1.44 As outlined in the Development Plan, the site is classified under Objective EE: to provide for enterprise and employment uses.

Draft South Dublin County Development Plan 2022-2028 (Ongoing)

1.45 It should be noted that SDCC commenced a review of the SDCC Development Plan 2016-2022[11] on the 31 of July 2020 and will create a new Development Plan for the period 2022 to 2028 over the next two years.

1.46 For the purposes of this EIAR, the EIA has not considered this emerging plan further as it is not a material consideration in terms of planning until adopted.

[5] Government of Ireland, 2018. National Planning Framework (NPF) – Ireland 2040 Our Plan (February 2018) [online]. Available at: https://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf [Accessed on 28/06/2021].
[6] Government of Ireland, 2020. National Development Plan 2018-2027 (last updated 26 November 2020) [online]. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/37937/12baa8fe0dcb43a78122fb316dc51277.pdf#page=null [Accessed on 28/06/2021].
[7] Government of Ireland, 2021. Climate Action Plan. Department of the Environment, Climate and Communications
[8] Eastern & Midland Regional Assembly, 2019. Regional Spatial & Economic Strategy 2019-2031 [online]. Available at: https://emra.ie/dubh/wp-content/uploads/2020/05/EMRA_RSES_1.4.5web.pdf [Accessed on 20/07/2021]

[9] SDCC, 2020. South Dublin County Council Corporate Development Plan 2020-2024, [online]. Available at: corporate-plan-2020-24.pdf (sdcc.ie) [accessed on 30/11/2021]
[10] SDDC, 2016. South Dublin County Council Development Plan 2016-2022 [online]. Available at: https://www.sdcc.ie/en/services/planning/development-plan/plan-2016-2022/ [Accessed on 28/06/2021].
[11] South Dublin County Council, 2021. South Dublin County Development Plan 2022-2028 [online]. Available at: https://consult.sdublincoco.ie/en [Accessed 19/07/2021]

Planning History

1.47 This section summarises the key planning history of most relevance to the site and provides background to the existing and consented land uses of the site.

1.48 The planning history of the site is presented in Table 1.1.

Table 1.1: Planning History of the Site

Application Number	Development	Decision	Date of Decision
SD20A/0124	• Demolition of existing single storey dwelling; • Construction of a Distribution Warehouse Building comprising warehousing and ancillary areas at ground floor and support offices, staff areas and plant across two floors; • Provision of car parking, cycle parking, security gatehouse, landscaping and boundary treatments (including security fencing and gates); and • All associated site development and services works (including diversion/culverting/reprofiling of existing stream on site)	Consented	November 2020

1.49 The extant permission on the site (Application SD20A/0124), consented in November 2020, will not be built out by the Applicant. The Applicant is seeking planning permission for the proposed development detailed below. In the instance that the proposed development does not come forward the Applicant would not build out the extant permission and the site would remain vacant.

Application Details

1.50 A planning application was submitted by the Applicant in August 2021 under application reference SD21A/0241. On 26 October 2021 SDCC responded to the planning application requesting additional information (AI) to be submitted. As such, the Applicant is now submitting an Additional Information response, that this EIAR forms part of.

1.51 The description of the proposed development as stated on the application form is:

"The development applied for consists of the demolition of the abandoned single storey dwelling and associated outbuilding (206sqm); and the construction of 2 no. two storey data centers with plant at roof level of each facility and associated ancillary development that will have a gross floor area of 40,589sqm that will consist of the following:

- *1 no. two storey data center (Building 11) that will be located to the south of the site and will have a gross floor area of 24,667sqm. It will include 22 no. emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height;*
- *1 no. two storey data center (Building 12) that will be located to the north of the site, and to the immediate north of Building 11 and will have a gross floor area of 12,915sqm. It will include 11 no. emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height;*
- *Each of the two data centers will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility that will provide emergency power to the admin and ancillary spaces. Each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators;*
- *The overall height of each data center apart from the flues and plant at roof level is c. 14.23m above the finished floor level;*
- *Construction of internal road network and circulation areas, with main entrance off Falcon Avenue to the south, as well as a secondary vehicular access off Legacy Drive to the south-west, both from within Profile Park; footpaths, provision of 144 no. car parking spaces, and 66 no. cycle parking spaces;*
- *Single storey step-up substation (38sqm) as well as 2 no. single storey switch substations (121sqm);*
- *AGI Gas Regulator compound that include 3 no. single storey buildings (134sqm);*
- *Construction of a gas powered generation plant in the form of a 13m high single storey building with a gross floor area of 2,714sqm that will contain 10 gas generators with associated flues that will be 25m in height, and grouped in pairs and threes. The Gas Plant will be located to the west of Building 11;*
- *Ancillary site development works, that will include reorientation of the Baldonnel Stream, biodiversity management initiatives, attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gates, sprinkler tanks and pump room; and*
- *A temporary gas powered generation plant within a fenced yard containing 21 no. generator units in containers, each with associated flues (each 25m high), 12 transformers and 10 containers of controls to be located to the west of, and associated with the first phase of Building 11, and will be required for a period of up to 2 years if connection to the national grid is delayed. This temporary plant will not be built if the connection to the national grid is in place prior to the operation of Building 11.*

The development will be accessed from Falcon Avenue and Legacy Drive from within the Profile Park Business Park that contains an access from the New Nangor Road (R134).

The Significant Further Information / Revised Plans includes a revised site plan that has modified the location of Buildings 11 and 12 within the site that enables the stream to remain in its current alignment within an enhanced riparian strip; amendment to the gross floor area of the entire development to 41,105sqm; revised EIAR that includes new photomontages; revised car parking layout; additional SUDS measures, attenuation and green infrastructure; as well as revised landscaping. It also includes a modification to the nature and use of the Gas Plant to a Multi-Fuel Generation Plant, which includes breaking it into two components and increasing its 11 no. flues to being 30m in height; and that its primary purpose is now to reinforce the national grid."

Applicant

1.52 The Application is submitted on behalf of the following entity:

Vantage Data Centers DUB11 Limited,

1-2 Victoria Buildings,

Haddington Road,

Dublin 4,

Dublin,

Ireland

Project Team

1.53 The Applicant has appointed a consultant team to assist in the development of the application and concurrently appointed an EIA team to undertake the EIA and prepare this EIAR in accordance with Regulations aforementioned. The same team have been appointed to respond to the Addition Information request that this revised EIAR forms part of. The team members and their respective roles are presented in Table 1.2: Design and EIA Team.

Table 1.2: Design and EIA Team

Company	Role
Vantage Data Centers	Development Manager/Project Manager
Burns & McDonnell	Principal Architect/Project Manager/Project Manager (Power plant development and substation)/Mechanical Engineer/BIM 360 Coordinator/GFS Power and Energy Project Manager and Engineer
Hyphen Architects	Local Architect
Kevin Fitzpatrick Landscape Architecture	Landscape Architects
Marston Planning	Planning Consultant
Ramboll	Environmental Permitting; EIA Project Manager and Coordinator; Environmental Consultants for Population and Human Health, Transport, Air Quality, Noise and Vibration, Water Resource and Flood Risk, Ecology, Ground Conditions, Climate Change, Waste, Material Assets and Landscape and Visual Assessment.
Neo Environmental	Ecology Consultant
Terence O'Rourke	Cultural Heritage Consultant
Geraghty Energy Consultants	Sustainability and Energy Consultant
Jensen Hughes Fire Consultants	Fire Engineering Consultant
O'Herlihy Access Consultants	Disability Access Consultant
Pinnacle	Structural and Civil Engineer and Flood Risk Consultant
Punch Consulting	Health and Safety Consultant
Found Digital	Fiber and Power Consultant

1.54 The EIA has been carried out by Ramboll UK Limited ('Ramboll') and a number of technical specialists. The technical specialists appointed are regarded as being competent experts within their relevant fields.

Structure of the Environmental Impact Assessment Report

1.55 The EIAR comprises the following documents:

- Non-Technical Summary (NTS);
- Volume 1: Main Environmental Impact Assessment Report, comprising the following chapters:
  - Table of Contents, List of Figures, List of Tables
  - Chapter 1: Introduction
  - Chapter 2: EIA Process and Methodology
  - Chapter 3: Alternatives and Design Evolution
  - Chapter 4: Proposed Development Description
  - Chapter 5: Demolition and Construction Environmental Management
  - Chapter 6: Population and Human Health
  - Chapter 7: Transport and Accessibility
  - Chapter 8: Air Quality
  - Chapter 9: Noise and Vibration
  - Chapter 10: Water Resources and Flood Risk
  - Chapter 11: Ecology
  - Chapter 12: Ground Conditions
  - Chapter 13: Climate Change
  - Chapter 14: Waste
  - Chapter 15: Material Assets
  - Chapter 16: Cumulative Effects
  - Chapter 17: Residual Effects and Mitigation
  - Glossary of Terms and Abbreviations
- Volume 2: Landscape and Visual Impact Assessment and Cultural Heritage Assessment
- Volume 3: Technical Appendices
  - Technical Appendix 1.1: IEMA Quality Mark Checklist
  - Technical Appendix 7.1: Traffic Flow and Distribution Diagrams;
  - Technical Appendix 7.2: Accident Data;
  - Technical Appendix 7.3: Cumulative Schemes Daily Traffic Flow Diagrams;
  - Technical Appendix 7.4: Proposed Development Trip Generation;
  - Technical Appendix 8.1: Air Quality Modelling Inputs;
  - Technical Appendix 8.2: Air Quality Detailed Results;
  - Technical Appendix 9.1: Acoustic Terminology;
  - Technical Appendix 9.2: Construction Noise Calculations;
  - Technical Appendix 10.1: Engineering Planning Strategy;
  - Technical Appendix 10.2: Site-Specific Flood Risk Assessment;
  - Technical Appendix 11.1: Ecological Impact Assessment Report;
  - Technical Appendix 11.2: Appropriate Assessment Screening Report;
  - Technical Appendix 11:3: Biodiversity Management Plan;
  - Technical Appendix 12.1: Ground Investigation & Geotechnical Report; and
  - Technical Appendix 12.2: Contaminated Land Interpretative Report.

Environmental Impact Assessment Report

Content of the EIAR

1.56 The required content of the EIAR is set out in Schedule 6 of the Regulations (2001 to 2021) as presented in Table 1.3 indicating where in this EIAR the requirements have been met.

Table 1.3: Information which is required in an EIAR (Schedule 6 of the Planning and Development Regulations (2001 to 2021)

Required Information		Section of EIAR
1	Description of the project, including in particular: (a) a description of the location of the project; (b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the, operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, and soil and subsoil pollution, noise, vibration, light, heat, radiation, etc.) and quantities and types of waste produced during the construction and operation phases.	Volume 1: EIAR Chapter 1: Introduction, EIAR Chapter 4: Proposed Development Description, EIAR Chapter 5: Demolition and Construction Environmental Management. EIAR Chapters 6-15, Volume 1 EIAR Volumes 2 and 3
2	A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Volume 1: EIAR Chapter 3: Design Evolution,
3	A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	Volume 1: EIAR Chapter 1: Introduction, EIAR Chapter 4: Proposed Development Description, EIAR Chapter 5: Demolition and Construction EIAR Chapters 16 and 17, Volume 1. EIAR Volumes 2 and 3.
4	A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape	EIAR Chapters 6-15, Volume 1
5	A description of the likely significant effects of the proposed project on the environment resulting from, inter alia: (a) the construction and existence of the project, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.	EIAR Chapters 6-15, Volume 1 Volume 1: EIAR Chapter 16: Intra-Cumulative Effects Volume 1: EIAR Chapter 17: Summary of Residual Effects
6	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.	Volume 1: EIAR Chapter 2: EIA Process and Methodologies EIAR Chapters 6-15, Volume 1
7	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	EIAR Chapter 4: Proposed Development Description, EIAR Chapter 5: Demolition and Construction EIAR Chapters 6-15, Volume 1
8	A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European	EIAR Chapter 4: Proposed Development Description, EIAR Chapter 5:

Table 1.3: Information which is required in an EIAR (Schedule 6 of the Planning and Development Regulations (2001 to 2021)

Required Information		Section of EIAR
	Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. W here appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	Demolition and Construction EIAR Chapters 6-15, Volume 1
9	A non-technical summary of the information provided under points 1 to 8.	Non-technical Summary
10	A reference list detailing the sources used for the descriptions and assessments included in the report.	EIAR Volume 1 and 2, all chapters EIAR Volume 3, all technical appendixes.

Good Practice

1.57 As with EIA, good practice in the preparation of the EIAR is defined in a number of sources, with more specific issues covered by EIAR review checklists. Many of these checklists are very detailed and go to some length. In terms of widely applicable and practical guidance, the recent IEMA Quality Mark indicator check has been referenced in producing this EIAR as described in Appendix 1.1: IEMA Quality Mark Checklist. Ramboll UK Ltd is a Registrant on the IEMA Quality Mark. Accordingly, as part of Ramboll's QA procedures and Quality Mark Commitments, this EIAR and EIA has been undertaken to meet the Quality Mark Commitments as set out in Appendix 1.1: IEMA Quality Mark Checklist. Additional detail on relevant guidance is provided within Volume 1, EIAR, Chapter 2: Process and Methodology.

2 EIA PROCESS AND METHODOLOGY

Introduction

2.1 This chapter of the Environmental Impact Assessment Report (EIAR) sets out the general approach to the process and to the methodology that is adopted when undertaking an Environmental Impact Assessment (EIA). It describes the legislative framework in which the EIA for the proposed development has been undertaken and identifies the key guidance that was considered. The EIA Scoping and consultation process that was adopted to identify the key environmental topics for inclusion in the EIA is outlined, as well as the overall EIA methodology adopted.

2.2 While the approach and methodology to the EIA are described in this chapter, further detail on how the methodology was tailored to each technical aspect of the EIA is presented in the relevant technical assessment chapters of the EIAR. Other supporting assessments for environmental aspects that were scoped out of the EIA are included as technical appendices to this EIAR.

Environmental Impact Assessment

2.3 Since the adoption of Directive 85/337/EEC[1] (on 27 June 1985) on the assessment of the effects of certain public and private projects on the environment, both the law and EIA practices have evolved significantly. The 1985 Directive was amended by Directives 97/11/EC[2], 2003/35/EC[3] and 2009/31/EC[4], and the Directive and its amendments were codified in 2011 by Directive 2011/92/EU[5]. The current Directive 2014/52/EU[6] amends the 2011 codified Directive but does not replace it. The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018[7,8] transpose the requirements of the 2014 Directive into existing planning consent procedures.

2.4 EIA provisions in relation to planning development consents are contained in the Planning and Development Act 2000 (as amended)[9] (the 'Act') and in the Planning and Development Regulations 2001 (as amended)[10] (the 'Regulations').

2.5 The Regulations set out the statutory process and minimum requirements for EIA and the contents of the EIAR. Specifically, they prohibit the grant of planning permission for developments likely to have significant effects on the environment (defined in the Regulations as 'EIA development') unless information on those effects is considered by the relevant planning authority in reaching its decision on a planning application. That information includes both the EIAR, which is the Applicant's own assessment, and any other information provided by consultees, the public, and any other persons about the proposal's environmental effects. This EIAR has been prepared pursuant to (and in accordance with) the Regulations.

2.6 In addition to the Regulations, there is guidance available on EIA and the application of the Regulations that has been considered in undertaking this EIA, including:

- Environmental Protection Agency's (EPA) Guidelines on Information to be Contained in an Environmental Impact Statement (2002)[11];
- EPA's Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (2003)[12];
- EPA's Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (2015)[13];
- EPA's Draft Guidelines on the information to be contained in Environment Impact Assessment Reports (2017)[14];
- European Commission's (EC) Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (2017)[15];
- EC's Environmental Impact Assessment of Projects – Guidance on Scoping (2017)[16]; and
- Department of Housing, Local Government and Heritage's Guidelines for Planning Authorities and An Board Pleanála on carrying out Environmental Impact Assessment (2018)[17].

2.7 Guidance of relevance to individual technical assessments have been set out in Chapters 6-15 of this EIAR Volume, as well as in Volume 2.

2.8 In accordance with the Regulations, this EIA has been undertaken based on the proposed development as described in Chapter 4: Proposed Development Description and details of the demolition and construction works in Chapter 5: Demolition and Construction Description of this EIAR Volume.

EIA Process

2.9 EIA is a process that identifies the likely significant environmental effects (both positive and negative) of a proposed development. The process aims to avoid, off-set and/or reduce any significant negative environmental effects, where these are identified, and to enhance any positive effects. Proposed developments to which EIA is applied (i.e. 'EIA development') are those that are likely to have significant effects on the environment by virtue of factors such as their nature, size or location.

2.10 The process and outcomes of the EIA are presented in an EIAR. The contents of an EIAR are prescribed by the Regulations and should be a clear and concise summary of a proposed development and its likely environmental effects (including direct, indirect and cumulative effects) on the natural, built and human environments. The EIAR is submitted to a relevant planning authority to accompany an application for planning permission. In this way, the aim of EIA is to protect the environment by ensuring that a local planning authority, when deciding whether to grant planning permission for a project which is likely to have significant effects on the environment, does so in the full knowledge of the project's likely significant effects and takes this into account in the decision making process. Alongside this, an EIA's objective is

[1] European Union, 1985. Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment. Document 31985L0337.
[2] European Union, 1997. Council Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. Document 31997L0011.
[3] European Union, 2003. Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC - Statement by the Commission. Document 32003L0035.
[4] European Union, 2009.Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (Text with EEA relevance). Document 32009L0031.
[5] European Union, 2011. Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance Official Journal of the European Union. Document 32011L0092.
[6] European Union, 2014. Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance. Official Journal of the European Union. Document 32014L0052.
[7] Government of Ireland, 2018. European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018. S.I. No. 296/2018. ISB.
[8] Later amended to: Government of Ireland, 2018. European Union (Planning and Development) (Environmental Impact Assessment) (Amendment) Regulations 2018. S.I. No. 646/2018. ISB.
[9] Government of Ireland, 2000. Planning and Development Act 2000 (as amended). S.I. No. 30/2000. ISB.
[10] Government of Ireland, 2001-2019. Planning and Development Regulations 2001 (as amended). S.I. No. 600 of 2001. ISB.
[11] Environmental Protection Agency, 2002. Guidelines on the information to be contained in Environmental Impact Statements
[12] Environmental Protection Agency, 2003. Advice Notes on Current Practice in the preparation of Environmental Impact Statements
[13] Environmental Protection Agency, 2015. Advice Notes on Current Practice in the Preparation of Environmental Impact Statements Draft
[14] Environmental Protection Agency, 2017. Draft Guidelines on the information to be contained in Environmental Impact Assessment Report (EIAR)
[15] European Commission, 2017. Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report.
[16] European Commission, 2017. Environmental Impact Assessment of Projects, Guidance on Scoping
[17] Government of Ireland, 2019. Guidelines for Planning Authorities and An Bord Pleanala om carrying out Environmental Impact Assessment 2018 (last updated 19 December 2019).

also to ensure that the public and statutory consultees are given early and effective opportunities to participate in decision making procedures and to enable the grant of required licences.

Screening

2.11 EIA Screening is the term in the Regulations used to describe the process by which the need for EIA is considered in respect of a proposed development. Some developments require a mandatory EIA by reason of their size, nature and effects. These projects, known as 'Schedule 1 developments', include mainline railways, airports, waste facilities and large power stations. The proposed development is not such a Schedule 1 development.

2.12 The need for an EIA for all other projects is determined on the basis of the following set criteria:

- The development is within one of the classes of development stated in Schedule 5 of the Regulations; AND
- EITHER it meets or exceeds the size threshold for that class of development in Schedule 2; OR a part of the project is in a sensitive area; AND
- It is likely to have significant effects on the environment by virtue of factors such as its nature, size, or location.

2.13 These are known as 'Schedule 5 developments'. The proposed development is below the 15 ha threshold under Part 2 of Schedule 5 of the Regulations. However, the scale and nature of the proposed development provides the potential for significant effects on the environment and the Applicant has therefore decided to undertake an EIA on this basis. Accordingly, a formal EIA Screening exercise with SDCC was not deemed necessary.

Scoping and Consultation

2.14 EIA Scoping is the term used in the Regulations whereby an applicant can request a formal 'scoping opinion' from the relevant local planning authority on the content of an EIAR and the extent of the information to be considered in the assessments. The purpose of EIA Scoping is to focus the EIA on the environmental issues and potential impacts which need the most thorough attention; to identify those which are unlikely to need detailed study; and to provide a means to discuss methods of impact assessment so as to reach agreement on the most appropriate.

2.15 The Applicant produced a formal EIA Scoping Opinion Request Report (the 'EIA Scoping Report'), which was presented to SDCC at the pre-application meeting on 23 June 2021. The EIA Scoping Report set out a description of the then emerging proposed development; the potential key environmental impacts and likely effects to be considered as part of the EIAR; as well as the proposed approach that would be adopted for the EIAR including the proposed scopes and assessment methodologies to predict the scale of effects and to assess the significance in each case.

2.16 A formal EIA Scoping Opinion was not provided by SDCC. A pre-application meeting was held on 23 June 2021 in which SDCC, the Applicant and Ramboll attended. The purpose of this meeting was to discuss the scope of the EIA and the proposed approach that would be adopted for the EIAR. Overall, SDCC confirmed their agreement to the scope of the EIA as presented in the EIA Scoping Report, with comments regarding to Traffic and Transport and LVHIA. Details of the revised approach for Traffic and Transport and LVHIA is contained within Volume 1, Chapter 7 and Volume 2 of this EIAR, respectively. The EIA has been undertaken on the basis of the EIA Scoping Report and comments provided through pre application consultation with the SDCC.

2.17 A second pre-application meeting was held on 19 July 2021 in which SDCC, the Applicant and Ramboll attended. The purpose of this meeting was to discuss the proposed realignment of Baldonnel stream.

2.18 Subsequently, the applicant submitted a planning application for full planning permission for the proposed development in August 2021 (Ref SD21A/0241).

SDCC Request for Additional Information

2.19 As part of the statutory consultation process associated with the determination of the full planning application, SDCC raised a number of queries in respect of the submitted application.

2.20 On 26 October 2021 SDCC responded to the full planning application requesting additional information to be submitted ('request for additional information' (AI)) in relation to:

- A need to balance the demand for development with climate action and resilience as well as the capability of the national grid to provide for such developments;
- The proposed realignment of the Baldonnel Stream;
- The proposed size, bulk, scale and mass of the proposed development;
- Proposed development phasing;
- The approach to tree and hedgerow protection;
- Incorporation of natural solutions, sustainable drainage systems (SuDs) and green infrastructure;
- Engagement with the department of defence on aviation impacts; and
- The status of feasibility and pre-connection enquiries on potable and foul water.

2.21 Accordingly, the design of the proposed development has evolved to respond to the items raised by SDCC as part of the AI response which is discussed in Chapter 3: Alternatives and Evolution and Chapter 4: Development Description. As such, the Applicant is now submitting a new EIAR for the proposed development.

2.22 A comprehensive response to the AI request is discussed within the Additional Information Response Letter prepared by Marston Planning Consultants.

Scope of EIA

Non-Significant Issues

2.23 The aim of the EIA Scoping process is to ensure that the EIA is proportionate and focussed only on the likely significant environmental effects of the proposed development. Appraisals for each technical topic were undertaken as part of the EIA Scoping process to determine the existing baseline conditions and as a result, the potential for significant effects to arise.

2.24 Accordingly, the EIA Scoping process identified that the proposed development is unlikely to give rise to significant environmental effects in respect of the following environmental aspects and therefore would not need to be scoped in as discrete technical assessment chapters within the EIAR:

- Daylight, Sunlight, Overshadowing and Wind Microclimate; and
- Major Accidents and Disasters.

2.25 Whilst significant environmental effects in respect of Major Accidents and Disasters is unlikely, consideration has been given to this topic within the following technical chapters in this EIAR:

- Chapter 4: Proposed Development Description;
- Chapter 5: Demolition and Construction Description;
- Chapter 10: Water Resource and Flood Risk; and
- Chapter 13: Climate Change.

2.26 Standard best practice, mitigation and enhancement measures identified during the course of preparing these chapters were integrated into the proposed development as described in Chapter 4: Proposed Development Description and in Chapter 5: Demolition and Construction Description of this EIAR Volume.

Potentially Significant Issues

2.27 The potentially significant environmental issues that were identified during the EIA Scoping process and that have been addressed within discrete technical assessment chapters are as follows:

- Population and Human Health (Chapter 6, EIAR Volume 1);
- Transport and Accessibility (Chapter 7, EIAR Volume 1);
- Air Quality (Chapter 8, EIAR Volume 1);
- Noise and Vibration (Chapter 9, EIAR Volume 1);
- Water Resources and Flood Risk (Chapter 10, EIAR Volume 1);
- Ecology (Chapter 11, EIAR Volume 1);
- Ground Conditions (Chapter 12, EIAR Volume 1);
- Climate Change (Chapter 13, EIAR Volume 1);
- Waste (Chapter 14, EIAR Volume 1);
- Material Assets (Chapter 15, EIAR Volume 1); and
- Landscape, Visual and Cultural Heritage (EIAR Volume 2).

EIA Approach

Consideration of Alternatives

2.28 The Regulations require that an applicant provides a summary description of reasonable alternatives studied and to provide a description of their specific characteristics, as well as an indication of the main reasons for selecting the preferred option, including a comparison of the environmental effects. The Regulations do not define the term 'alternative' and EIA practice tends to consider alternative design proposals and to explain the process through which the proposed development has evolved.

2.29 Chapter 3: Design Evolution and Alternatives of this EIAR Volume explores the objectives of the proposed development and describes how the development proposals have evolved in response to environmental and planning opportunities and constraints, as well as consultation comments including those from the AI Request.

2.30 For the proposed development, the following alternatives have been considered:

- The 'Do-Nothing' alternative where the existing site condition remains in its underutilised state with no redevelopment; and
- Alternatives considered in the course of the design process (such as layouts and design) taking into account environmental and other relevant planning and design constraints as part of the design evolution.

Baseline

2.31 The purpose of the EIA is to predict how environmental conditions may change as a result of a proposed development and to specify any investigative measures to be taken and/or required. This requires that the current environmental conditions and those in the future, are established. This is referred to as the 'baseline' and is usually established through a combination of desk-based research, site surveys and empirical studies and projections. Together, these describe the existing and future character of a site and the value and vulnerability of key environmental resources and receptors, against which any changes or effects resulting from a proposed development can be identified, understood and assessed.

2.32 For the EIA of the proposed development, the existing baseline represents the existing environmental conditions of the site and the surrounding study areas at the time of the assessments as described in Chapter 1: Introduction of this EIAR Volume. The technical assessments in EIAR Volume 1 (6 to 15), EIAR Volume 2 (1 and 2) and EIAR Volume 3 provide a description of topic specific existing baseline conditions against which the proposed development has been assessed.

2.33 The proposed development has also been assessed against future baseline conditions as follows:

- For the traffic and transport assessment (and associated assessments for air quality, noise and vibration and climate), consideration has been given to three projected environmental conditions in the future:
  - 2022, the year of the most intensive demolition and construction works, in terms of the number of traffic flows;
  - 2023, the projected year of completion of Phase 1 of the proposed development, when the proposed development would become operational and would give rise to environmental effects; and
  - 2024, the projected year of completion of Phase 2 of the proposed development, when the proposed development would become fully operational.
- For the operational air quality, noise and vibration and climate assessments, consideration has been given to the following modelling scenarios:

• Scenario 1 (~from Q4 2023 to Q1 2025)	• DUB 11 powered by northern block of MFGP using HVO as the fuel source. • MFGP running 24/7. • Emergency scenario below applies if there is the MFGP fails.
• Scenario 2 (reasonable worst case from Q1 2025)	• DUB 11 and 12 powered from the EirGrid connection across Falcon Avenue. • MFGP powered by gas from GNI. In a reasonable worst case this is assessed to be operational 24/7 using natural gas. • Emergency scenario below applies if the gas connection from GNI to the MFGP fails and there is a local grid network failure from EirGrid.
• Scenario 3 (reasonable best case from Q1 2025)	• DUB 11 and 12 powered from the EirGrid connection across Falcon Avenue • MFGP not in operation. • Emergency scenario below applies if there is a local grid network failure from EirGrid.
• Emergency Scenario	• Diesel used for day tanks for emergency backup generators for the data center in the unlikely event of an outage of the MFGP and grid connection (depending on scenario). MFGP and emergency generators would not be operational at the same time.

2.34 The baseline conditions have been characterised by means of desk studies, site visits, surveys and modelling. As a result of the lockdown arising from the COVID-19 pandemic, alternative methods have been used to collect representative data, with more reliance placed on desk-based studies, which are considered equally robust.

Receptors

2.35 Receptors that may be sensitive to potential environmental impacts as a result of the proposed development, can be summarised as follows, with further detail provided in respective technical assessments:

- Existing underlying geology and hydrogeology;
- Existing soils;
- Existing water resources, in particular ground water, surface water features and public potable water supplies;

- Existing utilities;
- Existing ecological receptors, in particular the Baldonnel Stream;
- Future users of and visitors to the site and surrounding study area;
- Future pedestrians at and around the proposed development;
- Existing community facilities in proximity to the site;
- Existing landscape character areas;
- Existing visual receptors and local and strategic views from publicly accessible locations such as roads, footpaths and open spaces;
- Existing above ground heritage assets such as archaeology and built heritage;
- Potential existing buried heritage assets on-site;
- Existing transport facilities, such as Nangor Road; and
- Demolition and construction workers.

Impact Assessment

Basis of the EIAR

2.36 In accordance with the Regulations, the EIA has been undertaken based on the:

- Site, as shown and described in Chapter 1: Introduction, as well as the individual technical assessments (Chapters 6 to 15) of this EIAR Volume and EIAR Volume 2; and
- Proposed development and proposed demolition and construction works, as shown and described in Chapter 4: Proposed Development Description and Chapter 5: Demolition and Construction Description, respectively, of this EIAR Volume.

2.37 The proposed development has been assessed in the EIAR, as defined by the following documents and materials:

- Detailed planning application drawings;
- Design Statement;
- Planning Statement;
- Engineering Planning Report; and
- 3D model.

Sources of Proposed Development Information

2.38 In addition to the above, information on the proposed development has been drawn from the following application documents, as appropriate:

- Newspaper notice;
- Site notice;
- Additional information response letter;
- RFI individual responses from relevant consultants;
- Architectural drawings;
- Screening Report for Appropriate Assessment;
- Landscape masterplan and drawings;
- Site Lighting Plan, modelling and details;
- Engineering Planning Report;
- Flood Risk Assessment;
- Engineering drawings; and
- Environmental Impact Assessment Report, Appendices and Non-technical Summary.

Assessment Methodology

General

2.39 The aim of the EIAR is not to assess the proposed development's compliance/performance against planning policy as this is considered within the Planning Statement that accompanies the application. Instead, reference has been made to national, regional and local policy (where appropriate) to inform the scope of the technical assessments, assessment methodologies applied and existence of any sensitive receptors to be considered. Detailed methodologies for the assessment of each of the environmental aspects scoped into the EIA as discrete technical assessment chapters are provided within each technical chapter of this EIAR Volume and EIAR Volume 2; however, in general terms, the assessments have been based upon the following approach:

- Review of the existing conditions at and surrounding the site for the environmental topic area under consideration via various sources of existing information, data and reports;
- Desk-top studies;
- Site surveys;
- Consideration of relevant legislation;
- Consideration of relevant planning policies (national, regional and local), guidance and standards;
- Consultations with stakeholders and consultees as appropriate including stakeholders and consultees referenced in the AI Request;
- Consideration of potentially sensitive receptors that could be affected by the proposed development;
- Use of published technical guidance and best practice;
- Use of quantitative and qualitative assessment methods, professional judgement and expert opinion;
- Identification of potential environmental impacts and likely effects, with an evaluation of their likely duration, magnitude and scale, taking into consideration embedded mitigation (where relevant); and
- Recommendation for additional mitigation and/or enhancement measures, followed by an assessment of the significance of the residual effects.

2.40 How the proposed development might affect the environment relies on predictions about what impact a certain action would have. Some predictions can be made using mathematical or simulation models, particularly where there are well known relationships between cause and effect. For example, the degree to which noise levels may increase as a result of additional traffic flows can be predicted using a mathematical equation; or the level of air pollution from a known traffic flow can also be predicted from a computer-based simulation model; or the visibility of a building can be predicted by accurately superimposing its outline and position over a photograph. Other impacts are less easy to predict in quantitative terms; for example, whilst the extent of a loss of a habitat on the abundance of individual species is more difficult to predict. In such cases, the EIA attempts to quantify the anticipated scale of impact using empirical experience, literature and professional judgement.

2.41 In all cases, the overall approach and specific methods of predicting the likely nature and magnitude of impact, as well as the scale of effect is set out in each of the technical assessments. Where used, recognised specific predictive methods are referenced. Any assumptions or limitations to knowledge are stated. In either case, the thought process leading to the conclusions is based on reasonably reliable data and so is considered to be prudent and robust.

2.42 Where detailed information on the proposed development has not been available, reasonable assumptions have been made, and clearly set out, based on experience of other developments of similar type and scale to enable assessment of likely significant effects.

2.43 The proposed development has not yet been approved so the conditional tense ('would') has been used to describe the development proposals, situations, potential impacts and likely effects that could/would arise from the introduction of the proposed development, as well as the mitigation measures that would be delivered or would be required upon approval of the proposed development. This approach does not lessen the Applicant's commitment to deliver the proposed development as presented within this EIAR. Furthermore, each technical assessment (and in particular summary tables at the conclusion of each chapter) clearly sets out the means by which any required mitigation measures relied upon, would be secured.

Proposed Development Stages

2.44 The EIA considers the following stages of the proposed development:

- Demolition and construction stage (i.e. the proposed development being built out, with ongoing demolition and construction works on the site);
- Operation stage (i.e. when the proposed development is built out and operational in its entirety).

2.45 Although the demolition and construction programme of the proposed development would be sequenced over a two to three year period, the EIA has assessed and reported on the environmental effects of the operation stage as a whole. This is because no significant delay (i.e. of more than 12 months) is anticipated between the development phases and therefore a phase-by-phase assessment is not appropriate and has not been undertaken.

2.46 However, assessment of the phased delivery of the proposed development has been undertaken in the demolition and construction stage assessment based on the information provided in Chapter 5: Demolition and Construction Description of this EIAR Volume. The development programme and demolition and construction methods presented in this chapter have informed the identification of on- and off-site receptors for assessment, as well as potential 'worst-case' scenarios.

Assessment Scenarios

2.47 As noted earlier, the assessment of the proposed development has been carried out against the existing baseline conditions as described in Chapter 1: Introduction of this EIAR Volume, technical assessment chapters and supplemented by relevant existing and updated surveys.

2.48 However, in accordance with standard practice, Chapter 8: Air Quality and Chapter 9: Noise and Vibration of this EIAR Volume have carried out their assessments against 'future baseline' scenarios for the demolition and construction stage and operation stage.

Demolition and Construction Stage

2.49 The future baseline for the demolition and construction stage is the year of the most intensive demolition and construction works, in terms of the number of traffic flows, as set out in Chapter 5: Demolition and Construction Description of this EIAR Volume.

2.50 Accordingly, the following assessments scenarios have been considered:

- Scenario 1: Existing Baseline (2021);
- Scenario 2: Future Baseline (2022) Year of Peak Construction of Proposed Development; and
- Scenario 3: Future Baseline (2022) Year of Peak Construction of Proposed Development + Cumulative Development.

Operation Stage

2.51 The future baseline for the operation stage comprises the year in which the proposed development would be fully completed, occupied and operational.

2.52 Accordingly, the following assessment scenarios have been considered:

- Existing Baseline 2021;
- Demolition and Construction Baseline (2022 'Do Nothing');
- Demolition and Construction Baseline (2022 'Do Nothing') + cumulative development;
- Operational Year Baseline (2024 'Do Nothing') + cumulative development; and
- Operational Year Baseline (2024 'Do Nothing') + cumulative development + proposed development (2024 'Do Something').

2.53 The 'Do Nothing' scenario refers to the instance where the proposed development is not built out. If the proposed development is not brought forward the Applicant would not proceed with implementing the warehouse permission (SD20A/0124), for which permission is existing, as detailed in Chapter 1: Introduction, of this EIAR Volume. Therefore, in this instance, the 'Do Nothing' scenario refers to the site remaining vacant.

2.54 The 'Do Something' scenario refers to the scenario where the proposed development is built out and operational in its entirety.

Mitigation

2.55 Mitigation is the term used to refer to the process of avoiding where possible and, if not, reducing, controlling and/or off-setting the likely significant negative effects of a development. Mitigation measures relate to the design stage; the demolition and construction stage; or the activities associated with the operation stage.

2.56 As part of the EIA, an iterative approach has been adopted where significant environmental effects have been avoided where possible in the first instance through the design refinements and iterations (referred to as 'embedded' mitigation'), as reported upon within Chapter 3: Alternatives and Design Evolution of this EIAR Volume. Where negative environmental effects were identified through early assessment work, opportunities to reduce or control impacts and effects, or in some cases, to compensate for impacts and effects, were identified and incorporated into the proposed development. In addition, opportunities to enhance the positive environmental effects of the proposed development have also been sought and incorporated into the proposed development.

2.57 Within each technical chapter of this EIAR, the assessment of the effects that are likely to arise as a consequence of a potential impact/change to environmental receptors from the proposed development is initially presented. If any 'additional mitigation' measures are required, further to that already embedded into the proposed development throughout its design evolution, these are proposed, and the proposed development is reassessed to ascertain the likely residual effects and the likely significant environmental effects. This is reported on within each technical assessment chapter of the EIAR.

2.58 In all cases, mitigation measures are presented as embedded, specific commitments or statements of fact. It is anticipated that the implementation of mitigation identified throughout the EIAR, would be secured by means of approval of the planning drawings, appropriately worded planning conditions or planning obligations. Where the need for mitigation is identified, each assessment confirms how the mitigation will be secured.

Impacts and Effects

2.59 Unless otherwise required by published assessment guidance, the EIA has made distinction between:

- **Impacts**: the change or action; and
- **Effects**: the result/consequence/outcome of the change.

2.60 As a general rule, the EIA assesses the effects that are likely to arise as a consequence of a potential impact to environmental receptors following the application/consideration of embedded mitigation measures.

2.61 The quality, magnitude and duration or potential effects are defined in accordance with EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports. These are summarised below.

Table 2.1: Description of Effects

Effect Characteristic	Description
Quality	
Positive	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Significance	
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects	
Momentary	Effects lasting from seconds to minutes.
Brief	Effects lasting less than a day.
Temporary	Effects lasting less than a year.
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to 15 years.
Long-term	Effects lasting 15 to 60 years.
Permanent	Effects lasting over 60 years.
Reversible	Effects that can be undone, for example through remediation or restoration.
Probability of Effects	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Type of Effects	

Table 2.1: Description of Effects

Effect Characteristic	Description
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 effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
'Do-nothing' effects	The environment as it would be in the future should the subject project not be carried out.
'Worst case' effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminant effects	When the full consequences of a change in the environment cannot be described.
Irreversible effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

2.62 There are some exceptions to the conventions and terminology described above for certain topic specific assessments. This is set out in the relevant technical assessment chapter.

2.63 The scale of effects is typically determined through the use of the terminology above and the application of professional judgement and discretion of the particular technical specialist. Accordingly, a fixed/set/generic matrix has not been adopted for the EIA as a whole.

2.64 The specific benchmarks have been established by the project team using available national, regional and local policy together with other relevant guidance, recognised best practice and expert judgement. The development of these benchmarks is explained in more detail in each assessment or technical appendix.

2.65 Throughout the EIAR, residual effects have been predicted as either '**significant**' or '**not significant**'. Significant effects are considered material to the planning decision process. Residual effects of moderate, significant, very significant and profound are typically considered **'significant'**, but would be dependent on the relevant technical assessment, as well as the existence of published assessment guidance. Where published assessment guidance is not definitive in respect of categorising/determining significant environmental effects, professional judgement has been applied, taking into account the duration, extent and context of the effect, to determine significant effects.

Cumulative Assessment

2.66 The Regulations require that all likely significant effects of a development are taken into account, including cumulative effects.

2.67 There is no prescriptive guidance on the methodology for the assessment of cumulative effects in Ireland. However, the Institute of Environmental Management & Assessment (IEMA) Guidelines[18] 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

[18] IEMA, 2004. Guidelines for Environmental Impact Assessment. IEMA.

- 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.

2.68 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

2.69 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, Ramboll has developed an approach which 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.

2.70 Intra-project cumulative effects from the proposed development itself on existing off-site and future on-site 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.

2.71 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.

2.72 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, as Imperceptible and not significant effects are, by definition, Not Significant in their nature in terms of EIA. 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 holistically presented within a discrete assessment chapter (Chapter 16: Cumulative Effects of this EIAR Volume) and not within each of the technical assessment chapters. This avoids unnecessary duplication and repetition and presents a proportionate approach.

2.73 With regard to the potential for cumulative effects to occur, it is anticipated that standard mitigation measures as detailed in Chapter 5: Demolition and Construction Description of this EIAR Volume 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

2.74 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.

2.75 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.

2.76 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.

2.77 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 consented/approved or have resolution to grant or are currently at early stage of demolition/construction; and
- are within 1km of the application site

2.78 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.

2.79 The location of the cumulative developments considered in the EIAR is shown in Figure 2.1 overleaf and the description of each cumulative developments, is summarised in Table 2.3.

2.80 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.

Table 2.3: Cumulative Development Descriptions

No.	Address (Application Reference)	Planning Application Description	Application Status
1	Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 [SD20A/0283]	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 – 29/03/2021 Enabling works in progress
2	UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	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 16.5 hectares (ha).	Grant Permission – 09/09/2020 Construction in progress
3	UBC Properties -Grange Castle South Business Park, Dublin 22 [An Bord Pleanála Reference – 308585]	Clutterland 110 kilovolt (kV) GIS Substation building and two underground single circuit transmission lines.	Approved 07/05/21
4	Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 [SD17A/0377]	Revisions and alterations of the permitted development of a data processing facility under planning Ref: SD12A/0002 on a 3.85ha site. The revised application consists of alterations to the DUB14 (previously DUB12) data centre/warehouse	Grant Permission – 15/12/2017 Constructed

Table 2.3: Cumulative Development Descriptions

No.	Address (Application Reference)	Planning Application Description	Application Status
		structure, granted in the previous application. The alterations to the DUB14 (Previously DUB12) include: (i) two data halls 2137sqm (increase of 180sqm), (ii) offices/reception 478sqm (decrease of 190sqm), (iii) support space/staff facilities and internal plant with a floor area of 953sqm (increase of 84sqm), (iv) external plant of 1,777sqm (footprint increase of 35sqm).	
5	Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 [SD18A/0134]	Demolition of the existing single-storey house of 'Erganagh' and the construction of a two-storey data centre and delivery bays with associated three-storey office block and services that will have a gross floor area of 35,426sqm on an overall site of 9.2 ha.	Grant Permission – 24/09/2018
6	Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0295]	Amendments and modifications to the permitted data centre development granted under Registration Ref SD18A/0134 - ABP Ref. ABP-302813-18 and the temporary substation	Permission granted under SD19A/0300
7	Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 [An Bord Pleanála Ref - 309146]	Two 110kV transmission lines and a 110kV Gas Insulated Switchgear (GIS) substation	Due to be decided
8	Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	Construction of a gas fired power plant with an electrical output of up to 125MW with associated balance of plant, equipment and buildings.	Due to be decided
9	Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD21A/0186]	Construction of a three-storey (part four-storey) data centre known as 'DB8' to include data halls, electrical/plant rooms including internal generators, offices, lobbies, ancillary staff areas including break rooms and toilets, stores, stair/lift cores throughout and photovoltaic panels at roof level.	Request additional information – due to be decided

2.81 As part of the cumulative assessment, consideration has been given to the proposed permanent electrical connection for the site that would be located <50 m to the southeast of the site. This is likely to comprise a 110kV gas-insulated switchgear (GIS) substation and two underground circuit transmission lines and would be subject to a strategic infrastructure development (SID) application to An Bord Pleanála (ABP) in due course.

2.82 Both of these developments fall under the control of the Applicant and therefore their development programmes have been used to inform the defined existing and future baselines scenarios as discussed previously.

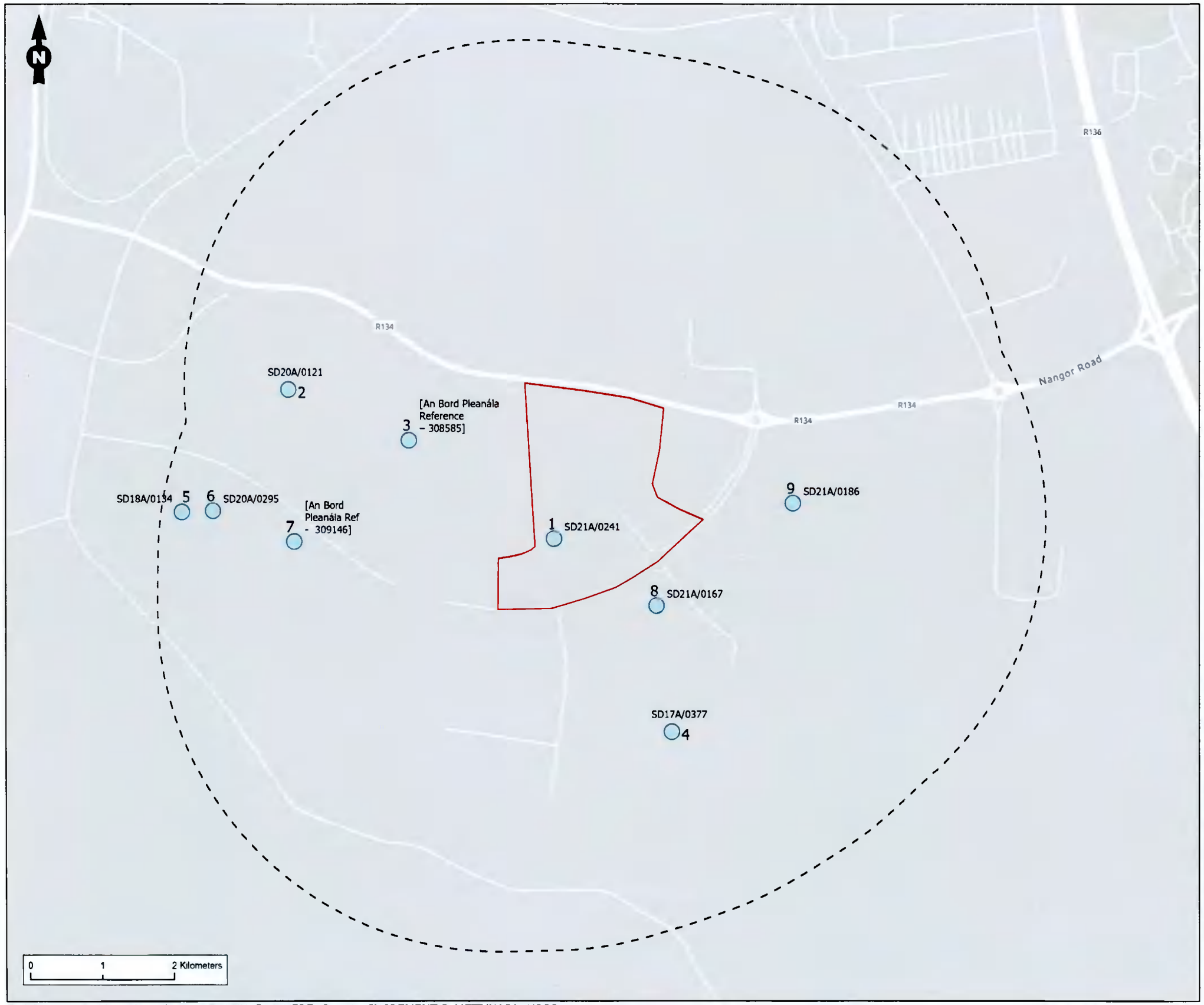


Figure 2.1: Cumulative Development Locations

Assumptions and Limitations

2.83 The principal assumptions that have been made, and any limitations that have been identified, in undertaking the EIA are set out below. Assumptions specifically relevant to each environmental topic have been set out in each technical assessment of the EIAR.

- Baseline conditions have been established from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions at the site and surrounding land uses may change.
- The assessments contained within each of the technical assessments of this EIAR Volume and within EIAR Volume 2 are based on the current legislative and policy framework, having regard to emerging policies and legislative changes.
- It is assumed that information received from third parties is accurate, complete and up to date.
- The assessments contained within each of the technical assessments of EIAR Volume 1 and within EIAR Volume 2 are based upon the application drawings submitted.
- The assessments contained within each of the technical chapters are based on the assumption that embedded mitigation measures set out in the application drawings, through regulatory regimes or via the management controls as set out in Chapter 4: Proposed Development Description and Chapter 5: Demolition and Construction Description of this EIAR Volume are implemented.
- The assessments contained within the Chapter 8: Air Quality and Chapter 9: Noise and Vibration of this EIAR Volume are based on industry-average specifications for construction, mechanical and services plant as project-specific details will be finalised during the construction planning and procurement stages.
- Demolition and construction works across the site would take place substantially in accordance with the phasing and programme of works described in Chapter 5: Demolition and Construction Description of this EIAR Volume.
- Cumulative developments would be implemented substantially in accordance with information that is publicly available or that has been provided to the Applicant, and subject to the same regulatory regimes and good practice management controls.
- Assessments have assessed the existing baseline conditions at the time of EIAR preparation (mid-2021) unless otherwise stated in the technical assessment chapter. The majority of baseline survey work was undertaken during the COVID-19 pandemic; therefore, where relevant, pre-COVID-19 data has been used to compare and supplement collected data. In respect of transport, the data presented is the best information available, given traffic surveys were not possible because of the 2020/2021 COVID lockdown restrictions, derived by adopting the following approach:
  - Baseline Traffic Flows have been taken from surveys undertaken to inform the Traffic Impact Assessment for submitted Grange Castle Business Park South, Baldonnel, Dublin 22 (Ref SD20A/0121).
- While it is widely acknowledged the COVID-19 pandemic has seen an increased prevalence of home-working and reduced traffic, noise and emissions, this is expected to gradually reverse when lockdown is lifted. It is not possible to predict what may change in the future, so it is considered that assessments based on or supplemented by pre-COVID-19 baseline assessments are reasonable and representative. In actual fact, the main difference would be to traffic flows, where pre-COVID19 baselines are worse, and therefore the assessments are based on reasonable worst-case scenarios.
- The EIAR does not include assessment of the decommissioning stage effects of the proposed development due to the long design life of the proposed development. It is assumed that an appropriate assessment of the potential decommissioning effects, and relevant mitigation proposed, would be undertaken prior to such works progressing.

Technical Assessment Chapters

2.84 A consistent approach to the presentation of EIA findings in the EIAR has been adopted for each of the technical assessments, including:

- explanation of the information gathering and assessment methodology, including a review of policy and legislative requirements of relevance to the specific technical area;
- description of the baseline conditions;
- description of mitigation that has been embedded into the proposed development's design;
- the identification and assessment of the potential impacts and likely effects arising during the demolition, construction and operation of the proposed development taking into account any embedded mitigation measures;
- description of additional opportunities for mitigation or enhancement to reduce the significance of any negative environmental effects, including the requirements for post-development monitoring; and
- assessment of the residual environmental effects and an evaluation of their significance against defined criteria.

2.85 Each environmental topic considered in the EIA has been assigned a separate chapter in EIAR Volume 1 (Chapter 6-15) with the exception of the landscape, visual and cultural heritage impact assessment which is presented separately in EIAR Volume 2. Within each technical chapter the assessment is presented and reported in the following format:

- Introduction – a brief introduction to the assessment;
- Methodology – an overview and review of policy and legislative requirements of relevance to the specific technical area, an outline of the technical, spatial and temporal scope of the assessment, a description of the methods undertaken to characterise the baseline, as well as an explanation of the approach to defining the significance of likely environmental effects;
- Baseline Conditions – a description of the baseline conditions;
- Assessment of Effects – an assessment of the likely significant effects of the proposed development and an evaluation of their significance against defined criteria taking into account embedded mitigation;
- Assessment of Residual Effects – a description of the additional mitigation, if required and then an assessment of the likely residual effects of the proposed development;
- Summary of Residual Effects – tabulated summary of the residual effects;
- Cumulative Effects – cross reference to the intra-cumulative effects assessment in Chapter 16: Cumulative Effects (of this EIAR Volume) and an assessment of inter-project cumulative effects; and
- Summary of Assessment– brief summary of the technical assessment.

3. ALTERNATIVES AND DESIGN EVOLUTION

Introduction

3.1 The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018[1,2] requires that information provided by the developer in an EIAR shall include a description of the reasonable alternatives studied by the developer[3]. 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.

3.2 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.

3.3 The following three alternatives were considered:

- The 'Do-Nothing' alternative;
- Alternative locations and uses; and
- Alternative design/layouts of the proposed development.

3.4 Further details can be found in the Design Statement which accompanies the application.

Development Objectives

3.5 The proposed development aims to develop the existing low grade agricultural land to meet development aspirations set out within local and regional policies.

3.6 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 12 data modules;
- Create a high-quality Business Park environment;
- Provision of SuDs and green infrastructure;
- Increased biodiversity;
- Increase the ecological value of the Baldonnel stream;
- Reduced climate impact of the proposed development and increase climate resilience;
- Increase capacity and resilience of the local grid network.

Development Considerations

Policy Considerations

3.7 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)[4];
- National Development Plan (NDP) 2018-2027 (2018)[5];
- National Climate Action Plan 2021[6];
- 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"*;
- South Dublin County Council Corporate Plan 2020-2024[8];
- South Dublin County Council (SDCC) Development Plan 2016-2022[9] – in particular Objective EE: *"To provide for enterprise and employment related uses"*.

3.8 The proposed development has had consideration for the following emerging policy and guidance:

- Draft SDCC South Dublin County Development Plan 2022-2028[10].

Site Considerations

3.9 The following site considerations informed the design process:

- Sensitive receptors adjacent to the site (in particular the residential property in the vicinity of the site);
- Site allocations under aforementioned planning policies;
- On-site environmental features, such as Baldonnel stream and existing trees and hedgerows.

Environmental Considerations

3.10 The design has given consideration to the following primary environmental constraints:

- Sensitive receptors adjacent to the site (in particular with adverse air quality and noise);
- Baldonnel Airfield Height Limit for the area;
- On-site trees and hedgerows;
- The surrounding landscape and visual character;

[1] Government of Ireland, 2018. European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018. S.I. No. 296/2018. ISB.
[2] Later amended to: Government of Ireland, 2018. European Union (Planning and Development) (Environmental Impact Assessment) (Amendment) Regulations 2018. S.I. No. 646/2018. ISB.
[3] See Article 5(1)(d) of Directive. See Schedule 6(1)(d) to the Regulations.
[4] Government of Ireland, 2018. National Planning Framework (NPF) – Ireland 2040 Our Plan (February 2018) [online]. Available at: https://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf [Accessed on 28/06/2021].
[5] Government of Ireland, 2020. National Development Plan 2018-2027 (last updated 26 November 2020) [online]. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/37937/12baa8fe0dcb43a78122fb316dc51277.pdf#page=null [Accessed on 28/06/2021].
[6] Government of Ireland, 2021. Climate Action Plan. Department of the Environment, Climate and Communications
[7] Eastern & Midland Regional Assembly 2019. Regional Spatial & Economic Strategy 2019-2031 [online]. Available at: https://emra.ie/dubh/wp-content/uploads/2020/05/EMRA_RSES_1.4.5web.pdf [Accessed on 20/07/2021]
[8] SDCC, 2020. South Dublin County Council Corporate Development Plan 2020-2024, [online]. Available at: corporate-plan-2020-24.pdf (sdcc.ie) [accessed on 30/11/2021]
[9] SDDC, 2016. South Dublin County Council Development Plan 2016-2022 [online]. Available at: https://www.sdcc.ie/en/services/planning/development-plan/plan-2016-2022/ [Accessed on 28/06/2021].
[10] South Dublin County Council, 2021. South Dublin County Development Plan 2022-2028 [online]. Available at: https://consult.sdublincoco.ie/en [Accessed 19/07/2021]

- Greenhouse gases;
- Flood risk at the site (primarily from the blocked downstream culvert) and infiltration associated with the Baldonnel stream;
- Biodiversity of the site and Baldonnel stream; and
- Water quality of the Baldonnel stream.

Consultation

Pre-Submission Consultation

3.11 As part of the pre-submission design process, pre-application consultation was held with SDCC on 23 June 2021, in which a range of issues were identified which influenced the design evolution of the proposed development. The pre-app comprised a presentation of the basis of design of a large data center appropriate to the lease of large modules of data space to major hyperscale customers.

3.12 Site constraints including flood risk, stormwater attenuation, nearby noise-sensitive receptors, preservation of hedgerows, and the current warehouse consent were discussed during the pre-application meeting.

3.13 The alignment of the Baldonnel Stream and measures proposed to mitigate any negative impacts were discussed. The SDCC team focused on this as a significant obstacle to the scheme both from a policy and an environmental standpoint.

3.14 The design team were tasked to respond to the consultation and look in more detail at the issues related to the stream. A second pre-application meeting was held with SDCC on 19 July 2021 in which the stream diversion was discussed. The key elements of the meeting included:

- A summary of the ecology investigations since the last meeting, more detailed landscape and water management proposals; and
- SDCC requested biodiversity management and landscaping proposals and an assessment of alternatives that could avoid the stream realignment.

3.15 The proposed development design which was submitted as part of the August 2021 EIAR, was informed by pre-submission consultation.

Additional Information Request

3.16 On 26 October 2021 SDCC responded to the planning application requesting Additional Information to address a number of issues, as outlined in Chapter 2.

3.17 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 is discussed in detail in Chapter 4: Description of Development.

Alternatives

Do-Nothing Alternative

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

3.19 For the purposes of the EIAR, the 'Do Nothing' scenario is where no development occurs on the site and therefore remains vacant and unchanged.

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

- The site consists of largely unused agricultural land and the site needs to be re-purposed;
- The site is located within Profile Park, on current agricultural land, which is designated in the SDCC Development Plan 2016-2022: 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 center would support RPO 8.25 to promote Ireland as a sustainable international destination for ICT infrastructures (such as data centres);
- The previous landowners secured planning consent in November 2020 for the development of a distribution warehouse (SDCC planning reference: SD20A/0124; refer to Table 1.1 in Chapter 1: Introduction of this EIAR Volume for further information);
- The proposed development, consisting of two data center buildings, would sit within a cluster of data centres within Profile Park;
- The Profile Park area has excellent fibre connectivity; and
- The 'Do-Nothing' alternative does not meet any of the developers objectives for the site.

3.21 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 Profile Park and the surrounding area as a data center hub; and
- Loss of opportunity to improve on-site biodiversity.

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

Alternative Sites

3.23 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 located within an area identified in SDCC's Development Plan 2016-2022 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 centers 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 south of the site;
- The proposal includes on-site power generation to ensure that the development would reinforce the grid and not lead to supply disruption in the surrounding area at peak demand;
- Dense hedgerows along the east and west boundaries creates a natural visual screen;
- There is no evidence of site contamination; and
- The level terrain is suitable for large floorplate buildings.

Alternative Land Uses

3.24 The proposed land uses have been informed by prevailing local and regional policy (as previously stated). Accordingly, no other land uses were considered outside of the proposed development.

3.25 The site has an extant permission for a distribution warehouse (SDCC planning reference: SD20A/0124); however, due to the site utilities connections and the surrounding uses the Applicant does not propose to build out the extant permission. Additionally, the viability of building the data center inside the envelope of the warehouse consent was investigated and rejected due to the limited developable floorspace, and therefore the insufficient number of data modules. In the instance that the client utilised the envelope of the warehouse consent it would only be possible to fit in 60% of the required data modules.

Alternative Layouts, Designs and Design Evolution

3.26 The following sub-sections of this chapter describe the design evolution process undertaken by the Applicant's design team. A series of site layout and built form options are presented and described along with an explanation of the decisions that have informed the evolution of the alternatives considered. Commentary has been provided where changes have been informed by (e.g.) pre-application consultation, post-application consultation with SDCC and/or environmental considerations.

3.27 A series of concept options were explored throughout the design development process. These sought to define the most appropriate design response for the site. The alternative layouts, designs and design evolution of the proposed development is presented in Table 3.1.

Site Arrangement

3.28 As part of the initial design process, the design team carried out a 'test-fit' exercise to assess the capacity of the site based on maximum utilisation or the irregular shaped site, as shown below in Table 3.1. The proposed development design as presented in the August 2021 EIAR was the outcome of this exercise and formed the basis of the scheme applied for in August 2021.

3.29 As displayed in Table 3.1, as part of the 'test-fit' exercise numerous alternative layouts were considered by the Applicant, were assessed and ranked on feasibility using a Pass/Fail system against a 'business case' which needed to be achieved; the result of which are presented in Table 3.1.

3.30 For the 'business case' to be achieved the viability of each site depends on achieving a specific number of modules. The 'business case' complexity is further compounded by the need to include a Multifuel Generation Plant (MFGP) to meet EirGrid's requirements proposed under the DCCOPP. In the case of the proposed development the number of modules required is 12 to pass feasibility.

3.31 The addition of on-site power generation to support the national utility capacity both reduces the space available for data centers within the site and raises the viability threshold for the number of data modules.

Power Generation

3.32 Following the AI Request from SDCC, the power generation approach and design for the proposed development has evolved, with a notable focus on compliance with the Climate Action Plan 2021, as detailed below in Table 3.1. This is discussed further within the additional information (AI) letter.

Table 3.1: Proposed Development Design Evolution

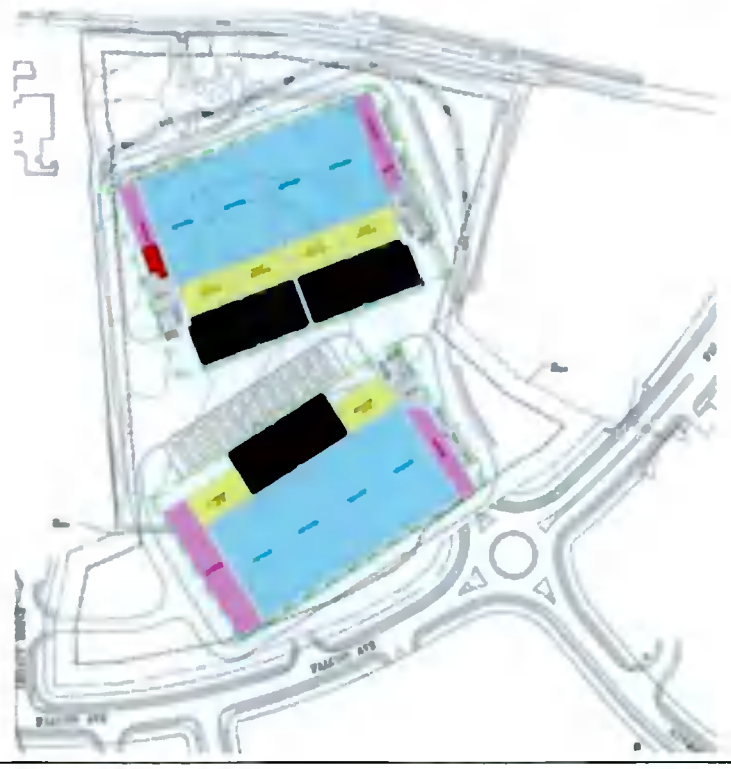
Concept Option	Concept Layout	Concept Test Fit Outcome	Concept Assessment Against Business Case	Power Generation Concept
Pre-Application Design Alterations				
1 – Test Consented Scheme		The standard design superimposed on the consented warehouse scheme yields an 8-hall data center.	**Fail** – Not enough data space to meet business case.	Main power supply for the proposed development would be from the EirGrid substation proposed to the south of Falcon Avenue. The proposed development included a gas-powered generation plant which would connect to the EirGrid in due course. A temporary power plant was proposed until the main EirGrid connection became available. In the event of a loss of power supply, diesel powered backup generators would be provided to maintain power supply.
2 – Maximum Site Coverage		Spatial exercise to see how many halls can fit on the site by building over the stream and using standard design.	**Fail -** Achieves 16 modules but without space for parking and onsite power plant as required by EirGrid.	

Table 3.1: Proposed Development Design Evolution

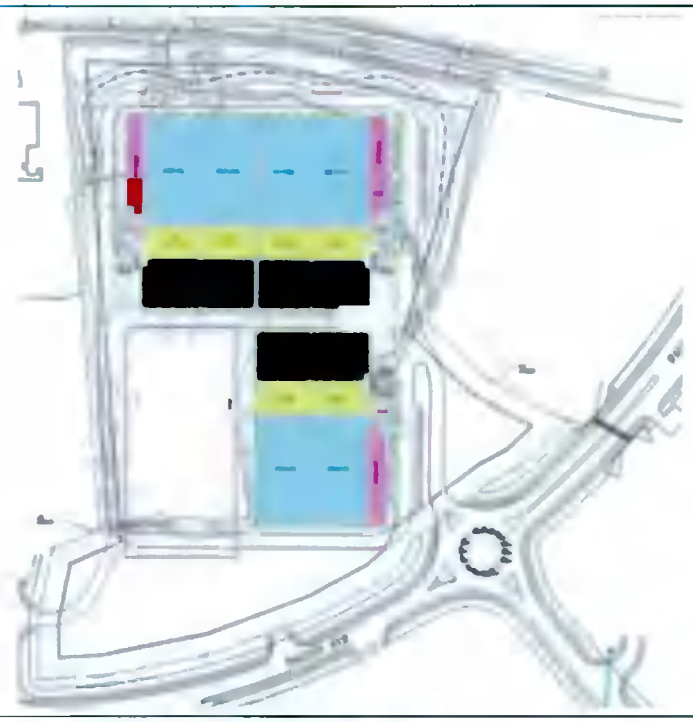
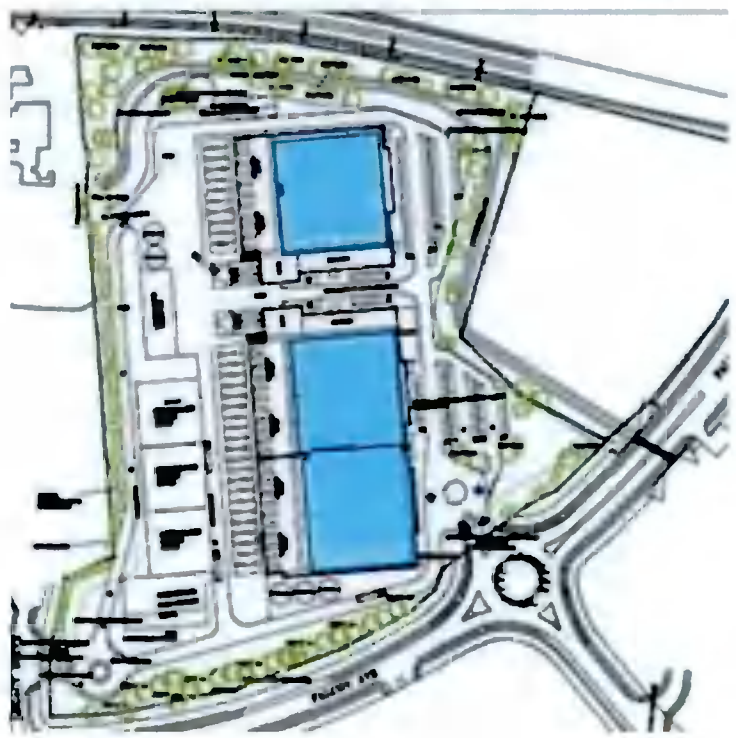
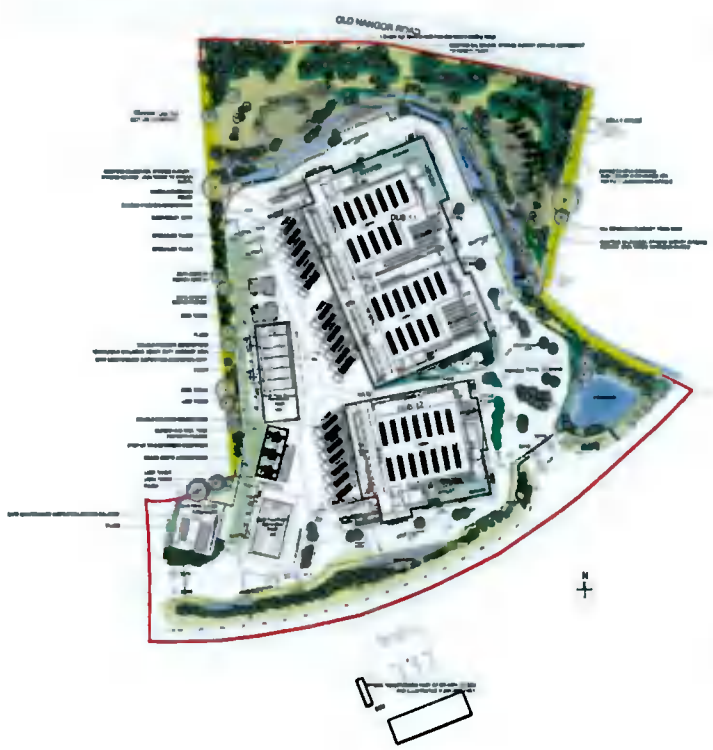
3 – Maximum Including Power Plant		Spatial exercise to see how many halls can fit on the site using standard design and with space for a power plant.	**Pass** – Achieves 12 data modules to meet the business case with space for a power plant	
4 – Site Plan Development		Design Evolution using CAD and with power plant. Stream realigned. Plant placed away from sensitive receptors.	**Fail** – Meets the business case but concerns raised by SDCC in pre-app meeting, notably around watercourse and loss of biodiversity.	
5 – Options to avoid stream diversion	Not feasible	Options tested to see if stream diversion can be avoided while still meeting the design brief.	**Fail –** At the time of the text fit exercise none of the options evaluated for retaining the current position of the watercourse achieved the business case for the site. It should be noted that the capital cost of the power plant means a minimum of 12 modules are essential. The only way to reduce the footprint enough to free space for the stream is to increase the number of	

Table 3.1: Proposed Development Design Evolution

			storeys which conflicts with the general 20 m height limit in the Local Plan and creates visual impact issues.	
6 – August 2021 Proposed Development		Intensive design work on landscaping and ecology aspects of the scheme to create a new watercourse that is longer, wider and richer than the existing. Stormwater management to reduce below ground attenuation and lower flood risk.	**Fail –** Concerns raised by SDCC around overdevelopment of the site, particularly the proposed stream realignment and a perceived lack of improvement to landscaping and biodiversity.	
Alternative scheme presented as part of the Additional Information response				
7 – Revised Proposed Development (the 'proposed development')		Redesign of the proposed development to: • Retain the Baldonnel stream to avoid realignment; • Shifted DUB11 and DUB12 south to reduce visual impact along the northern frontage; and • Incorporate a large number of natural solutions, SuDs and green infrastructure to increase stormwater attenuation and reduce flood risk.	**Pass –** Applicants preferred outcome to balance business drivers with biodiversity gains and long-term site improvement. This option avoids the stream diversion and will make significant improvement to landscaping and biodiversity. The design evolution deviates from the test fit carried out in Evolution 5 to avoid an extra storey whilst retaining the current stream alignment. This has been achieved by double stacking the generators, which leads to operational complexity and additional construction costs but meets the AI request to retain the current stream alignment.	Power for the proposed development would be provided by a MFGP from approximately Q4 2023 to Q1 2025 until such time that the connection to the GNI Gas Connection becomes available. Initially, the MFGP would be powered using hydrotreated vegetable oil (HVO) until such time that the natural gas connection by GNI is available. As part of the greener gas supply, at some point in the future we understand the intention by GNI is that natural gas will be decarbonised and mixed with 20% hydrogen or biogas. The MFGP has the flexibility to operate using these different fuel types. Once the GNI gas supply is operational, HVO would be used as the primary back-up fuel for the MFGP. Once operational the EirGrid GIS substation would power DUB11 and DUB12. In the event of a power outage to DUB11 and DUB12, emergency back-up generators would be powered by diesel.

Revised Proposed Development

3.33 The revised proposed development has been chosen for the reasons afore summarised in the upfront section of this chapter and Table 3.1. This section of the chapter describes in detail how the proposed development design has responded to environmental constraints and the outcome of these design changes.

Flood Risk and Rainfall

3.34 The site is at risk of flooding due to the location of the Baldonnel stream and the culvert. The design has sought to minimise flood risk through incorporating natural solutions across the site through:

- Incorporating increased above ground attenuation ponds providing SuDs;
- Collection of rainwater from roof generator yard areas and discharge of this into a new on-site attenuation pond;
- Implementation of green roofs onto office roofs to provide additional stormwater attenuation;
- Use of the northern section of the site for flood water compensation and attenuation to aid the downstream culvert to reduce flood risk; and
- Hardstanding (where required) would be designed to collect and attenuate rainwater from the front road areas of the data halls to reduce flood risk.

3.35 The extant permission on site proposed to use below ground attenuation. The proposed development provides flood compensation to the north of the Baldonnel stream and land to the south of the Baldonnel Stream for above ground attenuation and SuDs to remove the need for below ground attenuation.

Landscaping

3.36 The site comprises mature trees and hedgerows. Trees located in the centre of the site would be removed as to not limit the layout of the site and building positions. The design has sought to protect existing trees and hedgerows as far as reasonably possible through:

- Retention of mature trees located near to the border of the site;
- Implementation of a tree protection strategy; and
- Achieving a net gain of trees and hedgerow the planting.

3.37 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.

Landscape and Visual Impact

3.38 The built footprint of the proposed development has been refined and orientated to reduce the landscape and visual impact:

- Reorientation of data centers so that the office component is fronted along New Nangor Road;
- Reduction in the overall floor level of the proposed development;
- Rearrangement of the back-up generators, which were previously non-stacked and are now double stacked along the west of the data centers to reduce the overall built footprint; and
- Incorporation of green walls into the façades to improve overall perception and visual impact.

3.39 As a result of the retained Baldonnel Stream, DUB11 and DUB12 are staggered in orientation allowing improvements to facades and landscaping from sensitive receptors along the north-eastern frontage and New Nangor road.

Site Access

3.40 The layout of the site has been developed to allow segregated access for site operators and service HGVs from the data center workers. This would reduce disturbance and ease traffic management to/from the site, minimising impacts on the local road network.

Residential Receptors

3.41 The site is adjacent to a residential property to the northeast, which has informed the position and orientation of the proposed development under both the August 2021 application and that proposed as part of the AI response. Generators and other noise and exhaust emitting machinery has been moved to the west of the site, to minimise disturbance to residential properties.

3.42 Likewise, the flues associated with the proposed development are located to the west of the site, situated away from the residential property. Additionally, low-emission equipment with CFD modelling to validate the design will be used.

Climate Change

3.43 Data centers are typically carbon intensive developments and therefore, the Applicant has looked to reduce climate impact through the implementation of a MFGP that has the flexibility to be powered by natural gas, biogas, decarbonised gas and HVO. In addition, through the firm grid connection the Applicant can also buy green power from the make-up of generation on the grid.

Policy Objective EE

3.44 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.

4 PROPOSED DEVELOPMENT DESCRIPTION

Introduction

4.1 This chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the proposed development for the purposes of identifying and assessing the potential environmental impacts and likely environmental effects of the proposed development, as amended under the Additional Information response, in the technical assessments of EIAR Volume 1 (Chapters 6-15) and EIAR Volume 2.

4.2 In accordance with the Regulations, this chapter sets out the physical characteristics of the built development, the proposed access arrangements, the landscaping strategy, utility requirements and estimated emissions and arising's.

4.3 A general description of the site is provided in Chapter 1: Introduction, with more detailed descriptions provided in each technical assessment within EIAR Volume 1 and EIAR Volume 2 and is therefore not repeated here.

4.4 Further detailed information on the proposed development can be found within the following application documents:

- Design Statement;
- Planning Report;
- Architectural Drawings;
- Landscape Masterplan and Drawings;
- Engineering Planning Report;
- Energy Statement;
- Site Lighting Plan; and
- Flood Risk Assessment.

Planning Application

4.5 A planning application was submitted by the Applicant in August 2021 under application reference SD21A/0241. On 26 October 2021 SDCC responded to the planning application requesting additional information (AI) to be submitted. As such, the Applicant is now submitting an Additional Information response, that this EIAR forms part of.

4.6 As indicated in EIAR Chapter 1: Introduction, planning permission is sought by the Applicant under Planning Register Reference no. SD21A/0241 at this site that includes an abandoned single storey residential property on the New Nangor Road (R134), Dublin 22; and on land within the townlands of Ballybane and Kilbride within Profile Park, Clondalkin, Dublin 22 on an overall site of 8.7 hectares.

The development applied for consists of the demolition of the abandoned single storey dwelling and associated outbuilding (206sqm); and the construction of 2 no. two storey data centers with plant at roof level of each facility and associated ancillary development that will have a gross floor area of 40,589sqm that will consist of the following:

- *1 no. two storey data center (Building 11) that will be located to the south of the site and will have a gross floor area of 24,667sqm. It will include 22 no. emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height;*
- *1 no. two storey data center (Building 12) that will be located to the north of the site, and to the immediate north of Building 11 and will have a gross floor area of 12,915sqm. It will include 11 no. emergency generators located at ground floor level within a compound to the western side of the data center with associated flues that will be 22.3m in height;*
- *Each of the two data centers will includes data storage rooms, associated electrical and mechanical plant rooms, loading bays, maintenance and storage spaces, office administration areas, and plant including PV panels at roof level as well as a separate house generator for each facility that will provide emergency power to the admin and ancillary spaces. Each generator will include a diesel tank and there will be a refuelling area to serve the proposed emergency generators;*
- *The overall height of each data center apart from the flues and plant at roof level is c. 14.23m above the finished floor level;*
- *Construction of internal road network and circulation areas, with main entrance off Falcon Avenue to the south, as well as a secondary vehicular access off Legacy Drive to the south-west, both from within Profile Park; footpaths, provision of 144 no. car parking spaces, and 66 no. cycle parking spaces;*
- *Single storey step-up substation (38sqm) as well as 2 no. single storey switch substations (121sqm);*
- *AGI Gas Regulator compound that include 3 no. single storey buildings (134sqm);*
- *Construction of a gas powered generation plant in the form of a 13m high single storey building with a gross floor area of 2,714sqm that will contain 10 gas generators with associated flues that will be 25m in height, and grouped in pairs and threes. The Gas Plant will be located to the west of Building 11;*
- *Ancillary site development works, that will include reorientation of the Baldonnel Stream, biodiversity management initiatives, attenuation ponds and the installation and connection to the underground foul and storm water drainage network, and installation of utility ducts and cables, that will include the drilling and laying of ducts and cables under the internal road network within Profile Park. Other ancillary site development works will include hard and soft landscaping, lighting, fencing, signage, services road, entrance gates, sprinkler tanks and pump room; and*
- *A temporary gas powered generation plant within a fenced yard containing 21 no. generator units in containers, each with associated flues (each 25m high), 12 transformers and 10 containers of controls to be located to the west of, and associated with the first phase of Building 11, and will be required for a period of up to 2 years if connection to the national grid is delayed. This temporary plant will not be built if the connection to the national grid is in place prior to the operation of Building 11.*

The development will be accessed from Falcon Avenue and Legacy Drive from within the Profile Park Business Park that contains an access from the New Nangor Road (R134).

The Significant Further Information / Revised Plans includes a revised site plan that has modified the location of Buildings 11 and 12 within the site that enables the stream to remain in its current alignment within an enhanced riparian strip; amendment to the gross floor area of the entire development to 41,105sqm; revised EIAR that includes new photomontages; revised car parking layout; additional SUDS measures, attenuation and green infrastructure; as well as revised landscaping. It also includes a modification to the nature and use of the Gas Plant to a Multi-Fuel Generation Plant, which includes breaking it into two components and increasing its 11 no. flues to being 30m in height; and that its primary purpose is now to reinforce the national grid.

4.7 In summary, the proposed development, as amended under the AI response, would comprise the following:

- Demolition of the existing single-story dwelling and outbuilding, approximately 206 m^2;
- Erection of the two data centers along with associated emergency generators and flues with a gross floor area of approximately 41,105 m^2;
- Provision of 137 car parking spaces and 66 bicycle parking spaces provision; and
- Construction of a Multifuel Generation Plant (MFGP) with underground fuel storage beneath each block.

4.8 The application redline boundary is shown in Figure 1.1 Chapter 1: Introduction and covers an area of approximately 8.7 ha.

4.9 The proposed development site is divided into two plots, which would deliver two data center buildings: the northern building (DUB 11) and southern building (DUB 12) and the MFGP. The detailed layout, scale, appearance, and landscaping of the proposed development are described within this chapter.

4.10 Accordingly, the figures that accompany the application are outlined in Table 4.1 and are presented in Figures 4.1 – 4.9.

Table 4.1: Schedule of Figures

Figure No.	Name	Description
4.1	Masterplan	Figure showing the layout of the Proposed Development
4.2	Material Palette Detailing	Figure showing the material palette detailing
4.3	DUB11 Elevations	Figure showing the elevation, material palette and façade of DUB11
4.4	DUB12 Elevations	Figure showing the elevation, material palette and façade of DUB12
4.5	MFGP North Building Elevations	Figure showing the elevation, material palette and façade of MFGP North
4.6	MFGP South Building Elevations	Figure showing the elevation, material palette and façade of MFGP South
4.7	Phasing	Figure showing the phasing of the proposed development
4.8	Landscape Masterplan	Figure showing the landscaping proposals including the enhancements to the Baldonnel Stream
4.9	Access Arrangements	Figure showing the vehicular, pedestrian and cycle access routes to the site

Proposed Development

Site Arrangement

4.11 The site masterplan, detailing the site layout, as amended under the AI response, is presented in Figure 4.1 below.

4.12 As illustrated in Figure 4.1, the two data centers would be constructed across the site, broadly orientated north to south, within the southern portion of the site to reduce the visual bulk of the data centers from New Nangor Road. DUB11 and DUB12 would be screened by proposed extensive berms and planting and landscaping to the north of the Baldonnel Stream.

4.13 The proposed development would be oriented to allow the alignment of the Baldonnel Stream, located within the northern portion of the site, to remain as existing whilst also including measures to enhance the ecological value of the Baldonnel Stream.

4.14 The proposed data storage facilities are arranged into two data centers: The larger northern data center (DUB11) and the southern data center (DUB12).

4.15 Each of the data storage facilities would include:

- Data storage rooms;
- Associated electrical and mechanical plant rooms;
- Loading bays;
- Maintenance and storage space;
- Office administration areas;
- Plant at roof level;
- Areas of green roof;
- Standby generators with integral fuel tanks for emergency power to the data halls, admin and ancillary spaces;
- A house generator with integral fuel tanks for each facility that would provide emergency power to the admin and ancillary spaces; and
- A fuelling area to serve the proposed emergency generators.

4.16 New pedestrian and vehicle routes would be provided within the site. The proposed development would include the construction of an internal road network and circulation areas, dedicated pedestrian footpaths, provision of 137 car parking spaces (14 of which would be dedicated to electric vehicle (EV) charging and 7 for disabled users) and 66 bicycle parking spaces in double-stacked covered racks.

4.17 The two main entrances for the site would be from Falcon Avenue in Profile Park for staff, pedestrians and cyclists; and from Legacy Drive in Profile Park for HGVs, maintenance vehicles and construction access. Entry gates would be separated to provide safe division from pedestrian, cycle and car access from large heavy-duty vehicles (HGV) and construction traffic during the phased development and ongoing maintenance of the data centers.

Northern Data Center

4.18 The northern data center (DUB 11) would comprise of a two-storey data center of 24,667 m^2. DUB11 would include 22 double stacked standby emergency generators with associated flues, each 22.3 m in height (95.95m AOD), located to the west of the building.

4.19 DUB11 is designed to be constructed within a single phase and can be fitted out in stages to match the take-up of IT equipment.

Southern Data Center

4.20 The southern data center (DUB 12) would comprise a two-storey data center of 12,915 m^2. DUB12 would include 14 double stacked standby emergency generators with associated flues, each 22.3 m in height (95.95m AOD), and would be located to the west of the building.

Multifuel Generation Plant (MFGP)

4.21 To facilitate the proposed development a MFGP would be constructed to the west of the data centers. The MFGP would consist of a northern plant which would supply DUB11, with a Gross External Area

(GEA) of 1,784 m^2 (including mezzanine floor of 310 m^2), and a southern plant which would supply DUB12, with a GEA of 1,258 m^2 (including mezzanine floor of 187 m^2).

4.22 Flues for the MFGP would be 30 m in height (102.32 mAOD) and finished in light grey cladding. There is a larger casing to the flues up to 20 m high (92.32 mAOD) to conceal the silencers.

4.23 Power for the proposed development would be provided by the MFGP from approximately Q4 2023 to Q1 2025 when the connection to the GNI gas connection becomes available. Initially, the MFGP would be powered using hydrotreated vegetable oil (HVO) until such time that the natural gas connection by GNI is available.

4.24 As part of the greener gas supply, at some point in the future we understand the intention by Gas Networks Ireland (GNI) is that natural gas will be decarbonised and mixed with 20% hydrogen. The MFGP has the flexibility to operate using these different fuel types.

4.25 Once the GNI gas supply is operational, HVO would be used as the primary back-up fuel for the MFGP.

Single Storey Switch Room

4.26 Two single storey switch rooms of 60 m^2, would provide a medium voltage (MV) connection to the proposed development. The proposed switch rooms would include works to install new underground ducting and cables within a new trench that would extend approximately 450 m south from the proposed switch room to the proposed EirGrid substation to the south of the application site.

4.27 In the event of a local grid network failure or demand spike, the onsite MFGP would have the capacity to provide equal energy to the amount consumed on site and as such would support the local power infrastructure requirements.

MFGP Underground Fuel Storage

4.28 The MFGP fuel oil (FO) system would be provided for secondary fuel (HVO) and would be sized to provide 72 hours of fuel at 100% capacity. The 2 million litre fuel storage facility would be located below the footprint of the two blocks of the MFGP facility within buried double-skinned steel tanks and would be fully compliant with all environmental protection agency standards and regulations.

4.29 The tanks would be fully bunded with monitors and alarms for fuel level and fuel spill with a breach of primary containment. The fuel storage basement would be protected by manual and automatic fire protection.

4.30 Further detail and cross sections of the underground tanks are provided in information accompanying the AI Response by Burns & McDonnell.

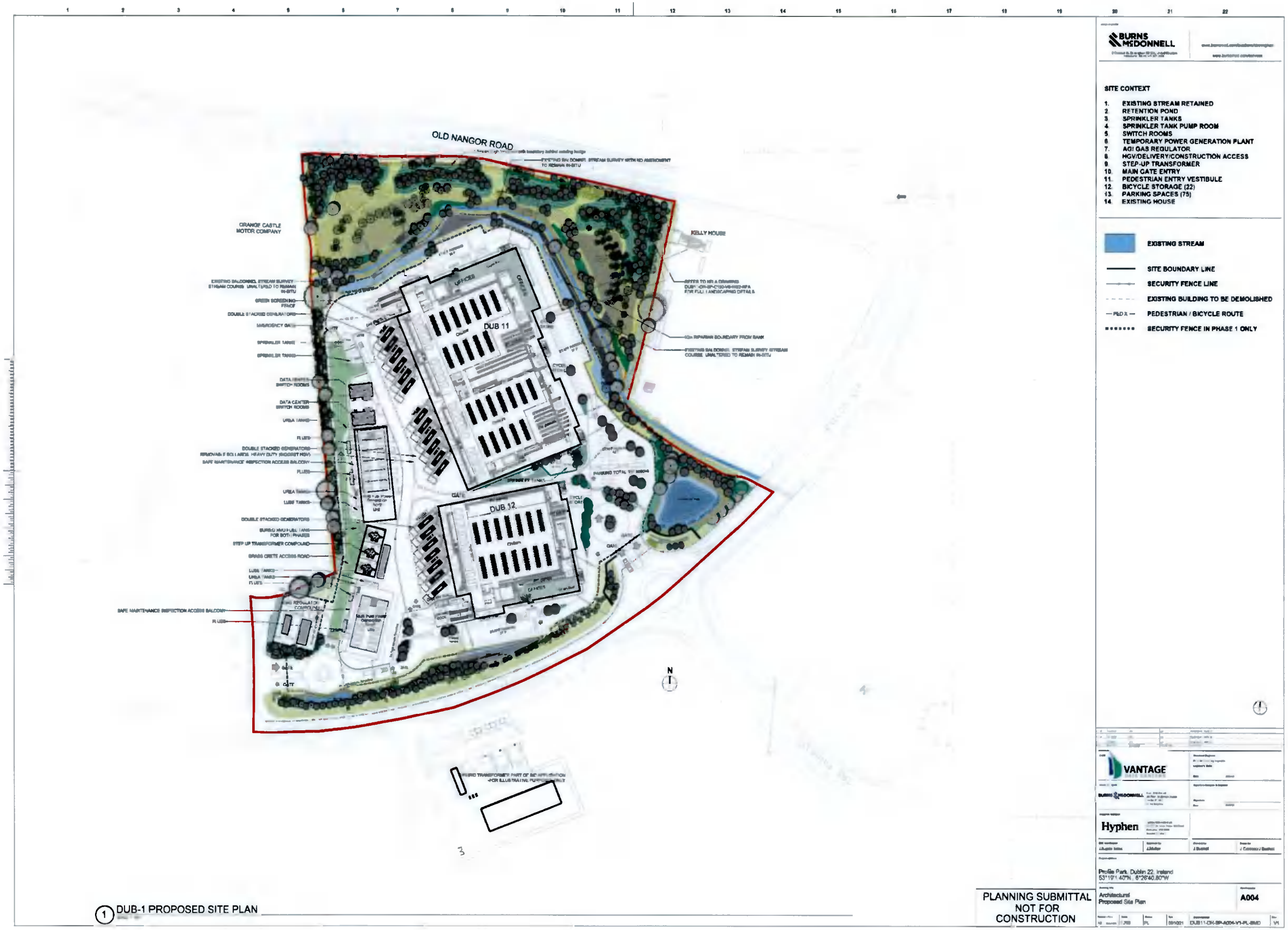


Figure 4.1: Proposed Development Masterplan (Source Burns & McDonnell)

Power Generation Plant and Connection

Main Supply

4.31 The power solution for the proposed development would be provided by a MFGP from approximately Q4 2023 to Q1 2025. Initially, MFGP would use HVO as the fuel source. Once the GNI gas connection is operational and available, HVO would be used as the primary back-up fuel for the MFGP.

4.32 As part of the greener decarbonised gas supply, the intention by GNI is that natural gas would be decarbonised and mixed with 20% hydrogen or biogas in the future. The MFGP has the resilience and flexibility to operate using these different fuel types.

4.33 Once operational, the main electrical supply to the campus would be provided from ESB via a network substation to a switch room on site with two diverse 20kV distribution feeds to each of the data centres. DUB11 and 12 would be powered from the EirGrid connection across Falcon Avenue.

4.34 Once the EirGrid connection is available the MFGP will operate as a peaking power unit and would address EirGrid's Data Centre Connection Offer Policy and Process (DCCOPP) requirements and would have the capacity to provide equal energy to the amount consumed on-site. In the event of a local grid network failure this power generation facility would provide additional power to the network infrastructure on demand, in accordance with the EirGrid DCCOPP.

4.35 The proposed MFGP would provide power security within the local and wider area. Energy production would reinforce the national gird and ensure supply of electricity to the wider national grid if and when required; irrespective of the demand on power of the proposed data centers. The MFGP is scaled to ensure it has capacity to dispatch energy equivalent to or greater than the data centers demand into the national grid.

4.36 Within the data centers equipment would be predominantly located indoors except for the lube oil tanks, lube oil pumps, air-cooled radiators, and exhaust fans. A control room would be in the new facility and would include workstations for the (engine) generators and balance of plant equipment. A new plant control system would be provided to integrate the generators and balance of plant equipment.

4.37 The MFGPs generator units would use medium voltage cabling in conduit/tray to make the connections. The MFGP service loads would derive from two single ended 400V switchgear lineups that would serve various panelboards and motor control centers throughout the plant. Two new 11 kV/400 V transformers, power by the new 12 kV switchgear line ups, would serve the 400 V gear and plant loads.

4.38 Permanent power is from the EirGrid substation. Two 100 MVA 110/20 kV Transformers would be installed at the EirGrid substation across the road from the main site to provide two independent 20 kV feeds to two separate prefabricated switchgear buildings. Two 20kV sectionalizing breakers would be installed in each of the switchgear buildings to provide a means of load transfer in the event of a transformer outage. Each 20 kV switchgear building would provide eight underground feeds to the Data Center for complete redundancy which would run to the west of the buildings.

Back-Up Supply

4.39 In the event of a loss of power supply, diesel powered back-up generators would be provided to maintain power supply. The back-up generators are designed to automatically activate and provide power to the plant pending restoration of mains power. A total of 36 double stacked generators are provided which are fed by dedicated bunded diesel storage tanks within each building. Fuel is stored under each genset in a double-walled belly tank with a capacity of 18 cubic meters. The back-up generators would be subject to periodic testing to ensure they remain serviceable and are only anticipated to be required in an exceptional event e.g., grid blackout.

4.40 In the event of a loss of gas connection to the MFGP back-up fuel supply would be provided from the underground HVO fuel storage tanks which are sized to provide 72 hours of fuel at 100% capacity. This allows the MFGP to continue meeting EirGrid DCCOPP requirements.

Land Use

Area Schedule

4.41 The summary floorspace schedule for the proposed development is presented in Table 4.2 including the quantum of each use to be delivered across the proposed development.

Table 4.2: Floorspace Schedule

Use	Gross External Area (GEA) m²
North Data Center DUB11 (including ancillary floorspace e.g. offices but excluding plant/substation)	24,667
South Data Center DUB12 (including ancillary floorspace e.g. offices but excluding plant/substation)	12,915
Multifuel Generation Plant North Building (including mezzanine of 310 m²)	1,784
Multifuel Generation Plant South Building (including mezzanine of 187 m²)	1,258
Switch Rooms (4 no. in 2 blocks)	252
Step-up Substation	95
AGI Gas Regulator	134
Total	**41,105**

Built Form, Height and Massing

4.42 The scale and massing of the proposed development seeks to respond to its surrounding context, in particular existing surrounding data centers, agricultural land, the Baldonnel Stream, whilst maximising the sites potential for data center usage and employment generation.

4.43 The topography of the site ranges from approximately 71.47 m AOD in the north to approximately 76.11 m AOD in the south.

4.44 The maximum overall height of each data center building, excluding the flues and plant at roof level is 15.70 m above finished floor level (FFL). Flues which are grouped in stacks of three and four flues would be 22.3 m in height (95.95m AOD) from ground level associated with the data center emergency generators and 30 m in height (102.32 mAOD) associated with the MFGP.

4.45 Table 4.3 summarises the maximum heights of proposed development components within the application site which are also shown overleaf in Figures 4.3 – 4.4.

Table 4.3: Maximum Plot Heights

Proposed Development Component	Height Above Ground Level (m)	Maximum Height (m AOD)
DUB11 Parapet/Stair Tower	14.23/21.55	95.40
DUB12 Parapet/Stair Tower	14.23/21.55	95.40
Genset Flues (within each data center building)	22.30	95.95
Multifuel Generation Plant (excluding plant at roof level)	18.00	92.00
Multifuel Generation Plant Flue Height	30.00	102.32
Switch Rooms	4.80	78.80
Gas Regulator	3.69	77.69
Step-up Substation/Blast Wall	4.22/5.50	79.50

Material Palette and Façade Detailing

4.46 For the proposed development, different options have been selected in respect of materiality, architectural style and detailing, to be implemented through design codes.

4.47 The northern and southern data centers would predominately comprise sandwich panels in white, light grey and dark grey, consistent with the surrounding data centers with some areas of green walls. The approach to materials is to use good quality materials in a restrained way with a limited palette of colours and finishes. The same approach has been taken on the MFGP.

4.48 The northern and southern elevations of DUB11 and the southern elevation of DUB12 will incorporate green walls. Living green walls would be introduced at ground level to increase biodiversity and soften the building at street level.

4.49 Rooftop plant, including chillers and transformers, are masked by dark grey mesh panels. Office entrances, generator plant and other ancillary building's façade would comprise a similar palette of dark grey mesh and aluminium curtain wall.

4.50 The material palette detailing is displayed in Figure 4.2.

Figure 4.2: Material Palette Detailing

4.51 The material palette and façade detailing of DUB 11 and DUB 12 and the MGFP is presented overleaf in Figures 4.3 - 4.6 which show elevations of the data centers and MFGP.

Figure 4.3: DUB11 Elevations (Source Burns & McDonnell)

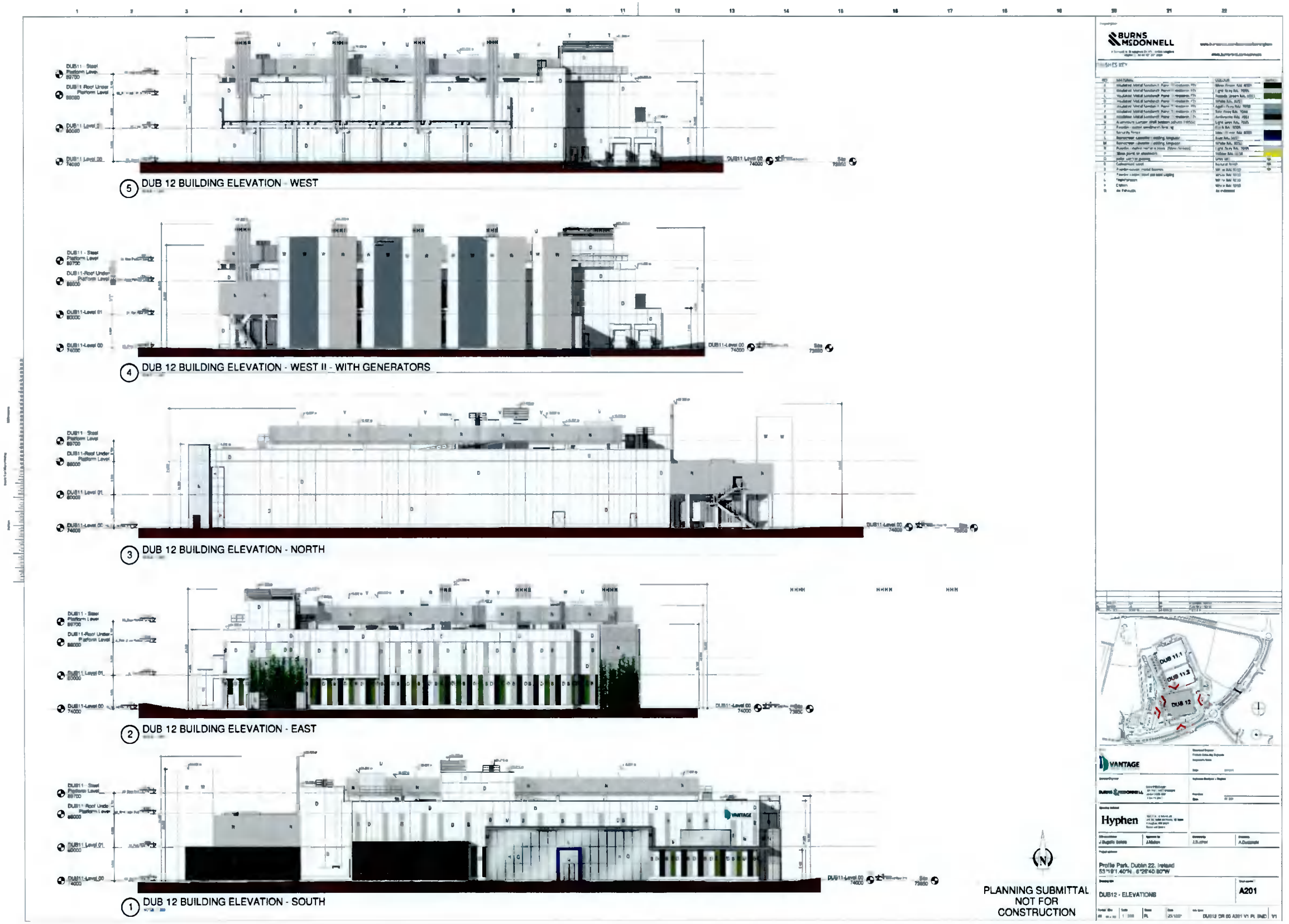


Figure 4.4: DUB12 Elevations (Source Burns & McDonnell)

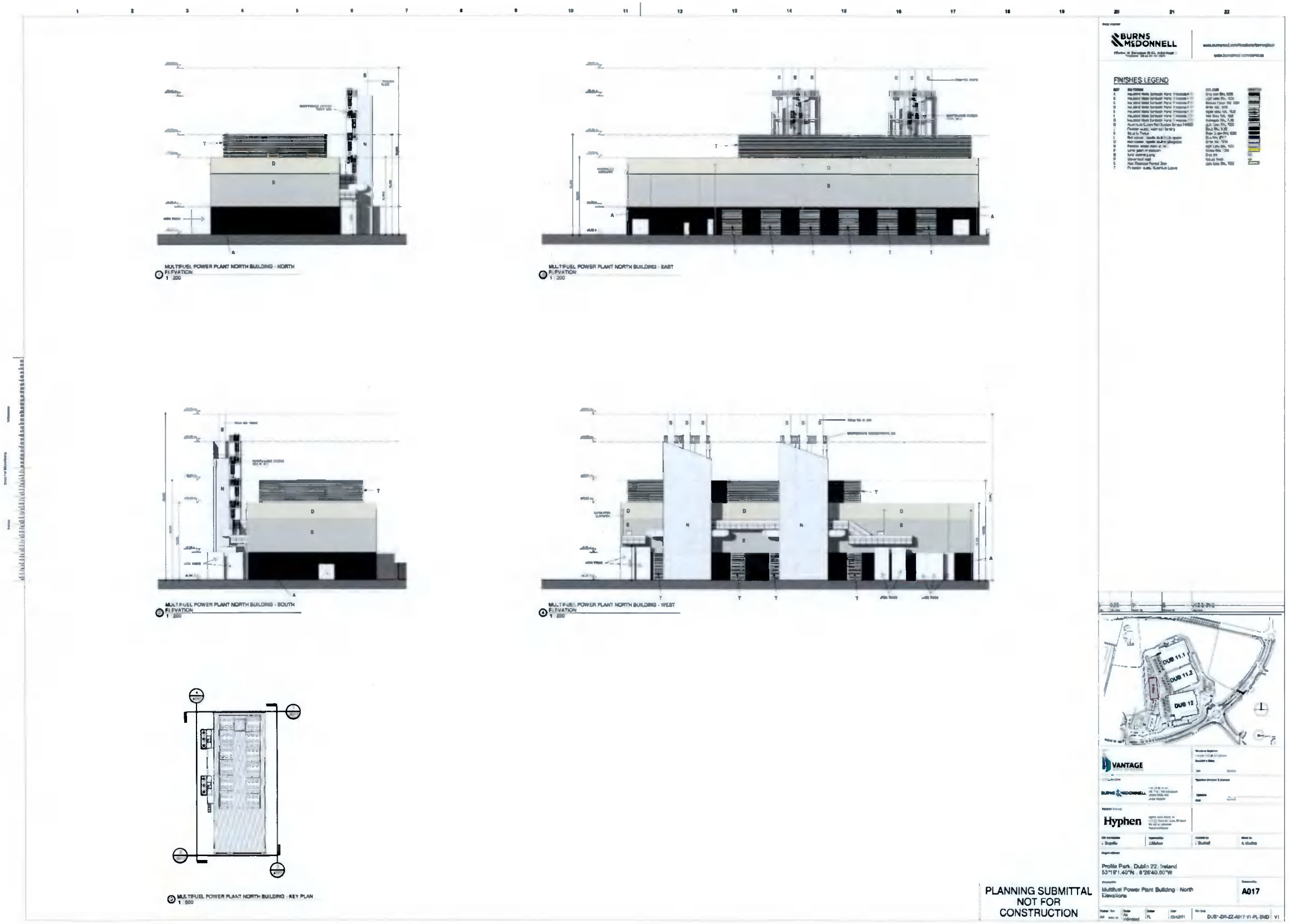


Figure 4.5: MFGP North Building Elevations (Source Burns & McDonnell)

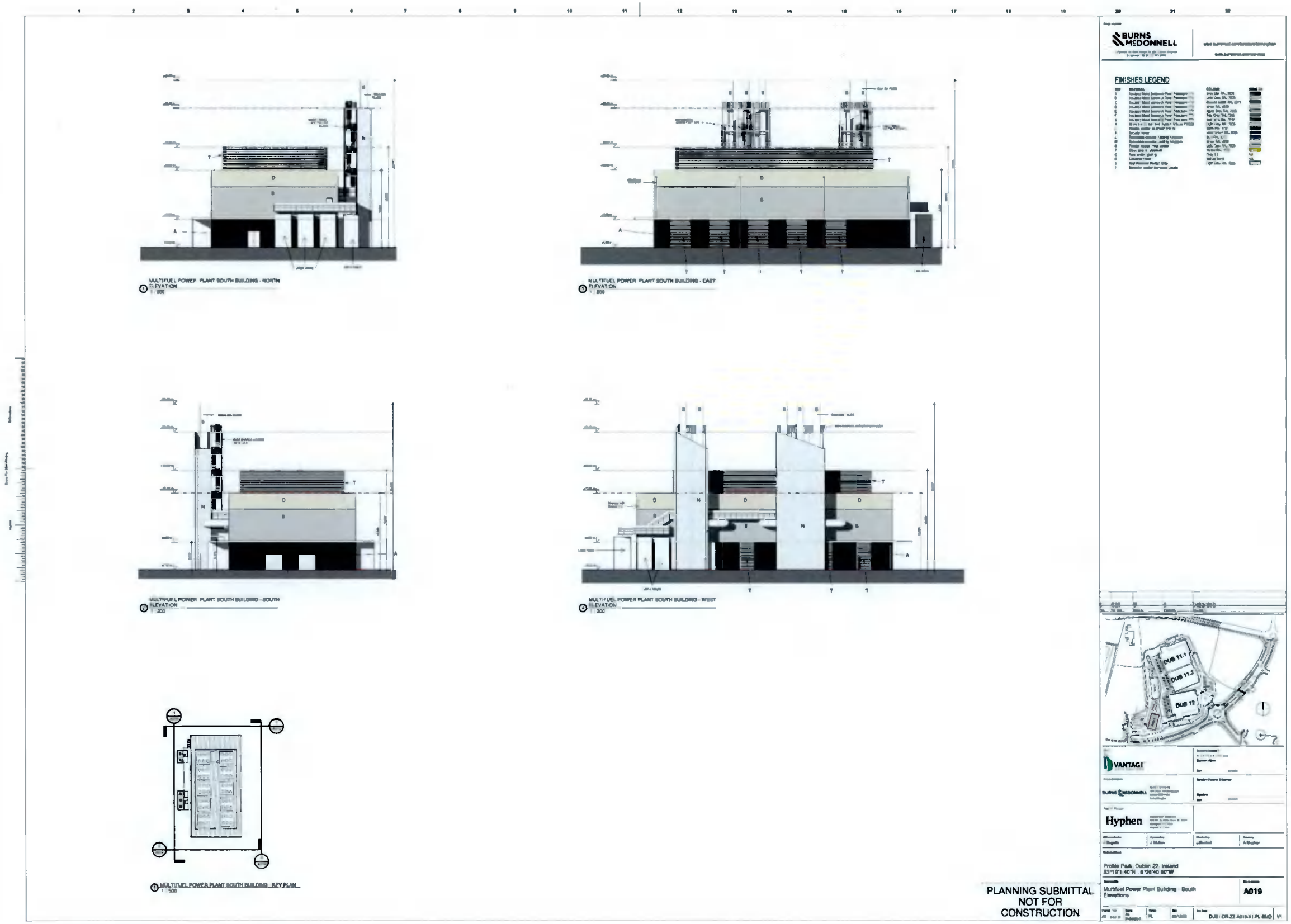


Figure 4.6: MFGP South Building Elevations (Source Burns & McDonnell)

Phasing of Development

4.52 The proposed development phasing is outlined in Table 4.4 and Figure 4.7.

Table 4.4: Development Phasing

Phase	Detail	Indicative Construction Completion and Start of Operation
Phase 1	• Site infrastructure works, landscaping and Baldonnel Stream enhancements constructed. • Sustainable Drainage System (SuDS) drainage constructed. • AGI Plant/Gas Regulator constructed. • Step-up Transformers. • DUB 11 constructed and operational with 22 emergency generators. • North MFGP constructed and operational. South MFGP building / slab constructed but not operational. • Construction of the 20kV switchrooms.	Q4 2023
Phase 2	• DUB 12 constructed and operational with 14 emergency generators. • South MFGP generators installed and operational. • Remaining external works • Main power supply from EirGrid Substation to the south of Falcon Avenue for main power supply.	Q3/Q4 2024

Figure 4.7: Development Phases – Phase 1 top and Phase 2 bottom (Source Burns & McDonnell)

Landscaping and Public Realm

Landscape Masterplan

4.53 The landscape masterplan is displayed in Figure 4.8.

4.54 The landscape strategy would ensure an enhanced, higher quality biodiverse environment is created, with particular regard to improving the biodiversity of the Baldonnel stream. As this site is not accessible to the public, landscaping would focus on creating areas for biodiversity to thrive and would not provide any public realm or open space.

4.55 The key considerations of the landscape masterplan are as follows:

- Providing sufficient measures to protect and enhance the existing landscape, the ecology of Baldonnel Stream and retain its current alignment;
- Provide areas of soft landscaping and enhanced biodiversity throughout the site;
- The retention of existing perimeter landscaping and trees wherever possible;
- The integration of a SuDS strategy, to slow out fall rates and manage storm water at source; and
- Provision of ecological enhancement areas.

4.56 The landscaping masterplan would incorporate the following elements:

- Berm and woodland planting;
- Native hedgerow;
- Meadow;
- Wetland meadow;
- Wildflower meadow;
- Riparian planting;
- The stream improvements; and
- Green walls.

Landscape and Biodiversity Enhancements

4.57 Figure 4.6 Landscape masterplan and sections details the biodiversity enhancements that would be introduced through the landscaping masterplan.

4.58 Eighteen trees are to be retained as part of the proposed development which predominantly relate to those trees along the western and eastern perimeter of the site boundary. However, 40 trees would be felled in order for the proposed development to be constructed. However, substantial new planting of berm and woodland would be provided in the landscaping scheme with 1,194 new trees proposed to be planted and 3,389 transplanted as saplings.

4.59 The retention of the existing stream which traverses the site is a central strategy within the overall landscape masterplan. The existing alignment of the stream is to remain the same, therefore the proposed earthworks, planting proposals, attenuation areas and site layout have been designed around it. Some parts of the stream banks are to be retained with no changes to the existing vegetation, this will provide areas for locally native flora to continue to grow. Other parts of the stream banks are to be enhanced with native riparian planting and wetland meadow, while ledges and shallow banks will be formed to create a high-quality riparian edge. Many of the existing trees along the stream are to be retained.

4.60 The stream is at a lower level than the proposed data centers and a living willow wall is proposed at the level difference to stabilise the banks of the stream and to provide a long term biodiversity benefit as they mature in banks of willow trees.

4.61 A wetland corridor, consisting of the enhanced existing stream, flood attenuation basins, riparian planting and bioswale attenuation areas is proposed to the north and east of the site that would add to the flood attenuation capacity of the site and increase biodiversity.

4.62 A number of trees are to be retained along with the main boundary hedges as part of the proposed development which predominantly relate to those trees along the western and eastern perimeter of the site boundary. However, a number of existing trees, would be felled in order for the proposed development to be constructed. These are further detailed in the Arboricultural Impact Assessment which accompanies the AI Response. However, substantial new planting of berm and woodland would be provided in the landscaping scheme and the proposed native hedgerow and artificial hibernacula, bird and bat boxes and insect holes proposed would act as an ecology corridor linking the new habitat with existing vegetation.

4.63 The proposed security fencing is located within the site along internal road carriageways and has been set back from site boundaries to help establish a continuous belt of woodland, hedgerow, wildflower and wetland planting around the buildings which allows the free movement of fauna through the site along fully connected green infrastructure links. Boundary fencing has also been proposed with openings accommodated to encourage the movement of fauna through the site.

4.64 Living Green walls are proposed on the northern and southern elevations of DUB 11 and the southern elevation of DUB 12 to soften the visual impact of the built structure. The external Fire Escape stairs will include climbing plants supported on a tensile wire frame.

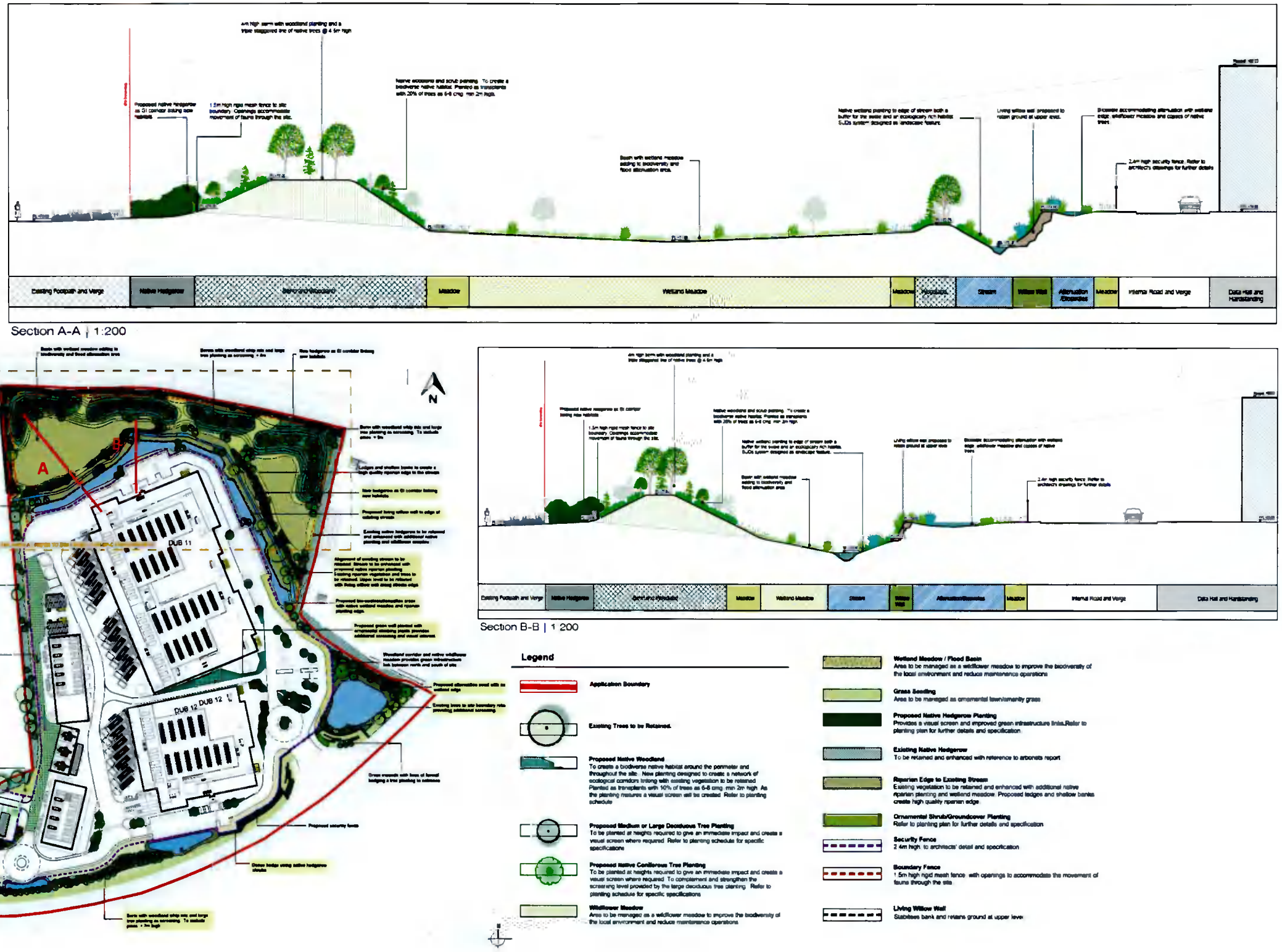


Figure 4.8: Landscape Masterplan and Selected Sections (Source Kevin Fitzpatrick Landscape Architects)

Access Arrangements

Vehicular Access

4.65 The application site would be accessed via two entry points on Falcon Avenue, as displayed in Figure 4.7. Heavy duty vehicles (HGV), maintenance and construction vehicles would access the site via Profile Park Road from the west. Cars would access the site via Falcon Avenue from the south, through the main gate. The main gate is located within the centre of the east access point, splitting the entrance and exit lanes and barriers are currently used to control entry to the application site.

4.66 Internal roads are proposed to be constructed to provide access to the data centers and to allow vehicles to access the proposed parking to the east of the buildings. These would be designed to accommodate the largest expected vehicle to access the application site.

Cycle and Pedestrian Access

4.67 As displayed in Figure 4.9, pedestrian and cycle access to the site would be via the controlled pedestrian and cyclist entry gate on Falcon Avenue.

4.68 Roads within Profile Park comprise cycle paths on both sides of internal roads and afford good connections to the wider public cycle network.

4.69 The proposed development has been designed to encourage cycling and pedestrian movements through designated cycle and pedestrian paths. Showers would be included in each building for staff.

Emergency Access

4.70 The internal roads would provide emergency vehicle access around the Data Center buildings and provide service access to the service areas and multifuel generation plant. Perimeter access roads would be provided around all the buildings for emergency access and to accommodate crane access for the replacement of rooftop plant.

Car and Cycle Parking

4.71 The Proposed Development would operate with approximately 135 Full Time Equivalent (FTE) members of staff across three shifts.

4.72 Car parking for the proposed development is provided by a total of 137 parking spaces which provides parking for site staff and visitors. Of these, 14 would be electric vehicle charging points, 7 would be disabled parking provision and 4 would be delivery vehicle spaces.

4.73 There would be 66 double-stacked spaces for covered cycle storage.

4.74 Car and cycle parking would be provided along the northern, eastern and southern sides of the data centers as shown in Figure 4.1. All employee spaces would be provided within a secure car park that would not be accessible to the general public. Visitor spaces would be located within this car park.

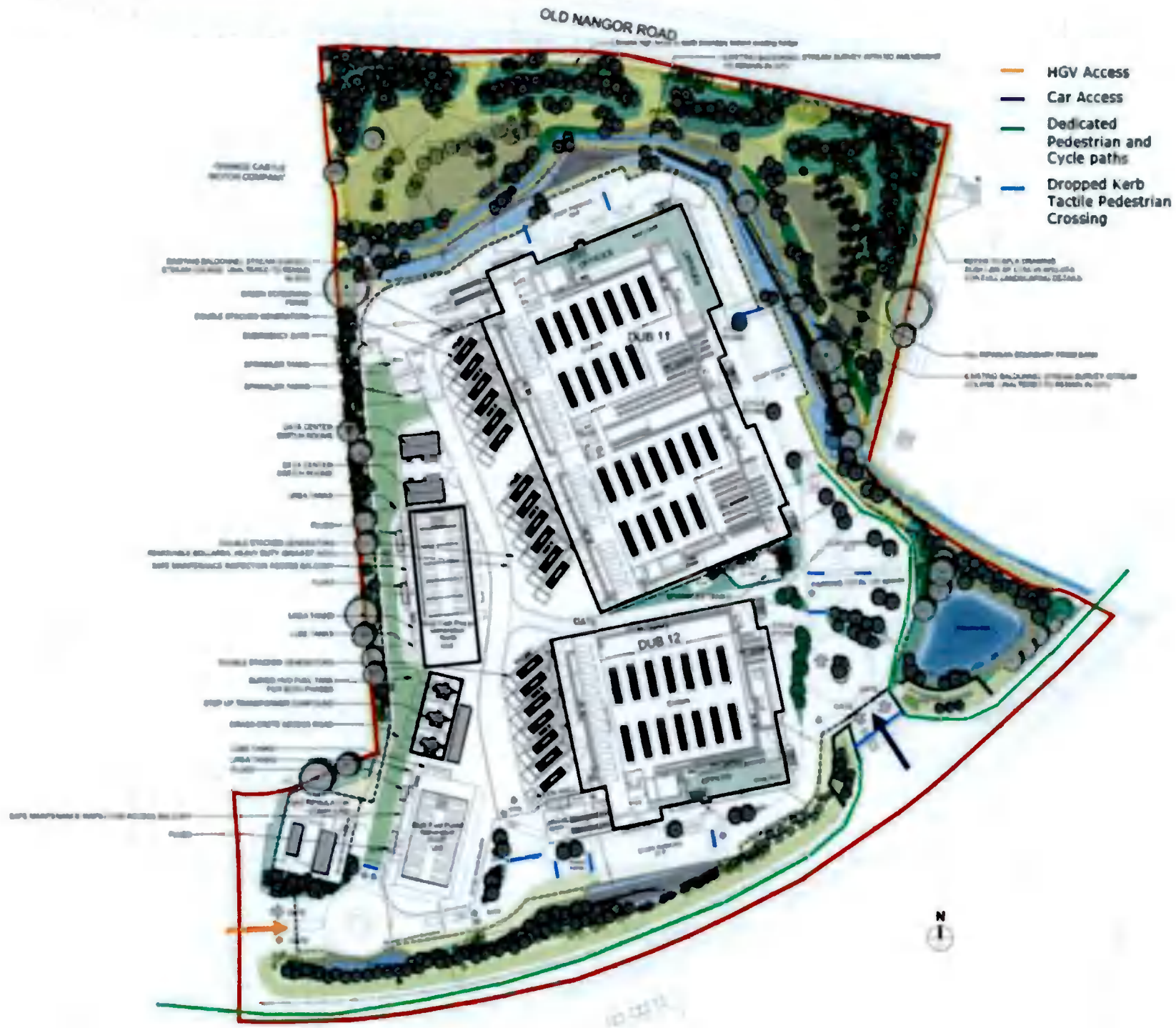


Figure 4.9 Proposed Site Access Arrangement (Source Burns and McDonnell)

Servicing and Deliveries

4.75 The site layout is designed to support the delivery and replacement of equipment and primary plant and to enable access for appliances in the event of fire.

4.76 Deliveries would come to a two-bay truck loading dock during the initial deployment of IT and mechanical equipment and would be issued for periodic replacement of equipment.

Waste Management

4.77 Deliveries of equipment to site may generate limited quantities of rubbish, which for the most part would be packaging material. This rubbish would be managed on site.

4.78 The buildings primary waste stream would come from the toilets, which is calculated at 45 staff per building phase, which equates to a total of 135 permanent staff once completed.

4.79 Refer to EIAR Volume 1, Chapter 15: Waste, for further information regarding waste generation volumes.

Plant and Ventilation

Heating

4.80 Heating to the office areas would be provided by heat pumps that would recover heat from the data module cooling system. This would allow the heat pump system to operate at higher efficiencies compared to air cooled systems operating at standard ambient conditions.

4.81 The heat load of the office areas is a very small percentage of the energy that is available from the Data Centers cooling process heat rejection systems, and thus the chilled water system can also offer the potential to reject heat into a local heat network later should a there be a local demand in the future.

4.82 To ensure that the system has the flexibility to connect into such a system whilst also maintaining a live data centre, valved, and capped off connections will be provided on return water risers, ready for future connection to a district heating network

4.83 The above provisions could allow the supply of heat energy to a future district heating scheme developed by others, external to the site boundary. At present there are no available projects within reasonable proximity to the site location for connecting this potential low grade heat energy.

Cooling

4.84 The data storage modules would be cooled with air handling units that are provided with chilled water via roof mounted free cooling magnetic bearing chillers.

4.85 Chilled water would be pumped around the building using variable volume pumps, chilled water flow is limited by 2 port control valves to match the demand.

4.86 The cooling systems utilises variable volume EC fans to match cooling capacity to load requirements from the data storage rooms.

4.87 Hot Aisle containment is used to separate supply and return air paths and maximize system efficiency by allowing elevated supply air temperatures.

4.88 Further information of heating, cooling and ventilation, including mechanical systems information is provided within the Energy Statement which accompanies this planning application.

4.89 Cooling to the office and ancillary areas would be provided by roof mounted air-cooled free cooling chillers. The free cooling chillers would utilize compressor free cooling when the ambient conditions are satisfactory, thus maximizing system efficiency.

Ventilation

4.90 Dedicated outside air-handling units (DOAS) would provide outside air into each data module MMR, main point of entry (MPOE) and intermediate distribution frame (IDF) rooms.

4.91 The fresh air ventilation system for the office area would be served using energy efficient Heat Recovery Units (HRU) which would recover waste heat from the office spaces and re-use to pre-heat the air with the HRU. This would reduce the overall energy consumption for this system.

Utilities

Electricity

4.92 The main power supply to the Business Park is from the EirGrid. This power network is known to be constrained in terms of providing electrical grid power to the area.

4.93 The power requirements for the proposed development would be provided via a connection to a 110 kV EirGrid substation and would be subject to a separate strategic infrastructure development application to An Bord Pleanála (ABP). The substation would then provide a 20 kV electrical power distribution at medium voltage throughout the site. The site distribution system supplies all electrical rooms where stepdown transformers are deployed to provide 400/230 V electricity to all loads.

4.94 To reduce electrical losses between HV/MV/LV conversions, the Applicant would install low loss transformers which comply with the Ecodesign directive 2009/125/EC1 as a minimum.

4.95 Whilst the connection to the EirGrid is implemented DUB 11 would be powered using the MFGP. The MFGP includes generators with flue stacks up to 30 m in height. Once the connection to EirGrid is implemented the MFGP and would be called upon for use on local network drops in response to EirGrid DCC OPP regulations.

4.96 Photovoltaic panels would be installed at the site to comply with Part L of the building regulations, with an approximate ratio of 1 m^2 per 20 m^2 of office space.

Gas

4.97 The Business Park is served by the GNI network, which is a natural gas network. It is proposed to extend the high-pressure gas network to the site to serve the MFGP.

Water

4.98 Detailed information regarding water can be found within the engineering report, which accompanies the planning application submission.

[1] European Environment Agency, 2021. Policy Document: 2009/125/EC - Ecodesign Directive. Online. Available at: 2009/125/EC - Ecodesign Directive — European Environment Agency (europa.eu) [accessed 13/07/2021]

4.99 Hydrants would be installed in accordance with the requirements of the building regulations and in accordance with the recommendations contained in the Technical Guidance Documents, Section B – Fire Safety[2].

4.100 The projected peak flow rate for DUB11 would be 2.82 litres/sec and the peak flow rate for the total would be from fixture demand to BS 6700(2006). The sprinkler tank requirements are 2 x 240 m^3 (DUB11) and 2 x 240 m^3 (DUB12), therefore the total sprinkler tank requirements are 4 x 240 m^3.

Potable Water

4.101 It is intended to serve the proposed development via a connection on Falcon Avenue.

4.102 Water demand for the development has been based of Irish Water Criteria, calculated based on 144 PE at 0.250 liters per second.

Foul Water

4.103 It is proposed to discharge foul water from the proposed development via a gravity foul sewer outfall and discharge into a spur connection across Falcon Avenue, which is connected to the existing foul sewer network, laid along the western edge of Falcon Avenue.

Surface Water Management

4.104 The total attenuation volume required for the site is approximately 2,391 m^3. As a result of the proposed development, total floodplain storage has increased by 2,018 m^3 from 7,764 m^3 to 9,782 m^3.

4.105 The SuDS measures to be adopted for the proposed development would comprise:

- The Baldonnel stream;
- Five ponds including a detention basin;
- Compensatory storage areas north of the Baldonnel Stream;
- Drainage channels that would intercept water flow into the site from the eastern entrance, which would be discharged into the Baldonnel stream
- Flood meadows that provide compensatory flood storage (provided by reducing the ground level in the flood meadow / landscape area adjoining the northern boundary) to replace the displaced storage.
- Permeable paving; and
- Gullies and channels.

4.106 The storm water drainage within the entire development has been designed to accommodate a 1:2 year storm frequency. The proposed ponds, compensatory storage and permeable paving areas have been designed to accommodate a 1:100-year storm event + 20% climate change.

4.107 Surface water drainage from the proposed development has been designed in accordance with Greater Dublin Strategic Drainage Strategy (GDSDS)[3] and ensures that best management practice has been incorporated into the design.

4.108 The results of the flood risk assessment (FRA) conclude that the proposed development of the site by the Applicant, for use as a Data Center development, is considered a suitable use of the site. Local infrastructure has the capacity to serve the proposed development. The proposed development would not be at risk of flooding from fluvial sources and will not give rise to fluvial flood risk elsewhere.

Telecommunications

4.109 A telecommunications network would be installed at the site which would serve all of the data center buildings on the site. The connection to the regional network would be implemented by the statutory network operator.

Resources, Emissions and Residues

Resource Use

Energy

4.110 An Energy Statement accompanies the AI Response, demonstrating how the proposed development would reduce the energy consumption and operation cost of the proposed development. A summary is provided below.

4.111 The proposed development would provide provision for an array of photovoltaic (PV) panels that would generate on site renewable energy up to a peak of 73.15 kW per building, to comply with Nearly Zero Energy Building (nZEB) requirements[4]. The on-site renewable electricity generation would be backfed to the electrical general supply for the building, serving lighting, office area general services and office IT equipment. The total amount of panels would cover 150 m^2 per building and would be located at the plant roof area. It is expected that the PV panels would generate 15,000 kwh/yr.

4.112 The proposed MFGP plant has been selected for its resilience and flexibility as it is designed to run on a main gas supply from GNI or on HVO, a synthetic 2nd generation bio-diesel. Additionally, the engines within the MFGP can accommodate a blended fuel (natural gas comprising 20% hydrogen or biogas) for a lower carbon footprint, once GNI is able to supply this via the existing gas ring mains.

Emissions

To Air

4.113 Please refer to EIAR Volume 1, Chapter 8: Air Quality for more detail.

4.114 The potential exists for dust deposition and increased particulate matter concentrations to occur during the demolition and construction stage, as well as increased air emissions resulting from the operational phases of the proposed development. The main air pollutants of concern are dust and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}), typically generated during demolition and construction activities, and nitrogen dioxide (NO_2) typically generated by combustion engine emissions i.e. the back-up diesel generators and road traffic. It is noted that the MFGP runs on HVO and natural gas which has significant reductions in NOx in operation compared to traditional diesel combustion engines.

To Water

4.115 A new surface water drainage network is to be designed and installed to serve the proposed development as detailed below and would be presented within a separate Drainage Strategy Report. Therefore, surface water runoff within the proposed development would be managed such that internal or vulnerable areas of the site are at low risk of flooding from pluvial sources.

[2] Government of Ireland. 2020. Technical Guidance Documents. Online. Available at: gov.ie - Technical Guidance Documents (www.gov.ie) [accessed 02/08/2021]
[3] Government of Ireland, 2005. Greater Dublin Strategic Drainage Strategy. Online. Available at: Greater Dublin Strategic Drainage Strategy | Greater Dublin Drainage [accessed 02/08/2021]

[4] Irish Green Building Council, Nearly Zero Energy Building Standard. On/line. Available at: Nearly Zero Energy Building standard - Irish Green Building Council (igbc.ie) [accessed 13/07/2021]

4.116 Due to a variety of measures such as the design of the car park with hydrocarbon interceptors, permeable paving drainage and attenuation, speed restrictions, and the fact that no refuelling would be carried out on site aside from on rare occasions to generators, the likelihood of any emissions into the water environment from vehicles on site would be unlikely.

4.117 Additionally, please refer to surface water management above for detail on SuDS infrastructure.

To Sewers

4.118 It is proposed to discharge foul water from the proposed development via a gravity foul sewer outfall and discharge into a spur connection across Falcon Avenue, which is connected to the existing foul sewer network, laid along the western edge of Falcon Avenue. Foul drainage is ultimately treated at the Dublin City Wastewater Treatment plant at Ringsend.

Sustainability Proposals

4.119 The Application is accompanied by a standalone Energy Statement which sets out the strategy for the proposed development in response to current planning requirements and demonstrates that there is a clear commitment to sustainable development principles within the proposed development.

Operational Management Controls

Operational Management

4.120 Once 'live' the proposed data center would operate 24 hours a day.

4.121 When operational approximately 45 full time equivalent staff members would be onsite in each data center building providing a total staffing level of 135 people. Additional to this would be the ad-hoc attendance of maintenance contractors and visitors. It is anticipated that the data centers would be in operation on a shift basis with reduced numbers presented during night shifts.

External Lighting

4.122 The proposed development would require suitable illumination to ensure a safe environment for site users.

4.123 For the northern and southern data centers, external lighting would be required for security purposes. CCTV would be required for security purposes, requiring external security lighting

4.124 Any external lighting would comply with the I.S. EN 12464 part1. IS 3217:2013+A1:2017. The external lighting would make use of high efficiency, low energy LED luminaires. The proposed development would also seek to minimise upwards light and obtrusive light and avoid light spill onto trees, hedgerows, the Baldonnel Stream and bird and bat boxes wherever possible to 1 lux and is cognisant of Bat Conservation Ireland guidance notes for consideration in the design of bat sensitive lighting schemes.

4.125 Secondary external lighting in areas such as the generator compound would be operated via daylight detection to minimise hours of operation and thus keep energy usage to a minimum.

4.126 A lighting report has been prepared to accompany the application, in which more detail can be found.

Internal Lighting

4.127 Internal lighting with occupancy and daylight controls would be required for office and ancillary areas.

4.128 Internal lighting would be provided by high efficiency, low energy LED luminaires combined with presence detection controls or local switching where appropriate. The lighting design meets the illumination level requirements as outlined in I.S. EN 12464 part1. IS 3217:2013+A1:2017.

4.129 LED luminaires are also to be used for the emergency lighting installation, which is designed to comply with the requirements of EN 1838 and IS 3217:2013+A1:2017

Security & CCTV

4.130 Access points to the site are gated, lit and covered by security cameras. Security staff would be responsible for ensuring that security procedures are implemented on the site and would maintain a record of all visitors to the site.

4.131 A 2.4m high security fence would be constructed around the perimeter of the Proposed Development. A series of landscaping berms and planting would also provide partial screening of the site from the R134 New Nangor Road to the north. Additional low level fencing would be present to the R134 New Nangor Road.

4.132 CCTV cameras would be installed at appropriate locations around the Proposed Development and their locations have been coordinated with the lighting and intruder detection systems to ensure that the site, site boundaries and access points are appropriate monitored.

Firewater System

4.133 The building would include fire protection, sprinklers and smoke detection systems to provide early warning of any combustion events. A dedicated fire water ring main would be installed as part of the Proposed Development to provide supply to fire hydrants in the event of the fire.

Major Accidents and Disasters

4.134 Whilst there is no recognised guidance on the assessment of major accidents and disasters within the 2014 EIA Directive and associated EPA Draft EIA Report Guidelines 2017 requires that the vulnerability of the project to major accidents, and/or natural disasters (such as earthquakes, landslides, flooding, sea level rise etc.)

4.135 It is considered that the proposed development would not give rise to significant environmental effects in relation to Major Accidents and Disasters as the site is not located within a geographical region that has historically been subject to natural disasters.

4.136 It is considered that the majority of major natural disasters, such as epidemics, earthquakes, volcanic eruptions and droughts are not of relevance to the site or proposed development; however, vulnerability to flood risk and storm events are considered to be relevant.

4.137 Flood risk would be considered within Chapter 10 of this EIAR, where best-practice mitigation measures are outlined.

4.138 The site does not lie within the consultation zones of the COMAH Establishment and there are no Control of Major Accident and Hazard (COMAH) establishments within 2.5km of the site. Therefore, there is no need to consult with the Health and Safety Authority (HSA) regarding the proposed development.

4.139 It is considered that no further assessment in respect of natural disasters is necessary.

5 DEMOLITION AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT

Introduction

5.1 This chapter sets out the demolition and construction works of the proposed development and the key activities that would be undertaken during the works. This chapter also describes the management controls that form part of the development proposals that would be implemented to avoid, minimise and where not possible, mitigate the magnitude of potential environmental impacts.

5.2 Impacts arising during the demolition and construction processes are temporary, generally short-term and intermittent. Nevertheless, they can be sources of potentially significant effects on environmental resources and residential amenity.

5.3 It is not possible to predict in detail the specific environmental impacts and effects that may arise from the proposed development's demolition and construction works as detailed construction method statements and specifications have not yet been prepared and construction contractors not yet appointed. However, it is possible to establish the potential broad environmental impacts associated with the proposed development's demolition and construction works and to determine a framework for the management of these impacts to ensure that significant adverse effects are avoided. The framework would form the basis for a Construction Environmental Management Plan (CEMP) to be implemented during the works. It is anticipated that the CEMP would be secured by means of an appropriately worded planning condition.

5.4 The CEMP would be prepared in accordance with standard industry practice and regulatory requirements and would include a traffic management plan, as well as a Site Waste Management Plan (SWMP). More specifically, the CEMP would set out policies, legislative requirements, thresholds/limits, procedures, roles and responsibilities relevant to the implementation of environmental and management controls throughout the duration of the works. The CEMP would be discussed and agreed with SDCC in advance of works commencing on site.

5.5 An outline of the anticipated environmental issues and necessary management controls that would be included within the CEMP is provided within this Chapter.

5.6 It is standard practice to allow the appointed principal contractor (or equivalent) substantial input into documents such as the CEMP, traffic management plan and SWMP; however, at this stage of planning, contractors have not yet been appointed and detailed method statements have not yet been prepared. Nevertheless, the likely content of such documents can be reasonably predicted. As such it is considered that the identification and assessment of likely environmental effects is still achievable in the EIA.

5.7 It is important to note that while this Chapter does not assess the magnitude of potential impacts, nor the significance of likely effects during the construction works, as this is dealt with in individual technical assessments within this EIAR Volume (Chapters 6 to 15) and EIAR Volume 2 (Chapter 1-2). Controls set out in this Chapter are considered within the 'Embedded Mitigation' and 'Mitigation' sections of each technical assessment to enable the assessment of residual construction effects within a particular technical assessment.

Programme of Works

5.8 A detailed development programme has not yet been prepared; however, to enable assessment of likely environmental effects within this EIAR, an indicative, but feasible, programme has been developed by the Applicant based on a number of assumptions. These assumptions have been informed by an understanding of current and future projected market conditions, technical considerations and professional experience, all of which are considered to be reliable.

5.9 Based on the assumption that planning consent is secured in Quarter 1/2 (Q1/Q2) 2022, the demolition and construction works would commence in Quarter 2 (Q2) in 2022. The works are anticipated to be undertaken over a 30 month period, with a completion targeted of Q4 2024. Due to the size of the proposed development, it would be completed in two phases, with the following indicative construction completion and start of operation dates:

- Phase 1: Q4 2023; and
- Phase 2: Q4 2024.

5.10 For the purposes of the EIA, it is assumed that 2022 would be the peak year for the demolition and construction works as this would include the site wide enabling works, groundworks, construction of the unground fuel storage tanks and associated landscaping and biodiversity improvements and is likely to have the most overlap between the proposed works for the early phases and would result in: noisiest works; majority of waste generation (such as from excavation and demolition) and import associated with cut and fill; and associated heavy good vehicles (HGV) trips.

5.11 A description of each phase is provided in the following sections.

Description of Works

Background

5.12 Once a contractor is appointed, early discussions would be held with SDCC and other relevant statutory consultees on site logistics, management, access and egress and hoarding arrangements.

5.13 Prior to work starting on site, the CEMP, traffic management plan and SWMP would be produced and agreed with SDCC. This will include roles and responsibilities, details on the control measures and actions to be taken to minimise the potential environmental impacts of the proposed development. Monitoring and record-keeping requirements will also be addressed in the CEMP.

5.14 In addition to the above, a key aspect of the successful management of the proposed development would be the maintenance of good relations with the site neighbours and the general public. The Applicant would consider other developments that may proceed at the same time and ensure close liaison with the other parties to co-ordinate and minimise potential impacts from the demolition and construction works.

Phasing

5.15 As stated previously, the proposed development would be constructed in two main phases. Table 5.1 provides a summary of the phases. Figure 5.1 illustrates the phasing.

Table 5.1: Summary of Development Phasing

Phase	Key Elements
1	• Site infrastructure works, landscaping and Baldonnel Stream enhancements constructed. • Sustainable Drainage System (SuDS) drainage constructed. • AGI plant/gas regulator constructed. • DUB 11 constructed and operational with 22 emergency generators. • North Multifuel Generation Plant (MFGP) constructed and operational. South MFGP building / slab constructed but not operational. • Construction of the 20kV switchrooms.
2	• DUB 12 constructed and operational with 14 emergency generators. • South MFGP generators installed and operational. • Remaining external works. • Main power supply from EirGrid Substation to the south of Falcon Avenue for main power supply.

Figure 5.1: Proposed Development Phasing (Phase 1 top, Phase 2 bottom). (Source Burns & McDonnell)

Site Enabling Works

5.16 Following the successful grant of planning permission, and receipt of other required statutory permissions, on-site works would commence with the following enabling works:

- Preparation of a Pre-Tender Health and Safety Plan and Construction Tender Document (or equivalent) concluding in the appointment of a principal contractor (or equivalent);
- Diversion, capping, and/or isolation of existing services running through or in close proximity to the proposed development; and
- Site wide earthworks, underground fuel storage tank construction, Baldonnel Stream enhancements and associated landscape and biodiversity enhancements.

Site Offices/Welfare Facilities and General Site Access

5.17 A 2.4 m high security fence/hoarding and access/egress gates would be installed and maintained throughout the duration of the works programme. This would segregate pedestrians and the general public from works and contain the work within the site boundary.

5.18 Construction compounds, including welfare facilities and offices for construction staff would be constructed on site, the location of which would be confirmed in the CEMP and traffic management plan.

5.19 Site access arrangements and locations would be confirmed in the CEMP and traffic management plan. However, for the purposes of the EIAR it is anticipated that all construction traffic would enter and exit the site via Falcon Avenue.

Demolition Works

5.20 Demolition works would comprise the removal of the existing on-site residence and outbuilding located in the north western corner of the site, together with any below ground structures and foundations.

5.21 Any asbestos identified from the Asbestos Register would be removed and disposed of by a fully licensed and qualified contractor before any other works are undertaken in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2010[1] and under an appropriate license from the Health and Safety Authority. During the internal strip-out and removal of asbestos, protection would be put in place.

5.22 Building demolition is expected to be undertaken using excavators fitted with crushing attachments and where practically possible, machinery would be located as far as possible from or shielded from sensitive receptors, such as the residential property to the northeast of the site. This would ensure the safety of the operatives carrying out the demolition work, help to keep noise and dust to a minimum and reduce the impact of operations on sensitive receptors.

5.23 Material loads removed from application site following the demolition works would be covered and appropriate wheel washing facilities would be located at the application site egress to prevent material spreading onto the road network. The road network would also be cleaned, when necessary, with the use of a street sweeper to remove any build-up of material on the road network.

Excavation Works

5.24 Following the completion of site enabling works, all structures will require foundations to structural engineer specifications as well as excavations for underground fuel storage tanks beneath the footprint of the MFGP blocks. These would require moderate scale excavations.

5.25 Where possible, noting the low risk of contaminants identified on site following the site investigation works, appropriate material excavated during ground works would be re-used as part of earthworks and as temporary back-fill where necessary. It is proposed that some of the spoil generated will be reused under and as part of landscaped areas (including bunds) where suitable and/or in the formation level for the construction compound.

5.26 Any temporary storage of spoil would be managed, as set out under the CEMP to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment and other contaminants.

5.27 Waste arising from the site clearance, primary infrastructure and earthworks is expected to comprise made ground/topsoil, rubble, bricks, concrete, gravel and clay/silt material, and would be either re-used onsite or removed offsite for appropriate reuse, recovery and/or disposal as required, as described in EIAR Volume 1, Chapter 14: Waste.

5.28 Any clean (i.e. uncontaminated) excavated material that cannot be reused on site would be removed by licensed waste carriers and sent for reuse at another development site or sent for disposal at appropriately licensed facilities (expected to be inert waste landfill sites).

Temporary Works

5.29 Some temporary works would be necessary during the development works, to protect the public and ensure the structural integrity of the works as they progress. These would range from propping of hoardings to scaffold protection fans, temporary propping of walls and other temporary structures such as loading platforms. In all cases these works would comply with legislation and would be designed and managed by the principal contractor.

Substructure Works

Foundations and Structure

5.30 Following the completion of enabling works. All structures, including the MFGP will require foundations to structural engineer specifications. The structures are likely to comprise either precast concrete elements or a standard structural steel frame.

5.31 Foundations would be formed of pads and strips that would be founded on the bedrock underlying the site at an anticipated depth of three to four m below ground level. Foundations would be advanced taking account of the ground conditions and environmental considerations.

5.32 Based upon investigations of the site (Chapter 12: Ground Conditions of this EIAR Volume), there is a low potential for soil and groundwater contamination on site. Opportunities for the storage and re-use of excavated material would be considered.

Building Cores

5.33 The cores of the proposed facilities (i.e. DUB 11 and 12) would incorporate the lifts, stairs and service risers and would be designed to provide the main lateral stability system for the buildings.

5.34 The concrete walls would be constructed from reinforced concrete.

Superstructure Works

5.35 It is anticipated that the proposed development buildings and MFGP would be constructed of either precast concrete elements or a steel frame with reinforced concrete floor slabs.

[1] Government of Ireland, 2010. Safety, Health and Welfare at Work (Exposure to Asbestos) (as amended) Regulations 2010.

5.36 The proposed data centers may require long clear spans in the data halls and therefore deep structural floor systems in steel and/or concrete may be required. Steel-framed systems would be stabilised through vertical bracing located in walls and around cores. Concrete-framed systems would be stabilised through concrete shear walls and/or core walls located around lifts, stairs and service risers.

Fit-out

5.37 Internal fit out and services would include data halls, generator sets and associated offices.

5.38 Typically, the contractors would build from the inside out.

Landscaping Works

5.39 Installation of the proposed landscaping would commence at the beginning of Phase 1 of the proposed development and would include enhancements to the existing alignment of the Baldonnel Stream. Landscaping would be constructed as early as possible to allow the establishment of new species. Topsoil would either be reused or imported to fill and shape landscaped areas.

5.40 Construction of access roads, internal roads and surface parking would be undertaken following the site enabling works, demolition and site preparation on a phased basis. Works would also include excavation to create development platforms and the sustainable drainage system (SuDS) drainage features; layering of road fill material; and levelling, compaction and finishing off with specified material (e.g.) bitumen tarmac.

Utilities and Service Installation

Utility Supply

5.41 The main power supply to the Business Park is from the EirGrid. This power network is known to be constrained in terms of providing electrical grid power to the area.

5.42 The power requirements for the proposed development would be provided via a connection to a 110kV EirGrid substation and would be subject to a separate strategic infrastructure development (SID) application to An Bord Pleanála (ABP). The substation would then provide a 20kV electrical power distribution at medium voltage throughout the site. The site distribution system supplies all electrical rooms where stepdown transformers are deployed to provide 400/230 V electricity to all loads.

5.43 The MFGP will connect to the network via a step-up transformer to 20kV on site south of this building and then distribute to the EirGrid substation and would be called upon for use on local network drops in response to EirGrid DCCOPP regulations.

5.44 Whilst the connection to the EirGrid is implemented DUB 11 is proposed to be powered using the MFGP that would be located in the west of DUB 11 and would run on HVO fuel. The MFGP would be in operation for 24 hours a day for an anticipated time period of up to two years.

5.45 The distribution system described above is chosen as it represents the safest, most efficient, and most economical method for site wide electricity distribution and in agreement with EirGrid.

Transformers

5.46 To reduce electrical losses between HV/MV/LV conversions, the Applicant would install low loss transformers which comply with the Eco-design Directive 2009/125/EC[2] as a minimum.

Emergency Back-Up Generators

5.47 In the event of a loss of power supply, diesel powered back-up generators would be provided to maintain power supply to the data centers. The back-up generators would be subject to periodic testing to ensure they remain serviceable and are only anticipated to be required in an exceptional event e.g. grid blackout. Back up to the MFGP would be provided by HVO stored within the underground storage tanks located beneath each block of the MFGP.

Water

5.48 The proposed development via connection off the 150mm diameter network, as located in Falcon Avenue. Water meters, sluice valves and hydrants, in line with Irish water requirements and specifications, will be installed at the connections onto the aforementioned existing water mains, as required. It is understood that there is adequate capacity within the existing water main network to supply the proposed development.

Foul Water Drainage

5.49 Foul water will discharge via a 225mm diameter gravity foul sewer outfall into the existing 225mm diameter spur connection laid across Falcon Avenue, which is connected to the existing foul sewer network laid along the western edge of Falcon Avenue. It is understood that the foul water drainage network has sufficient available capacity for the wastewater discharges during operation.

Telecommunications

5.50 Multiple connection service lines currently exist along Falcon Avenue and Concorde Drive, including

- Virgin Media fibre cable;
- BT fibre cable;
- Colt fibre cable; and
- EU Network fibre cable.

5.51 A telecommunications network would be installed at the site which would serve all of the data center buildings on the site. The connection to the regional network in Falcon Avenue would be implemented by the statutory network operator.

Vehicles and Plant

Vehicle Trips

5.52 Deliveries and removals would be scheduled to take place out of peak hours when congestion on the local road network is lower. Likely numbers of trips associated with on-site works are provided in Table 5.2 and is based on professional judgement that the demolition and construction traffic for the proposed development of 41,105m^2 would be proportional (approximately 51%) to the construction traffic used for the site in the previous approved application (Planning Ref SD20A/0121) of 80,269m^2. Refer to Chapter 7: Transport of this EIAR Volume and Technical Appendix 7.3 of EIAR Volume 3 for further details.

5.53 As previously stated, the most intensive ('peak') period for demolition and construction vehicle activity would occur in 2022 as the enabling works and demolition phase is concluding and the construction works begin.

[2] European Union, 2009. Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (Text with EEA relevance). Document 32009L0125.

5.54 Accordingly, it has been assumed that up to approximately three HGV trips would be made to the site each hour during the demolition and construction phase (one HGV arrival and one HGV departure every 20 minutes). It has also been assumed that up to 157 vehicular trips per day in either direction to and from the site would be made by construction personnel commuting to and from work.

5.55 Accordingly, it is considered that the maximum number of HGV trips would be associated with the demolition and construction stage would be a maximum of 126 HGV movements and 314 car or light goods vehicles (LGV) movements per day (not week).

Typical Construction Plant and Machinery

5.56 The types of plant and machinery that are likely to be used on site per development works activity are provided in Table 5.2.

Table 5.2: Indicative Plant and Machinery

Plant	Site Enabling Works	Demolition	Substructure	Superstructure	Internal works /Fit-out	External Works
Excavator (wheeled and tracked)	✓	✓	✓			✓
Dumper	✓	✓	✓			✓
Hydraulic cutters. Breaker	✓	✓	✓	✓		✓
Loading lorries	✓					
Scaffold construction	✓					
Generator	✓	✓	✓	✓	✓	✓
Electric drills	✓			✓	✓	
Metal cutter	✓			✓		
Electric bolter	✓			✓		
Road sweeper	✓	✓	✓	✓		✓
Lorries	✓	✓	✓	✓	✓	
Dozer		✓				
Pneumatic breaker		✓				
Compressor		✓				✓
Wheeled loader		✓				
Hand-held breaker		✓	✓			
Forklift		✓	✓	✓		✓
Water pump		✓	✓			✓
Air compressor		✓	✓	✓		
Lorry-mounted concrete pump			✓	✓	✓	✓
Hydraulic vibratory compactor			✓			
Scabbler			✓			

Table 5.2: Indicative Plant and Machinery

Plant	Site Enabling Works	Demolition	Substructure	Superstructure	Internal works /Fit-out	External Works
Crane			✓	✓		
Hydraulic access platforms				✓		
Welding plant				✓		
Motor batching plant					✓	
Hydraulic bender						✓
Breakers and crunchers						✓

Construction and Contracting Strategy

5.57 The principal contractor (or equivalent) would be responsible for a number of sub-contractors (e.g. foundations, concrete, cladding) and ultimately for the environmental management during the construction process.

Demolition and Construction Employment

5.58 The demolition and construction stage of the proposed development would generate employment; a proportion of the employment is expected to be generated on site, with the rest being elsewhere in the construction supply chain, possibly including modular unit production facilities. From a review of other data center developments in the area it is expected that the proposed development would generate in the region of 130 direct workforce jobs, with approximately 80 additional jobs during the peak construction phasing period. The demolition and construction works would have local benefits through construction training and targeting the local labour force.

Hours of Work

5.59 Working hours would be agreed with the SDCC but are expected to be:

- 07:00 to 19:00 hours Monday to Friday;
- 08:00 to 13:00 hours Saturday; and
- No working on Sundays or Bank Holidays.

5.60 In order to maintain the above working hours, the principal contractor may require, at certain times, a period of up to one hour before and after normal working hours, to undertake start and close down activities (this would not include works that are likely to exceed agreed maximum construction works noise levels).

5.61 Although working outside the stated hours would not normally be undertaken, it is possible that some deliveries may take place at night, and that certain works may have to be done during this period for safety or other considerations. If required, such works would be subject to reasonable notice and either securing the required licenses or obtaining prior agreement with SDCC, who may impose certain restrictions.

5.62 All work which is intended outside of these hours, excluding emergencies, would be subject to prior agreement, and/or reasonable notice to SDCC.

Health and Safety

5.63 All works on site would be undertaken in accordance with relevant health and safety regulations and a dedicated health and safety coordinator would be appointed by the Applicant to work with the Project Team and principal contractor to ensure compliance with these regulations.

5.64 All method statements would incorporate regulatory safety matters and a Health and Safety File would be maintained on site for inspection by the Health and Safety Authority, SDCC and others as appropriate.

Access and Parking Management

5.65 At this stage it is anticipated that all demolition and construction stage traffic would enter and exit the site via Falcon Avenue or from the New Nangor Road through secure hoarded gates on the south or north of the site using existing accesses. However, site logistics are indicative at this stage as the principal contractor may consider alternative options that would further minimise adverse impacts from vehicles during the demolition and construction process. Any alternative arrangements proposed by the principal contractor would be subject to the prior approval of the SDCC. All contractors would be supplied with a vehicle route card and details of all access routes would be provided.

5.66 If in the unlikely event that any temporary stopping-up notices are required on the surrounding roads, specific applications would be made to the SDCC relating to road closures and would be implemented by the principal contractor in accordance with all statutory notice periods.

Materials Management

Material Selection

5.67 Construction materials would be selected following the BRE 'Green Guide to Specification'. These include the following:

- Minimising embodied energy content (the energy used in manufacture);
- Using recyclable materials where they have high embodied energy; and
- Maximising the recycled content of the material, ease of maintenance, appropriate sourcing of materials and totally excluding deleterious and hazardous materials.

Materials Storage and Handling

5.68 All construction materials would be appropriately stored on site to minimise damage by vehicles, vandals, weather or theft.

5.69 Due to the limited amount of space on site, where practical, contractors would be expected to operate a 'just-in-time' policy for the delivery and supply of construction materials, and packaging would be returned. This means that materials would be brought to the site just before their incorporation into the work, thereby minimising the need for on-site storage.

5.70 Where possible, prefabricated elements would be lifted directly into position from delivery vehicles. This would assist in reducing on site storage and labour requirements and construction noise levels, thereby reducing potential nuisances to surrounding receptors.

Materials Waste Volumes and Management

5.71 Table 5.3 presents the estimated excavation, demolition and construction waste and end destination. Note that values presented in Table 5.3 have been rounded to the nearest tonne.

Table 5.3: Estimated Construction and Excavation Waste and End Destination

Waste Type	Estimated Quantities	Reuse		Recycle/ Recovery		Disposal	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	775	0	0	90	697	10	78
Timber	658	0	0	90	592	10	66
Plasterboard	235	0	0	90	211	10	24
Metals	188	0	0	100	188	0	0
Concrete	141	100	141	0	0	0	0
Other (including cabling, ducting, conduits, packaging, and plastic	352	0	0	80	282	20	70
Topsoil	24,645	100	24,645	0	0	0	0
Excavated materials	17,830	100	17,830	0	0	0	0
Total	**44,472**	**-**	**42,616**	**-**	**1,970**	**-**	**238**

5.72 Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services would generate approximately 17,830 m^3 of clean excavated materials. It is proposed that all excavated material would be reused on site.

5.73 The importation of approximately 36,594 m^3 of fill materials would be required for construction of foundations and other ground preparation works.

Sensitive Receptors

5.74 A review of adjacent properties and open spaces has identified the following sensitive receptors in close proximity to the site:

- Existing residential occupants in proximity to the site;
- Existing industrial and commercial properties in proximity of the site;
- Baldonnel Stream; and
- Local air quality.

Potential Environmental Impacts

5.75 A review of the potential environmental impacts associated with the demolition and construction works has been undertaken to proactively inform the development proposals and agree appropriate mitigation measures. Potential impacts can arise from day to day works or from individual instances of accidents, poor operation or management. They are, however, largely dependent on the implementation of effective controls (e.g. the employment of dust suppression methods, use of a well trained workforce and properly maintained plant).

5.76 A summary of the potentially significant environmental impacts that could arise during the demolition and construction stage and mitigation measures integral to the development proposals are provided in

Table 5.4. Further detail and assessment of these likely impacts are provided in Chapters 6 to 15 in this EIAR Volume and EIAR Volume 2.

5.77 Demolition and construction plant specifications have been defined allowing noise and other implications to be assessed. Potential impacts in many areas are largely dependent on attention to management control (e.g. watering to control dust, use of noise attenuated plant), which would be under the control of the contractor(s) required, by tender requirements, to adhere to management controls and measures detailed in the CEMP.

Table 5.4: Summary of Potential Environmental Impacts during Demolition and Construction

Receptor	Potential Impacts	CEMP Mitigation
Transport and Pedestrian Infrastructure	• Temporary traffic disruption caused by site traffic and an increase in HGV movements	• Implementation of a traffic management plan. • Use of Profile Park access points and routes to the site, with deliveries outside peak hours where possible (and abnormal loads at quiet times).
	• Transfer of mud and materials from vehicles onto public highways causing the potential for pollution hazards	• On-site wheel washing facilities.
	• Temporary disruption to pedestrian access and routes within the locality of the site.	• Implementation of a traffic management plan. • Maintenance of footpaths around the site, where possible, ensuring access is maintained for all.
Noise and Vibration	• Temporary increased noise levels at surrounding residential, industrial and commercial properties, from HGV vehicle movements and demolition and construction activities (e.g. breaking out, crushing, foundation installation, cutting, etc).	• Installation of 2.4m site hoarding. • Agreement of working hours with SDCC, careful selection of quiet plant. • Appropriate siting and regular maintenance of plant. • Use of silenced and well-maintained plant conforming with the relevant EU directives relating to noise and vibration.
	• Vibration impacts on local buildings, due to (e.g.) increased vibration from demolition works, foundations and use of HGVs within the site.	• The construction techniques proposed are considered unlikely to result in significant vibration impacts but the need for vibration monitoring and/or setting of vibration action levels would be discussed and agreed with SDCC.
Air Quality	• Windblown dust generated from (e.g.) demolition works, earthworks, stockpiles, construction vehicle movements on unpaved surfaces and crushing.	• Dust suppression techniques, such as damping down, use of temporary screens and covering of stockpiles. • Preparation and implementation of a SWMP. • Appropriate sourcing of materials.
Soil and Groundwater	• Pollution incident through spill of fuels or chemicals, or discharge of sediment laden water and runoff.	• Appropriate storage of fuels and potentially hazardous construction materials within a secure site compound. • Provision of on-site pollution control kits. • Use of settlement system prior to discharge.

Table 5.4: Summary of Potential Environmental Impacts during Demolition and Construction

Receptor	Potential Impacts	CEMP Mitigation
	• Siltation and contamination of surface water runoff and ground water.	• Use of settlement tanks, bunding and street sweeping to prevent contamination of the stormwater system.
	• Potential for soil contamination.	• Site investigations that have been undertaken have identified a low potential for soil and groundwater contamination at the application site. In the event that contamination is found, soil would be managed and an appropriate Remedial Strategy developed in conjunction with SDCC and the EPA.
Ecology	• Accidental spills and discharges from the storage of fuels and construction materials which may create pollution hazards. • Accidental release of surface water runoff containing elevated levels of suspended sediments or other contaminants	• Appropriate storage of fuels and potentially hazardous construction materials within a secure site compound. • Provision of on-site pollution control kits. • Use of settlement system prior to discharge.
	• Permanent damage and loss of habitats. • Injury or death of protected birds and animals.	• Works to remove trees to be undertaken outside of the bird breeding season of March to August in the event that nesting birds are encountered.
Natural Resource Use	• Waste generation and disposal of materials to landfill.	• Preparation and implementation of an SWMP. • Waste minimisation at source, with segregation and recycling of waste generated.
	• Use of natural resources	• Preparation and implementation of an SWMP. • Appropriate sourcing of materials.
Site Workers	• Release of asbestos during demolition	• Completion of asbestos surveys and removal of all identified asbestos materials by a specialist contractor as part of the demolition works.
	• Exposure of construction staff to contamination, if confirmed during planned site investigations works.	• Use of Personal Protective Equipment (PPE).
Local Amenity	• Temporary visual intrusion for nearby residents, occupiers of other land uses, pedestrians and passers-by. • Temporary visual intrusion of construction works on views into and out of the application site. • Temporary increases in road noise and vibration generated from construction vehicles. • Temporary increases in noise and vibration levels generated from	• Installation of 2.4m site hoarding. • Standard, good site housekeeping. • Appropriate construction site layout. • On-site wheel washing facilities. • Dust management. • Demolition and construction traffic management. • Agreement of working hours with SDCC careful selection of quiet plant, appropriate siting and regular maintenance, use of temporary acoustic barriers around specific activities etc.

Table 5.4: Summary of Potential Environmental Impacts during Demolition and Construction		
Receptor	**Potential Impacts**	**CEMP Mitigation**
	the use of site plant and machinery. • Temporary generation of wind-blown dust nuisance from ground surfaces, stockpiles, vehicles, work faces and cutting and grinding of materials. • Temporary generation of exhaust emissions from lorries and plant delivering and removing materials including dust and particulates which may impact upon local air quality.	• Setting of noise and vibration limits with associated monitoring during the works.

Mitigation and Scope of Environmental Management Controls

5.78 The following mitigation controls would be committed to and delivered pursuant to either planning conditions, obligations contained in a legal agreement and supported as necessary by contractual obligations between the Applicant and the main contractor(s) or regulatory provisions in force from time-to-time.

Proposed Site Management Controls

Construction Environmental Management Plan (CEMP)

5.79 A CEMP would be prepared, to include a traffic management plan and SWMP, and submitted for review and approval by SDCC prior to commencement of works on site. It would include:

- A commitment to environmental protection (all consultants and trade contractors would be invited to declare their support for this at tender stage);
- Documentation of measures to comply with environmental aspects of any planning conditions;
- Detailed control measures and activities to be undertaken to minimise likely environmental impacts, as well as associated roles and responsibilities;
- Target criteria for environmental issues, where practical, such as water and energy consumption;
- Any requirements for monitoring and record keeping;
- A dedicated point of contact during normal working hours and in emergencies with responsibility to deal with environmental issues if they arise; and
- A review and monitoring regime of on-site performance against the CEMP provisions by the project team and regular environmental audits of its implementation.

5.80 The CEMP would provide the necessary level of management and control of demolition and construction practices. This includes advance notice of operations and duration of work that may cause noise, disruption to access, or other effects.

5.81 The CEMP would form part of tender documentation and contractors would be required to demonstrate how they will work within these provisions, identify communication channels for exchange of information and set out programmes for monitoring and auditing of environmental control systems.

5.82 Where departures from the CEMP are inevitable, prior identification is required, such that other mitigation measures can be considered.

Considerate Constructors

5.83 All contractors would seek to register the site under the relevant Considerate Constructors Scheme.

Principal Contractor (or equivalent) and Management of Subcontractors

5.84 All contractors would have responsibility for monitoring any subcontractors' environmental performance; acting as a point of contact for consultation and feedback and for developing mechanisms to solve on-site issues as and when required.

Environmental and Communication/Liaison Strategy

5.85 The Applicant would be expected to nominate a manager who would act as the Project Environmental Manager (PEM) (or equivalent), who would be named at all site entrances, with a contact telephone number. The contact name and details would be provided to all the relevant stakeholders by the Applicant prior to the start of the demolition and construction works.

5.86 The PEM would have primary responsibility for dealing with SDCC and other stakeholders on environmental matters, and all key stakeholders would be notified whenever a change of responsibility occurs for the PEM role. The PEM would keep neighbours, SDCC and other relevant parties informed of the nature of the on-going works, their duration and programme to establish and maintain good relationships with them.

5.87 It is anticipated that regular meetings would take place between the PEM and SDCC to review progress and to agree any necessary actions. The PEM would also deal with enquiries from the general public, including any complaints. Any complaints would be logged and reported to the relevant individual within SDCC (and vice versa) as soon as practicable.

5.88 The PEM would coordinate responses to queries and address issues in a timely and satisfactory manner.

Emergencies and Environmental Incidences

5.89 Protocols to be implemented on site in instances of emergencies and environmental incidents would be set out within the CEMP for approval by SDCC.

Housekeeping and General Site Management

5.90 Hoardings/security fencing would be erected around the site to provide a clear and secure demarcation between operational activities and other areas and to provide information regarding the proposed development and its progress. Particular attention would be paid to locations supporting high volumes of pedestrian movement, demolition and construction routes, access gates and security arrangements.

5.91 A 'clean site' policy would be maintained and contractors and their subcontractors would be expected to maintain a tidy site. A street sweeper would be employed as required during the demolition, foundation, and excavation periods of the construction programme to make sure that the streets around the site would be kept clean during the works.

Nearby Residential Properties and Other Neighbours

5.92 The following mitigation and environmental controls would collectively limit potential visual, noise, vibration, traffic and dust impacts associated with the proposed development's construction works:

- Maintaining aesthetically appropriate site hoardings/fencing;
- Agreeing working hours with the SDCC;

- Undertaking regular road sweeping;
- Arranging and locating potentially high impact site activities and plant away from neighbouring residential receptors;
- Selecting quiet plant and regularly maintaining plant;
- Implementing good site housekeeping measures;
- Directing site lighting away from sensitive receptors;
- Turning site lighting off outside of normal working hours;
- Screening scaffolding and active construction activities above hoarding levels, where practical;
- Implementing construction traffic management measures as agreed with SDCC;
- Implementing and monitoring dust management measures;
- Implementing and monitoring noise and vibration measures; and
- Using temporary acoustic barriers around potentially noisy activities.

Population and Human Health

5.93 If feasible, and available, it is encouraged that the applicant considers using local suppliers for goods and services; demolition and construction stage jobs created should be advertised and made available in the local area initially in order to maximise this opportunity. This would result in a more positive effect on local employment and the local economy.

Archaeology

5.94 There is no potential for impacts on the archaeological resource beneath the ground surface of the site. A detailed scheme of test trenching failed to reveal any archaeological deposits, finds or features and no further archaeological investigations are necessary prior to the commencement of construction.

Contaminated Soil

5.95 The following management and control measures would be included in the CEMP in order to control ground contamination:

- Incorporate the reduction, reuse and recycle approach in terms of on-site soil excavations. The proposed works will be carefully planned to ensure only material required to be excavated will be, with as much material left in situ as possible. Reuse of on-site excavated soil and capping with hardstand will minimise any increase in aquifer vulnerability.
- Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil. In the unlikely event that any potentially contaminated soils are encountered, the soil should be tested and classified as hazardous or non-hazardous in accordance with the EPA's Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous'[3] publication, HazWasteOnline tool[4] or similar approved method. The material will then need to be classified as inert, non-hazardous, stable non-reactive hazardous or hazardous in accordance with EC Decision 2003/33/EC[5]. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.
- The effects of soil stripping and stockpiling will be mitigated against through the implementation of an appropriate earthworks handling protocol during construction within the CEMP. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body.
- Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads.
- EPA agreement will be obtained before re-using the spoil as a by-product. However, it is not currently anticipated that any excavated material will be removed offsite or imported onto the site for reuse as a by-product. Where material cannot be reused off site it will be sent for recovery or disposal at an appropriately authorised facility.
- All fill and aggregate for the proposed development will be sourced from reputable suppliers. All suppliers would be vetted for:
  - Aggregate compliance certificates/declarations of conformity for the classes of material specified for the proposed development;
  - Environmental Management status; and
  - Regulatory and Legal Compliance status of the Company.
- In order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:
  - Designation of a bunded refuelling areas on the site;
  - Provision of spill kit facilities across the site;
  - Where mobile fuel bowsers are used the following measures would be taken:
    - Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
    - The pump or valve would be fitted with a lock and would be secured when not in use;
    - All bowsers to carry a spill kit;
    - Operatives must have spill response training; and
    - Drip trays used on any required mobile fuel units.
- In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:
  - Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
  - Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
  - All drums to be quality approved and manufactured to a recognised standard;
  - If drums are to be moved around the site, they would be secured and on spill pallets; and
  - Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.
- Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management, as set out in the CEMP, will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation.
- Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any off-site impacts. All run-off will be prevented from directly entering into any water courses or drainage ditches.

[3] EPA, 2018. Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous. July 2018 EPA.
[4] HazWasteOnline, 2012. Waste Assessment Tool [online]. Available at: https://www.hazwasteonline.com/ [Accessed 28/07/2021].
[5] European Union, 2003. 2003/33/EC: Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC. Document 32003D0033.

- Should any discharge of demolition or construction related water be required, discharge would be to foul sewer. Pre-treatment and silt reduction measures on-site would include a combination of silt fencing, settlement measures (e.g. silt traps, 20m buffer zone between machinery and watercourses, off-site refuelling of machinery) and use of hydrocarbon interceptors. Active treatment systems such as Silbusters, or similar, may be required depending on turbidity levels and discharge limits.

5.96 Construction vehicles would be properly maintained to reduce the risk of hydrocarbon contamination and would only be active when required. Construction materials would be stored, handled and managed with due regard to underlying soil and thus the risk of accidental spillage or release would be minimised.

Water Resources

5.97 To ensure that no contaminant-pathway-receptors pathways are created and to reduce the potential for contamination to occur during the demolition and construction stage, all site activities would be undertaken in accordance with the relevant pollution control requirements and guidance. The Applicant would also be responsible for obtaining all necessary consents and ensuring compliance with the conditions of the consents.

5.98 The following procedures will be included in the CEMP in order to prevent any spillages of fuels to the Baldonnel Stream, or groundwater, and to prevent any resulting water quality impacts:

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures would be taken:
- Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
- Pumps or valves would be fitted with a lock and would be secured when not in use;
- All bowsers to carry a spill kit;
- Operatives must have spill response training; and
- Drip trays used on any required mobile fuel units.
- In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:
- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they would be secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

5.99 Potential pathways for contamination could be minimised as follows:

- Groundwater would be prevented from entering excavations by dewatering, if required;
- Surface water would be prevented from entering excavations by using cut-off ditches, covering the excavation, or captured within the groundwater pumping system;
- Potentially contaminating activities such as concrete preparation, vehicle washing and fuelling etc. are constrained to dedicated protected areas where contaminated water can be collected; and
- Contaminated water from excavations would be collected within a settlement tank or lagoon to enable treatment prior to release.

5.100 Subsoil would be excavated to facilitate the proposed development. Such works would be carefully planned to ensure as much material is left in situ as possible. Reuse of on-site excavated soil 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 the site. It is envisaged that any soil excavated will be retained on site and reused as fill material or landscaping. Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil.

5.101 Stockpiles have the potential to cause negative impacts on and water quality through increased potential for sediment release to watercourses. The effects of soil stripping and stockpiling would be mitigated against through the implementation of an appropriate earthworks handling protocol during construction within the CEMP. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body.

5.102 In addition, the construction drainage system for the proposed development would be designed and managed to comply with Irish requirements, which details methods that should be considered for the general control of drainage on construction sites.

5.103 Wherever possible, the Applicant would minimise the amounts of wastewater discharged from the site. Surface drainage and wastewater would pass through settlement tanks and oil interception facilities before discharge to sewer. The Applicant would ensure that all potentially contaminated water, e.g. dewatering effluent, is disposed of in accordance with relevant pollution control requirement and guidance.

5.104 An Emergency Incident Plan would be in place for the site to deal with potential spillages and/or pollution incidents. This would include the provision of on-site equipment for containing spillages, such as emergency booms and chemicals to soak up spillages.

5.105 Any pollution incidents would be reported immediately to SDCC and the regulatory bodies such as the EPA.

5.106 In order to reduce the flood risk to the proposed development, it is proposed that finished floor levels (FFLs) be raised above the peak modelled flood levels for the Baldonnel Stream. In the absence of mitigation, this could create the potential for the proposed development to displace floodplain storage and thereby increase flood risk elsewhere. To prevent this, it is necessary to provide compensatory storage within the site and the FRA sets out that the proposed development includes embedded mitigation in the form of compensatory storage (provided by reducing the ground level in the landscape area adjoining the northern boundary) to replace the displaced storage. The volume of compensatory storage exceeds the volume of existing floodplain storage that is being lost and so the proposed development will lead to a slight reduction in flood risk elsewhere.

Ecology

5.107 Pollution prevention measures as outlined in the preceding sections.

5.108 In relation to badgers and otter all excavations are to be securely covered or closed off at the end of each working day to prevent the accidental trapping of badgers. Where this is not possible, a means of escape (for example a ramp) must be included to allow safe exit from the excavation. Checks of any open excavations should be performed by site staff prior to each day's works. The proposed security fencing will have mammal gates or a gap of at least 10cm at the bottom to allow free movement of badgers through the site.

5.109 Breeding birds are highly susceptible to disturbance, and therefore where works are to commence during the breeding season (March to August inclusive), bird surveys should be undertaken prior to the initiation of construction works. If breeding birds are identified within the site at this time, species-specific buffers will be implemented to protect nesting birds during construction.

5.110 Dust generated from construction works would be managed by means of 2.4 m high site hoarding and dust suppression measures, such as the use of water sprays, dampening down of roads and covering of storage areas, such that the potential for adverse dust generation is reduced.

5.111 Construction drainage, air quality and noise management controls would be actively implemented at the site to minimise potential construction impacts.

5.112 All lighting would appropriately be aimed, controlled and switched off when the site is not operational (where practicable).

Landscape and Visual

5.113 Measures would be undertaken to protect existing vegetation (such as trees and hedgerows) throughout the demolition and construction stage, such as exclusion zones around trees to avoid root damage as outlined in the Arborist Associates Arboricultural Impact Assessment and Tree Protection Plan for the site which accompany the application.

5.114 The demolition and construction site would be surrounded by 2.4 m high hoarding to reduce negative visual impacts from the activities.

Transport

5.115 A Construction Management Plan (CMP) would be prepared by the contractor, when appointed, that would require construction traffic including both construction plant and materials deliveries to be programmed to avoid peak traffic periods on the surrounding local and strategic road network. The Traffic Management Plan would be reviewed and updated in line with the construction programme and would typically include details of the following:

- preferred hours of deliveries and removals (out of peak hours);
- agreed demolition and construction traffic routing and site access points;
- road cleaning facility provisioning;
- temporary traffic control measures;
- temporary and permanent access to the works – for personnel/vehicles;
- off-loading and storage areas;
- traffic management procedures for waste disposal vehicles;
- personnel and vehicle segregation;
- equipment, e.g. temporary fencing, signage, etc.;
- temporary and permanent closures and diversions of footpaths; and
- site inductions.

5.116 Wheel cleaning facilities with adjoining hard standings would be located at the access and egress points of the site. These wheel cleaning facilities would be supplemented by regular road cleaning during the excavation and would have appropriate catchment areas.

Vehicle Routing

5.117 Vehicles making deliveries to the application site or removing spoil material would travel via designated routes which would be agreed with SDCC as required. The principal contractor would liaise with SDCC to provide directional signage on the principal routes on the highway network surrounding the application site, if required, in order to improve navigation.

5.118 Where possible vehicle movements would be scheduled out of peak hours (i.e. 08:00-09:00 and 17:00-18:00 during the weekdays.).

5.119 Vehicles coming to the site would have specific timeslots booked. It would be the responsibility of the driver and company to ensure they arrive on site at the designated time.

5.120 The construction sequence for the site would be programmed to minimise the need for road closures. However, there may be instances when they are unavoidable. Where this is the case, road closures would be requested weeks in advance and authorised by SDCC.

5.121 The principal contractor would co-ordinate all deliveries and collections to/from the site, and ensure that as far as possible that:

- all delivery and collection vehicles are aware of the proposed routing;
- prior to a delivery or collection, haulers would notify the relevant authorities;
- liaison would be undertaken with occupants of adjacent buildings to avoid delays to service deliveries due to construction vehicles; and
- deliveries would be made on a 'just in time' basis.

5.122 Larger vehicle movements would be scheduled to avoid peak hours on the local road network if at all possible. If an alternative construction traffic route is required, this would first be agreed with SDCC.

5.123 Suppliers would be encouraged to consolidate deliveries where feasible. Where possible all deliveries would be made to designated areas within the application site. If for any reason it is necessary to load and unload outside site boundaries, the details and procedure for this would be agreed in advance with SDCC.

5.124 There would be no waiting areas for site vehicles in the roads around the site.

HGV Management

5.125 The most intensely used HGVs on the site would be ready mix concrete trucks for the delivery of concrete and articulated lorries for the delivery of fabricated steelwork.

5.126 It is assumed that HGV construction traffic would be spread evenly over an 8 hour long working day (to avoid peak periods), although there may be slight peaks.

5.127 Loading and unloading of vehicles, dismantling of equipment such as scaffolding or moving equipment or materials around the site would be conducted in such a manner as to minimise noise impacts to existing surrounding residential properties.

Parking Management and Staff Travel

5.128 A key aspect of the demolition and construction process would be the management of demolition and construction worker travel to and from the site. Construction workers would be encouraged to access the site by public transport, walking and cycling in order to reduce the potential impact of vehicle traffic

during this temporary period. A series of measures would be implemented to encourage workers to travel using sustainable modes, which would form part of the traffic management plan. These may include:

- Cycle parking would be provided and this would be covered and secure;
- Facilities for changing and storing cycling clothes would be provided;
- The developer would investigate the provision of public transport vouchers to encourage workers to travel to the site by public transport;
- The contractor would encourage workers to car share where possible and would set up a car sharing database to identify where matches could be made;
- Incentives such as a free breakfast once a week for those walking, cycling, car sharing or using public transport would be provided; and
- Travel information packs would be provided to all workers. These would be provided in either paper form or electronically and would include public transport timetables and information on cycling routes.

5.129 Parking provision would be provided on site, however this would be limited and spaces would be managed.

5.130 Vehicle movements would be managed to avoid queuing outside the site access points.

Noise and Vibration

5.131 Effective co-ordination and time management of demolition and construction activities would be used to avoid adverse effects from noise and vibration to surrounding areas. Early and helpful communications with the surrounding and on-site receptors would assist in managing any complaints arising during the demolition and construction works of the proposed development.

5.132 Contractors would be required to ensure that works are carried out in accordance with best practicable means. A full explanation of measures to control construction noise would be incorporated within the CEMP and detailed in all construction method statements.

5.133 As set out in Chapter 9: Noise and Vibration, noise levels from the demolition and construction of the proposed development have been predicted at noise-sensitive properties on site and in close proximity to the site and the impact of the noise assessed. Noise levels likely to be generated by the demolition and construction works have been predicted based on the type and number of plant likely to be in operation.

5.134 The CEMP will include the following Best Available Techniques (BAT):

- Demolition operations will be organised with regard to positioning of plant and movement of vehicles so as to minimise noise adjacent to properties.
- Use of plant conforming with relevant Irish standards, directives or recommendations on noise or vibration.
- Works will only be carried out within agreed working hours. Restricted working hours (including Monday to Friday: 07:00 to 19:00, Saturday: 08:00 to 13:00, and no working on Sundays or Bank Holidays). Planning of working hours to take account of the effects of noise and vibration upon persons in areas surrounding site operations and upon persons working onsite.
- Construction plant will be maintained in good condition with regards to minimising noise output and workers exposed to harmful noise and vibration.
- All drivers to site, including deliveries, will drive vehicles in a considerate manner in accordance with the specified speed limits with any failure to comply addressed as per infringements of the contractor's Project Health and Safety Plan.
- Construction plant will be operated and maintained appropriately, having regard to the manufacturer's written recommendations and maintenance programmes.
- Starting plant and vehicles sequentially rather than all together. Plant, equipment and site vehicles will be switched off when not in use.
- Construction traffic will only use the designated routes as per the construction traffic management plan as outlined in Chapter 5: Construction Description.
- The transport of construction materials, spoil and personnel will be programmed and routed to reduce the risk of increased noise and vibration impacts.
- Adoption of quiet working methods, using plant with lower noise emissions, where reasonably practicable.
- Use of silenced and well-maintained plant conforming with the relevant Irish directives relating to noise and vibration. Vehicle and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers and/or mufflers, maintained in good working order and operated in such a manner as to minimise noise emissions.
- Construction plant and activities will be positioned to minimise noise at sensitive locations.
- Equipment that breaks concrete by munching or similar, rather than by percussion, will be used as far as is practicable.
- Mufflers will be used on pneumatic tools.
- Avoiding breaking out hard surfaces using percussive techniques, where reasonably practicable. Where practicable, rotary drills actuated by hydraulic or electrical power will be used for excavating hard materials.
- Controlled demolition techniques: In order to reduce the noise and vibration impacts associated with the demolition activities across the site, the works will be undertaken using controlled demolition techniques. This approach requires the demolition methodology to be planned meticulously in advance of works commencing to ensure potential environmental disturbances to surrounding receptors are minimised wherever possible i.e. noise, vibration, dust.
- Adoption of working methods that minimise vibration generation, where reasonably practicable;
- Locating plant away from noise and vibration sensitive receptors, where feasible;
- Use of site hoarding, assumed 2.4m high, and acoustic screening for static items of plant and work areas, where feasible;
- Avoiding unnecessary revving of engines and switch off equipment, when not required;
- Keeping internal haul routes well maintained and avoid steep gradients;
- Use of rubber linings for chutes and dumpers to reduce impact noise;
- Minimisation of drop height of materials;
- Carrying out regular inspections of noise mitigation measures to ensure integrity is maintained at all times;
- Providing briefings for all site-based personnel so that noise and vibration issues are understood, and mitigation measures are adhered to;
- Management of plant movement to take account of surrounding noise sensitive receptors, as far as is reasonably practicable; and
- Carrying out compliance monitoring of onsite noise and vibration levels to ensure that the agreed limits are being adhered to.

5.135 An appropriate community awareness campaign will be undertaken to provide information to people residing in properties in the vicinity of the construction works, to reduce the likelihood of negative impacts on the public which could result in complaints. The level of engagement will vary depending upon the expected effects experienced by individual receptors due to the construction works.

5.136 It is envisaged that the public awareness campaign will provide local residents with the following items of information:

- The nature of the works being undertaken;
- The expected duration of the works;
- The contractor's working hours;
- Mitigation measures that have been adopted to minimise noise and vibration, as detailed in the CEMP; and
- Contact details in the event of a noise disturbance.

5.137 If work is required to extend into periods beyond the agreed hours, separate authorisation will be secured with SDCC via the CEMP or other agreement process.

5.138 Best Available Techniques (BAT) as defined in Section 7 of the Protection of the Environment Act will be implemented as part of the working methodology as detailed in the CEMP. This will serve to minimise the noise and vibration effects at receptors in the vicinity of the construction works. The reduction in noise levels provided through the implementation of BAT varies depending on the nature of the works; however, values in excess of 5 dB can be expected through a combination of appropriate measures and the use of site hoardings for noise screening.

Air Quality

5.139 Dust and emission control and mitigation at the application site would be particularly important during earthworks and dry weather periods. To minimise adverse effects due to dust, the site-specific best practice measures described in Table 5.5 would be implemented by the principal contractor.

Table 5.5: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display name and contact details of responsible person for dust issues on the site boundary (e.g. hoarding) in addition to head/regional office contact information. • Display the head or regional office contact information.
Dust Management Plan	• Develop and implement a Dust Management Plan (DMP) which is included as part of the CEMP.
Site Management	• Record all complaints and incidents in a site log. • Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. • Make the complaints log available to the Local Authority if requested. • Record any exceptional dust incidents on site or off site. • Hold regular liaison meeting with other high-risk construction sites within 500 m.
Monitoring	• Undertake daily on site and off site visual inspections where there are nearby receptors. • Carry out regular inspections to ensure compliance with the DMP and record results in the site logbook. • Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and Maintaining the Site	• Plan site layout to locate dust generating activities as far as possible from receptors. • Use solid screens around dusty activities and around stockpiles. • Avoid site runoff of water and mud. • Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period. • Keep site fencing barriers and scaffolding clean using wet methods. • Remove dusty materials from site as soon as possible, unless being re-used on site. If they are being re-used on site cover as described below • Minimise emissions from stockpiles by covering, seeding, fencing, or damping down.
Operating Vehicle/ Machinery and Sustainable Travel	• Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. • Ensure vehicles switch off engines when stationary. • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Produce a Construction Logistics Plan (CLP) to manage the sustainable delivery of goods and materials. • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations	• Only undertake cutting, grinding, or sawing equipment with suitable dust suppression equipment or techniques. • Ensure adequate water supply for effective dust and particulate matter suppression. • Use enclosed chutes, conveyors, and covered skips. • Minimise drop heights of materials. • Ensure suitable cleaning material is available at all times to clean up spills.
Waste Management	• Avoid bonfires. • Avoid explosive blasting using appropriate manual or mechanical techniques. • Bag and remove any biological debris.
Measures Specific to Demolition	• Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure effective water suppression during demolition. • Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition.
Measures Specific to Construction	• Ensure aggregates are stored in bunded areas and are not allowed to dry out. • Avoid concrete scabbling where possible. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos. • For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Measures Specific to Trackout	• Use water-assisted dust sweepers to clean access and local roads. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving the site are appropriately covered. • Record inspections of haul roads in site log, including any remedial action taken. • Implement a wheel washing system.

Table 5.5: Dust Mitigation Measures for Medium Risk Sites	
	• Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit. • Access gates to be located at least 10 m from the receptors where possible.
Measures Specific to Earthworks	• Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil. • Only remove the cover in small areas during work and not all at once.

5.140 The Applicant would give detailed dust control protocols as part of their contracts for the site.

Waste Management

5.141 As a principal waste mitigation measure during the proposed development's construction, the principal contractor would prepare an SWMP at the site, which would be secured by an appropriately worded planning condition.

5.142 The scope of the SWMP would cover the following:

- All excavations would be carefully monitored by a suitably qualified person to ensure that potentially contaminated soil is identified and segregated, if encountered. If any potentially contaminated material is encountered, it will be segregated from clean/inert material, tested, and classified as either non-hazardous or hazardous and further classified as clean, inert, non-hazardous, or hazardous in accordance with the EC Council Decision 2003/33/EC6, which establishes the criteria for the acceptance of waste at landfills. All excavated material would be used.
- Waste materials generated at the site compound would be stored in suitable receptacles in designated areas of the site compound.
- On-site segregation of waste materials would be carried out to increase opportunities for off-site reuse, recycling, and recovery, to ensure that the majority of construction materials are either recyclable or recoverable – it is anticipated that the following waste types, at a minimum, would be segregated: made ground, soils and stones and trees/shrubbery. In addition, the following wastes would be segregated at the site compound: organic (food) waste, packaging (paper/card/plastic), mixed dry recyclables and mixed non-recyclable waste.
- All waste contractors collecting waste from the site would hold a valid collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO).
- Construction wastes would be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, recycling, recover and/or disposal. As stated in the baseline section, there are numerous licensed waste facilities in the local region that have sufficient capacity to accept both hazardous and non-hazardous waste materials and could manage C&D waste from the proposed development.
- All waste leaving site will be reused, recycled, or recovered where possible to avoid material designated for disposal.
- All waste leaving the site would be transported by suitable permitted contractors and taken to suitably registered, permitted, or licenced facilities.
- All waste leaving the site would be recorded and copies of relevant documentation maintained.
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) would also be segregated and would be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager would be appointed by the main contractor to ensure effective management of waste during the excavation and construction works.
- All construction staff would be provided with training regarding the waste management procedures.
- The waste from delivers into the two-bay truck loading bay would be compacted on site.

5.143 In particular the following measures would be proposed in the SWMP to minimise waste generation on site:

- Ordering the quantity of materials required for the job, thus reducing over-ordering;
- Determining when and where materials are required and requesting 'just in time' deliveries;
- Returning damaged goods or incomplete deliveries;
- Requesting suppliers to minimise packaging and to guarantee a take-back service, especially for pallets;
- Ordering materials that are cut to size, rather than standard sizes;
- Where possible and appropriate to do so, using prefabrication off-site;
- Having appropriate storage areas ready - these should be covered to protect against rain and ideally have a hard standing surface;
- Determining where special handling is required;
- Securing the site to avoid theft and vandalism; and
- Ensuring good on-site segregation of wastes.

5.144 Any waste that is not re-used on site and therefore requires off-site disposal would be dealt with in accordance with the Waste Hierarchy, the requirements of the EPA and in line with relevant legislation.

Recycling

5.145 Segregation (on site or off site) and recycling of cardboard, timber, metal, plastics, plasterboard and gypsum based products will be required by the project team. The segregation of polythene film waste from other plastics would also be considered and local collections investigated.

5.146 It is proposed that waste would be segregated and stored for collection on site.

5.147 Where standard sized pallets are used for material storage, then regular collections would be organised for removal and for re-use rather than disposal in timber skips.

5.148 Where on-site segregation of waste is not deemed possible due to spatial constraints at the application site, the waste carriers would be required to ensure off-site segregation for waste and diversion from landfill is undertaken.

Disposal

5.149 All construction materials that cannot be re-used or recycled or would be disposed of at appropriately licensed disposal facilities. The destination of all waste or other materials from the application site would be notified to the relevant authority for approval. No burning of construction waste would take place on site.

[6] European Union, 2003. 2003/33/EC: Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC. Document 32003D0033.

Climate

5.150 The proposed development has, seek to minimise GHG emissions, wherever possible, to contribute to the achievement of Ireland's GHG reduction targets and carbon budget. The embedded mitigation measures relevant to the construction and demolition stage of the proposed development have been presented in Table 5.6.

Table 5.6: GHG mitigation measures during construction and demolition stage

Mitigation measure	Mitigation detail	Method of reduction
Excavation of materials	Material excavated during construction would be processed for use in the works wherever possible to reduce the amount of material disposed of off site as well as imported from other sources, and associated GHG emissions. Possible uses of excavated materials include general fill and other graded materials. Processing of material would take place on site.	Reduce
Sustainable materials	Using sustainability sourced, recycled or secondary materials with lower embedded GHG emissions and water consumption; e.g. Specifying products with a high recycled content and (e.g. Pulverised Fuel Ash (PFA) replacement for up to 30% of the cementitious material (i.e. as replacement for Portland cement); Using recycled crushed concrete in granular sub-base materials in pavements sourced from existing pavements on site to be demolished as part of the works;	Reduce
Reporting	Energy consumption and materials use would be recorded and reported on an ongoing basis during the construction phase of the development;	Reduce
Equipment	Using low-emissions or electric construction plant, including the potential for portable PV for use in powering temporary compound and equipment;	Reduce
Procurement	Procuring materials with Environmental Product Declarations (EPD) to allow for the most informed procurement choices; and procuring materials from suppliers that offer take back schemes, where possible;	Reduce
Reuse	Reusing the materials from the pre-existing building wherever possible.	Avoid/ prevent
Minimising waste during construction	Following measures would be proposed in the SWMP to minimise waste generation on site; ordering the quantity of materials required for the job, thus reducing over-ordering.	Reduce

5.151 In addition, and to reduce GHG emissions associated with vehicles from workers, the following mitigation measures would be implemented:

- Cycle parking would be provided, and this would be covered and secure.
- Facilities for changing and storing cycling clothes would be provided.
- The developer would investigate the provision of public transport vouchers to encourage workers to travel to the site by bus or rail.
- The contractor would encourage workers to car share where possible and would set up a car sharing database to identify where matches could be made.
- Incentives such as a free breakfast once a week for those walking, cycling, car sharing or using public transport would be provided.
- Selecting electrically driven equipment where possible in preference to internal combustion powered; hydraulic power in preference to pneumatic; and wheeled in lieu of tracked plant.
- Operating plant at low speeds where possible and incorporating automatic low speed idling.
- Switching off vehicle engines where vehicles are standing for extended periods and avoid unnecessary revving of vehicle engines.

5.152 Other potential opportunities to reduce GHG emissions during the demolition and construction stage include the following:

- Specification of concrete with increased cement replacement – 40% of none-critical structural elements as a minimum;
- Specification of reinforcement steel with 100% recycled content of non-critical structural elements;
- Aluminium windows frames with recycled content >35% or replace with Wood Alu windows frames;
- Use of glass with recycled content, where available;
- Substitute raised access floor with timber flooring or RAF with recycled content;
- Specify aluminium with 20-35% recycled content;
- Specify plasterboard with 95% recycled content or substitute with gypsum fibreboard; and
- MEP service elements with recycled content where feasible.

Cumulative Impacts

5.153 Site preparation, demolition and construction activities, when undertaken at the same time, have the potential to give rise to combined (cumulative) impacts and effects. Although temporary, these combined impacts, if not managed can give rise to potentially adverse effects on sensitive receptors in proximity to the site, i.e. existing residential, industrial, commercial, community and open space receptors.

5.154 Such impacts are typically restricted to temporary to short-term periods of time. Even then, not all receptors would experience impact interactions during this time depending on phasing and proximity to the sensitive receptor. The majority of interactions are likely to arise from activities such as demolition works, noise and vibration from construction plant and vehicles, dust from plant and vehicles, the visual impacts of the work and passing HGVs.

5.155 In terms of residential amenity, demolition and construction works would typically be carried out outside of those hours when residents could reasonably expect quiet enjoyment of their properties. Demolition and construction works would typically be carried out between the hours of 07:00 to 19:00 hours, so residents would not be subjected to unreasonable impacts during daytime works periods.

5.156 Impact interactions that are likely to occur would generally be of a temporary and short-term nature and would be carefully co-ordinated to ensure minimal disruption to sensitive receptors.

5.157 It is anticipated that the stringent management controls set out in this Chapter would ensure that the potential demolition and construction of the proposed development would be kept to a minimum and as such, would limit the potential for further predicted impacts when considered in conjunction with the development proposals in the surrounding area. It is expected that other schemes in the area would also adopt similar stringent management controls.

5.158 The CEMP, to be secured by an appropriately worded planning condition, would be implemented during the demolition and construction works and would provide a framework within which activities on site would be managed 'at source' to minimise impacts on all sensitive receptors.

Deconstruction of Proposed Development

5.159 The deconstruction of the proposed development would follow a demolition method and sequence. Safe working practices would be devised and implemented and would be undertaken according to typical dismantling techniques prevalent at the time.

5.160 The site would be hoarded and full height scaffold with sheeting would be erected to surround the buildings. Soft stripping works would then commence, removing all fixtures and fittings bringing the structure back to its shell. As well as the buildings, the scaffold protection would be dismantled as the development is lowered. When the development is at an appropriate level, long arm track mounted shear cutters would be used. The site would then be taken down to basement level and temporary works installed to make the perimeter retaining walls stable and the site left safe.

Summary

5.161 The development programme comprises the demolition of the existing residential property on the site and construction of the proposed development as described in Chapter 4: Proposed Development Description. Assuming planning permission is secured, on-site works are projected to start Q2 2022 and the construction works to be completed in Q4 2024, with a peak year of the works experienced in 2022.

5.162 Demolition and construction works have the potential to cause environmental impacts, from subsurface works, noise, wastes, surface water runoff, and emissions to air. Measures to control potential environmental impacts would be set out within the CEMP (including a traffic management plan and SWMP) to be secured by an appropriately worded planning condition.

6 POPULATION AND HUMAN HEALTH

Introduction

6.1 This chapter of the Environmental Impact Assessment Report (EIAR) reports on the likely significant population and human health effects to arise from the demolition and construction stage and operation stage of the proposed development.

6.2 The chapter describes the population and human health policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely population and human health effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

6.3 There are no technical appendices associated with this chapter.

Methodology

6.4 The assessment has been informed by the following legislation, policies, and published guidance:

- International Legislation:
  - Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017)[1];
- National Legislation and Policy:
  - Healthy Ireland Framework: A framework for improved health and wellbeing (2013-2025)[2].
- National guidance and industry standards:
  - Health in Environmental Impact Assessment: A primer for a proportionate approach (2017)[3];
  - PubMed MEDLINE database of biomedical and life sciences journal literature[4].

6.5 The EC guidance on the preparation of an EIAR states that:

"Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population."

6.6 This assessment follows the EC guidelines, and examines the health effects relevant to the proposed development as they relate to a relevant, defined study area.

6.7 Further consideration for this assessment is given to the findings of the other technical chapters of this EIAR, in particular in relation to air quality, noise and vibration, transport and accessibility, and landscape and visual impact assessment.

Assessment Scope

6.8 Health, or what constitutes 'good' health, is difficult to define and measure in all its aspects for a population because perceptions regarding health and expectations of good health vary. This chapter therefore applies the World Health Organization (WHO) definition[5], which states: "Health is a *state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity".*

6.9 The focus of this assessment is on community health [6] and wellbeing and not on occupational health and safety[7]. The terms 'health', 'human health', 'population health' and 'health and wellbeing' are used interchangeably.

Technical Scope

6.10 The technical scope of the assessment has considered the following effects during demolition and construction stage:

- Generation of demolition and construction related employment;
- Introduction of transient residential population; and
- Effects from increased traffic, noise and dust on amenity and health.

6.11 The following effects during the operation stage of the proposed development have been considered:

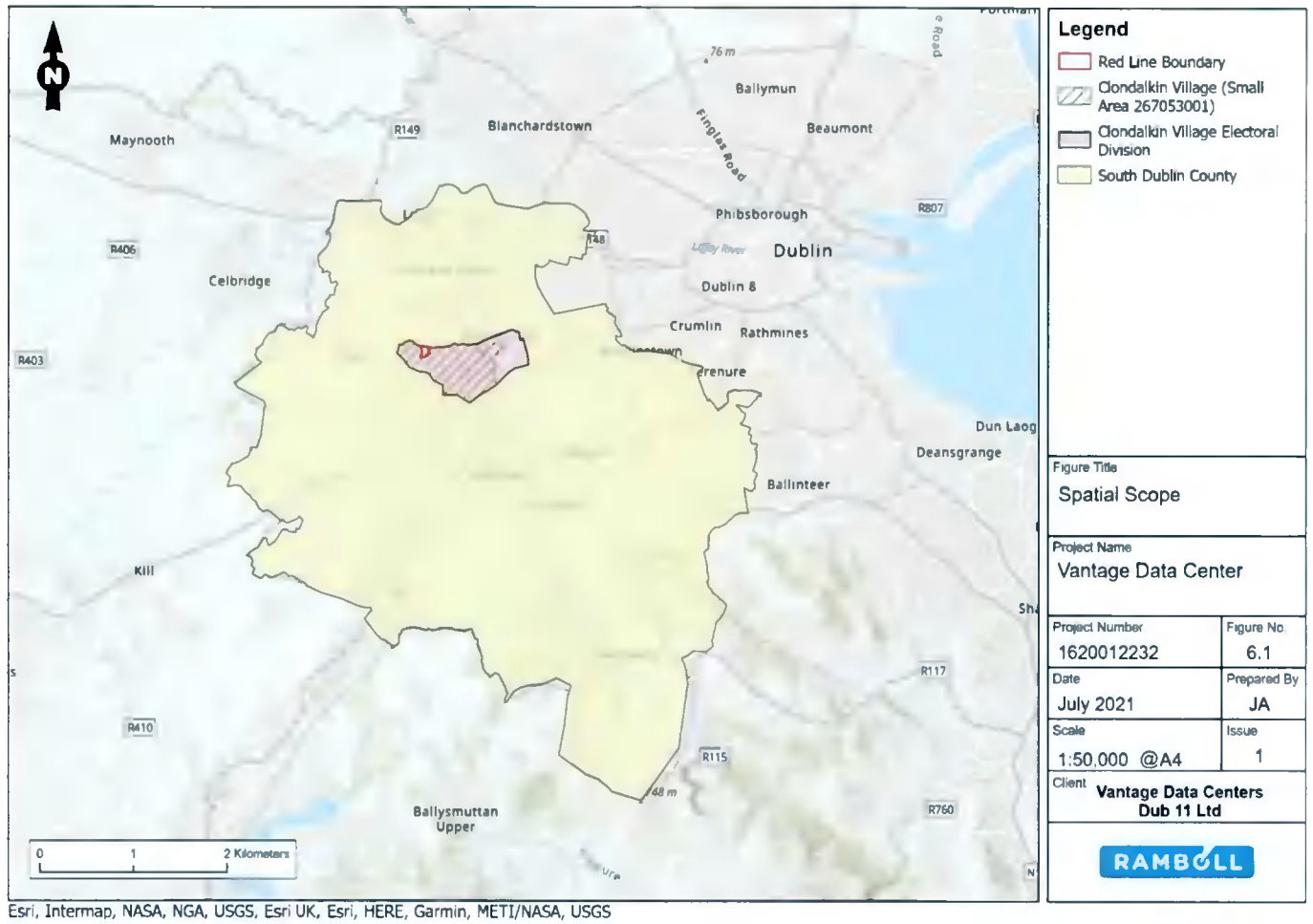
- Generation of operation employment;
- Effects from increased traffic on health;
- Effects on amenity; and
- Effects from the multifuel generation plant (MFGP) on health.

Spatial Scope

6.12 The site lies within the functional area of South Dublin County, which is sub-divided into Electoral Divisions and Small Areas. The site is located within the western end of Clondalkin Village Electoral Division (ED) and is within the Clondalkin Village Small Area (SA) (reference: Sa2017_267053001), as displayed in Figure 6.1. This Clondalkin Village SA excludes almost all of the residential areas of Clondalkin, with the exception of part of the estate of St. Johns off the Fonthill Road South, and primarily covers the employment zoning and wider area to the west of Clondalkin.

[1] European Commission, 2017. Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU). EU. 2017.
[2] Department of Health, 2013. Healthy Ireland Framework. A framework for improved health and wellbeing 2013-2025. Government of Ireland.
[3] Cave B, Fothergill J, Pyper R, Gibson G, Saunders P, 2017. Health in Environmental Impact Assessment: a primer for a proportionate approach. IEMA, Faculty of Public Health and Ben Cave Associates Ltd. Lincoln, England.
[4] PubMed MEDLINE database of biomedical and life sciences journal literature.

[5] WHO, 1948. WHO remains firmly committed to the principles set out in the preamble to the Constitution [online]. Available at: https://www.who.int/about/governance/constitution [Accessed on 06/07/2021].
[6] The health and wellbeing of those communities in the study area who have the potential to experience effects associated with the proposed development.
[7] This refers to the health and safety of workers employment by the proposed development, either during construction or operation.



Esri, Intermap, NASA, NGA, USGS, Esri UK, Esri, HERE, Garmin, METI/NASA, USGS

Figure 6.1: Spatial Designations in South Dublin County

Temporal Scope

6.13 In line with EPA guidance, as outline in EIAR Chapter 2: EIA Process and Methodology of this EIAR Volume, the duration of effects has been classified using the following: Momentary (seconds to minutes), Brief (<1 Day), Temporary (<1 Year), Short-term (1 to 7 years), Medium-term (7 to 15 years), Long-term (15 to 60 years), Permeant (>60 years). The assessment has considered impacts arising during the demolition and construction stage (Q2 2022 to Q4 2024) which would be expected to be temporary to short-term in nature and from the operation stage which would be expected to be long-term to permeant.

Baseline Characterisation Method

Desk Study

6.14 In order to establish baseline population and human health conditions in the study area, relevant data was reviewed and assessed. Data was obtained from a review of demographic characteristics of the area, ascertained from Census of Population data and other statistics released by the Central Statistics Office (CSO), comprising:

- Central Statistics Office, South Dublin County Council, 2016[8];
- Central Statistics Office, Clondalkin Village ED, 2016[9]; and
- Central Statistics Office, Clondalkin Village SA, 2016[10].

Field Study

6.15 A field study was not required as the data provided by other sources was deemed to be adequate and representative of the site conditions.

Assessment Method

Methodology

6.16 Health at the population level (all the persons inhabiting a defined location) is influenced by a number of determinants of health (non-medical factors that influence health outcomes). Many of these are socio-economic in nature. Those determinants of health commonly thought to be important are:

- employment;
- income;
- access to services;
- transport;
- housing;
- education;
- crime and fear of crime;
- social capital; and
- the physical environment.

6.17 To determine the potential population and human health impacts of the proposed development on nearby residents, the assessment needs to consider the pathways by which the proposed development might affect the determinants of health and by how much. For example, a development that creates new employment opportunities could contribute positively to health. However, if a development causes degradation in air quality, this could have a negative impact for health.

6.18 In terms of assessing the potential human health impacts associated with the proposed development, outputs of the landscape and visual, transport and accessibility, air quality, and noise and vibration chapters have been reviewed and any significant impacts identified in these chapters are considered in terms of their potential implications on population and human health.

6.19 The assessment methodology applied to the population and human health assessment is outlined below.

Assessment Criteria

6.20 The assessment of significance of effect with regards to population and human health is based on professional judgement of the sensitivity of the receptor and the magnitude of effect.

6.21 This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

6.22 There is no specific guidance in relation to sensitivity of receptors with regards to population and human health. The baseline below outlines the key population and health vulnerabilities in the study area;

[8] Central Statistics Office, 2016. South Dublin County Council [online]. Available at: https://census.cso.ie/sapmap2016/Results.aspx?Geog_Type=CTY31&Geog_Code=2AE1962914A113A3E055000000000001#SAPMAP_T13_1301 [Accessed 09/07/2021].

[9] Central Statistics Office, 2016. Census 2016 Sapmap Area: Electoral Division Clondalkin-Village ED [online]. Available at: https://census.cso.ie/sapmap2016/Results.aspx?Geog_Type=ED3409&Geog_Code=2AE196291D0213A3E055000000000001#SAPMAP_T14_1401 [Accessed 09/07/2021].

[10] Central Statistics Office, 2016. Census 2016 Sapmap Area: Small Area Sa2017_267053001 [online]. Available at: https://census.cso.ie/sapmap2016/Results.aspx?Geog_Type=SA2017&Geog_Code=4c07d11e-0d56-851d-e053-ca3ca8c0ca7f#SAPMAP_T14_1401 [Accessed 09/07/2021].

however, due to the baseline being desk-based and without in-depth stakeholder engagement at the community level, it is not possible to assign an overall sensitivity classification to the population in the study area. Therefore, the precautionary principle has been adopted for this assessment, which assumes that the population within the study area is of a medium to high sensitivity.

Impact Magnitude Criteria

6.23 The magnitude of impact has been classified as low, medium, or high, in accordance with the criteria set out in Table 6.1.

Table 6.1: Impact Magnitude Criteria

Magnitude of Impact	Criteria
Low	Change in an environmental and/or socio-economic factor(s) as a result of the proposed development which would result in a minor change to existing baseline conditions (negative or positive).
Medium	Change in an environmental and/or socio-economic factor(s) as a result of the proposed development which would result in a moderate change to existing baseline conditions (negative or positive).
High	Change in an environmental and/or socio-economic factor(s) as a result of the proposed development which would result in a major change to existing baseline conditions (negative or positive).

Scale of Effect Criteria

6.24 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 6.2.

Table 6.2: Scale of Effect Criteria

Magnitude	Sensitivity of Receptors		
	Low	Medium	High
Low	None	Imperceptible	Not Significant - Slight
Medium	None - Imperceptible	Not Significant - Slight	Moderate - Significant
High	Not Significant - Slight	Moderate - Significant	Very Significant - Profound

6.25 Based on Environmental Protection Agency's (EPA) Draft Guidelines on the information to be contained in Environment Impact Assessment Reports[11] (2017), as described in Chapter 2: EIA Process and Methodology, effects ranging from 'moderate' to 'profound' are considered 'significant' in terms of EIA.

Nature of Effect Criteria

6.26 The nature of the effect has been described as either positive, neutral, or negative as follows:

- Positive – An advantageous effect to a receptor;
- Neutral – An effect that on balance, is neither positive nor negative to a receptor; or
- Negative – A detrimental effect to a receptor.

Assumptions and Limitations

6.27 The assessment has relied on baseline data from the Central Statistics Office which is now five years old but still the most reliable source.

[11] Environmental Protection Agency, 2017. Draft Guidelines on the information to be contained in Environmental Impact Assessment Report (EIAR)

Baseline Conditions

Existing Baseline

Land Use

6.28 The surrounding context of the site is largely industrial and agricultural. The site is surrounded by numerous residential properties. A large proportion of these are no longer in residential use due to the extension of Grange Castle Business Park (located approximately 500m west) and road improvement in recent years. The closest residential receptor is at the sites north eastern boundary.

6.29 The site is located in Profile Park industrial estate and within the functional area of South Dublin County. Under the South Dublin County Council's (SDCC) Development Plan 2016-2022[12], the site is allocated under Objective EE: Employment and Enterprise. The stated aim is to provide for enterprise and employment related uses. The proposed land use of a data center is a permitted use under this zoning. Significant precedent exists for the establishment of this use on other EE zoned lands in the area. EE zoned areas are established economic industrial areas running essentially in an arc northward from City West to Grange and Grange Castle.

6.30 The current land use on the site is agricultural. There is an extant permission on-site for a distribution warehouse (SDCC planning reference: SD20A/0124), as detailed in EIAR Volume 1, Chapter 2: EIA Process and Methodology; however, it is understood that the Applicant will not be implementing the permission.

Population

6.31 At the time of the 2016 Census[12], the total resident population of South Dublin County was 278,767.

6.32 Table 6.3 presents the 2016 Census population data for the study area in 2016. The data shows population at county, electoral region, and Small Area level. The Small Area, where the site is located, represents the local area Clondalkin Village SA, which had a decline in population by 13 people between 2011 to 2016.

Table 6.3: Study Area Population (2016)

Area	Total Population
Clondalkin Village SA	257
Clondalkin Village ED	9,152
South Dublin County	278,767

6.33 The population age ranges at study area are presented in Table 6.4. The data shows that Clondalkin Village SA has a lower-than-average younger population (0-19 years old) compared to the electoral region and county average and a significantly higher elderly population (65-84 years old). The overall averages for Clondalkin Village ED align with the South Dublin County average.

[12] SDDC, 2016. South Dublin County Council Development Plan 2016-2022 [online]. Available at: https://www.sdcc.ie/en/services/planning/development-plan/plan-2016-2022/ [Accessed on 28/06/2021].

Table 6.4: Population Age Ranges (2016)

Area	Percentage of Population (%)					
	0-19	20-24	25-44	45-64	65-84	85 and over
Clondalkin Village SA	20.23	3.89	26.46	31.52	17.51	0.39
Clondalkin Village ED	27.80	5.40	31.81	26.31	8.02	0.66
South Dublin County	29.46	5.78	31.40	22.27	10.23	0.86

6.34 Ethnicity in the study area is presented in Table 6.5. According to the 2016 Census, 77.77 % of the county population are White Irish, compared to 72 % in Clondalkin Village SA. Clondalkin Village ED and SA both have a higher than county level of those stating Other White as their ethnicity and a lower percentage of Black or Black Irish, White Irish Traveller, Asian or Asian Irish and other residents compared to South Dublin County as a whole.

Table 6.5: Population Ethnicity (2016)

Ethnicity	Percentage of Ethnicity (%)		
	Clondalkin Village SA	Clondalkin Village ED	SDCC
White Irish	72.00	77.75	77.77
White Irish Traveller	0.00	0.39	0.80
Other White	14.40	11.69	9.31
Black or Black Irish	1.20	2.43	3.31
Asian or Asian Irish	3.20	2.04	4.11
Other	1.60	1.42	1.91
Not Stated	7.60	4.28	2.79

6.35 The general health of the population is presented in Table 6.6. General health is a self-assessment of a person's general state of health. Within the 2016 Census, people were asked to assess whether their health was very good, good, fair, bad, or very bad. Within South Dublin County 60 % of people rated their overall health as very good compared to 56.82 % and 52.14 % for Clondalkin Village ED and Clondalkin Village SA respectively. In addition, Clondalkin Village SA has a significantly higher percentage of those stating their health as fair compared to Clondalkin Village ED and South Dublin County.

Table 6.6: Population General Health (2016)

Area	General Health Category					
	Not Stated (%)	Very Bad Health (%)	Bad Health (%)	Fair Health (%)	Good Health (%)	Very Good Health (%)
Clondalkin Village SA	7.39	0.00	1.95	12.06	26.46	52.14
Clondalkin Village ED	5.54	0.30	1.19	7.67	28.48	56.82
South Dublin County	3.70	0.29	1.26	7.38	27.23	60.14

Employment

6.36 The percentage of employment by industry is presented in Table 6.7. Within Clondalkin Village SA there is a higher proportion of employment within the agriculture, forestry and fishing industry and building and construction industry compared with Clondalkin Village ED and South Dublin County as a whole. In comparison only 21 % of employed individuals within Clondalkin Village SA work within the commerce and trade industry compared with the 27.94 % in South Dublin County as a whole.

Table 6.7: At Work by Industry (2016)

Industry	Percentage of Employment (%)		
	Clondalkin Village SA	Clondalkin Village ED	South Dublin County
Agriculture, Forestry and Fishing	4.10	0.21	0.20
Building and Construction	8.20	5.48	5.10
Manufacturing Industries	8.20	10.12	8.80
Commerce and Trade	21.30	26.42	27.94
Transport and Communications	9.02	11.21	10.57
Public Administration	6.56	5.99	5.82
Professional Services	22.95	19.38	23.12
Other	19.67	21.19	18.45

Community Facilities

Residential Dwellings

6.37 There is one existing residential dwelling located within the site boundary, however this is now unoccupied/vacant dwelling and would be demolished as part of the proposed development.

6.38 Residential dwellings are primarily located to the east and west of the site. The closest occupied residential dwelling is offsite at the sites north eastern boundary. The three next nearest existing residential properties are located approximately between 600-700 m south-west of the site, bounding the north side of Baldonnel Road, and to the immediate south of the Cyrus One Development. Four other residential properties to the east of these are within the Cyrus One Development site, of which one is to be demolished as part of the permission for the Cyrus One Development site. Two of the others are unoccupied and not in residential use. There is further residential development along the Baldonnel Road to the south of the site, of which the closest property is located approximately 500 m.

6.39 A group of three occupied residential properties are located on Aylmer Road to the south-west of the site, approximately 850 m south and south-west.

Schools

6.40 The population in the surrounding areas of the site (i.e. Clondalkin, Newcastle, Lucan, Tallaght and Rathcode), is serviced by various junior and secondary schools.

6.41 The Junior Genius Creche is located in Castlebagot, approximately 765 m west. Numerous junior schools are located in the wider site area, namely, Nano Junior National School, Our Lady Queen of Apostles, Sacred Heart National School and Scoil Mhuire located approximately: 2 km north east; 2.8 km north east, 2.7 km east; and 3 km east respectively.

6.42 The wider site area contains numerous National Schools. Talbot Senior National School, Sacred Heart National School and St Johns National School are 2.1 km north east, 2.7 km and 3.2 km east, respectively.

Healthcare Facilities

6.43 The nearest health centre is the Deansrath Health Centre, located approximately 1.4 km north east. Nangor Medical Center, Boot Road Health Center and Clondalkin Health Center are located approximately 2 km, 3 km, and 3 km east respectively.

6.44 The nearest hospital to the site is located approximately 5 km south-east at the Adelaide and Meath Hospital incorporating the National Children's Hospital, Tallaght, Dublin 24.

Sensitive Receptors

6.45 The focus of this assessment is on community health and wellbeing; therefore, all those who are likely to experience population and health effects (positive or negative) associated with the proposed development are considered sensitive receptors. The main sensitive receptor that this assessment will focus on is the Clondalkin Village SA community, as this is where the development is located. The community receptors that have been considered within this assessment include:

- Local residents (including vulnerable groups such as children and the elderly within the population);
- Local economy; and
- Pedestrians, cyclists, and drivers.
- Vulnerable groups (children and elderly population).

Assessment of Effects

Demolition and Construction Effects

Employment Generation

6.46 The demolition and construction stage of the proposed development would create employment opportunities; however, levels of employment for the demolition and construction stage are estimated to be in the region of 200 direct workforce jobs, with approximately 100 additional jobs during the peak construction period.

6.47 Increased employment opportunities can have a positive influence on health through increasing social contact, involvement in a collective effort or activity and by forming social relationships. All of these contribute to wellbeing. In addition, those with insecure employment are likely to have poorer mental health than those with secure employment.

6.48 Construction jobs often have a related multiplier effect, creating additional indirect employment in business, which in turn benefit from increased spending by local construction workers. Procurement of goods and services may have the potential to create additional short-term employment opportunities, which in turn may potentially increase people's incomes and have a positive impact on their health. The extent of these benefits will be determined by the level of local procurement. Most of the procurement would be spread across the national economy due to the nature of the goods; this combined with the temporary nature of the demolition and construction stage would limit any health benefits.

6.49 The impact magnitude of employment generation on human health is considered to be medium on a receptor of medium sensitivity; therefore, health effects associated with employment generation during the demolition and construction stage would be **Not Significant to Slight**, **Positive** in nature and **Not significant** in terms of EIA.

Introduction of Resident Population

6.50 There is the potential for an increase in the temporary population of the area as a result of demolition and construction workers from outside the wider Dublin area choosing to reside in the immediate and wider local area.

6.51 While it is anticipated that some of the workforce would be sourced from outside the local area, their presence is unlikely to place additional demands on local services (most notably health care facilities) which cannot be met within the existing capacity. Therefore, it is unlikely that the presence of the additional workforce would result in negative health impacts. In addition, an increased temporary resident population could result in additional trade for local accommodation and services.

6.52 The impact magnitude of the introduction of a resident population on human health is considered to be medium on receptor of medium sensitivity. Given the estimated 200 direct workforce jobs and approximately 100 additional jobs created during the demolition and construction phase, the human health effects associated with the introduction of a resident population would be **Not Significant to Slight**, **Positive** in nature and **Not Significant** in terms of EIA.

Air Quality Effects

6.53 There would be air quality impacts from demolition and construction stage activities in terms of dust impacts and on-site vehicle emissions.

6.54 The air quality assessment, as reported in Chapter 8 of the EIAR volume, concludes that the demolition and construction dust and on-site vehicle emissions effects in the study would be neutral, temporary to short-term, and imperceptible.

6.55 Air quality effects have the potential to affect health in a variety of ways, in particular targeting vulnerable groups such as children, the elderly and those with respiratory problems. However, embedded mitigation and standard good practice measures would be implemented to reduce dust emissions and vehicle emissions, through the construction environmental management plan (CEMP).

6.56 The impact magnitude of air quality effects on human health is considered to be low due to the implementation of the CEMP. Local residents and vulnerable groups are all considered to be of high sensitivity; therefore, health effects associated with dust and on-site vehicle emissions during the demolition and construction stage would be **Not Significant to Slight, Negative** in nature and **Not Significant** in terms of EIA.

Noise Effects

6.57 There would be noise impacts from demolition and construction stage activities and associated traffic that have the potential to cause effects to human health.

6.58 The noise and vibration assessment in Chapter 9: Noise and Vibration of this EIAR Volume reports that based on the predicted mitigated noise levels and distanced to receptors, demolition and constriction stage works are likely to give a rise in noise levels that are considered minor, negative in nature and not significant in terms of EIA.

6.59 The noise assessment also reports that noise associated with demolition and construction stage traffic would not exceed the construction noise limit of 65 dB L_{Aeg} and is therefore considered minor negative and not significant in terms of EIA.

6.60 Noise has the potential to affect health in a variety of ways. Some negative effects can be auditory (i.e. damage to the ear) and occur as a direct impact of noise (i.e. at levels higher than considered here and in excess of statutory acoustic limiting values) whilst others are non-auditory; such as annoyance, night time effects (e.g. sleep disturbance) and mental health impacts and may be associated with exposure to excessive noise.

6.61 Annoyance is the most reported non-auditory health effect associated with noise with sleep disturbance also being common with certain vulnerable groups (such as the elderly, new-borns and shift workers).

6.62 The impact magnitude of noise effects on human health is considered to be low due to noise levels not exceeding demolition and construction noise limits. Residential receptors in close proximity to the site are considered to have a high sensitivity to change in the noise environment; therefore, any auditory and non-auditory health effects during the demolition and construction stage would be **Not Significant to Slight, Negative** in nature and **Not Significant** in terms of EIA.

Transport and Accessibility Effects

6.63 The transport assessment in Chapter 7: Transport and Accessibility of this EIAR Volume reports that during the peak demolition and construction period (in 2022) there would be a maximum additional 220 vehicle movements per day (of which 63 would be heavy goods vehicles (HGV) and two highway links

which would have an increase of over 30 % in vehicle movements. This increase in vehicle movements is reported to be slight, negative in nature and not significant in terms of EIA in relation to pedestrian severance, delay, amenity, fear, and intimidation.

6.64 The assessment also reports that it is anticipated that there may be some driver delay at times during the demolition and construction stage. However, the CEMP would commit to ensuring deliveries are co-ordinated to ensure vehicles are not waiting on the local highway, and wherever feasible deliveries would be undertaken outside peak hours and the effect would be slight, negative in nature and not significant in terms of EIA. However, some level of annoyance and stress amongst local residents and road users may occur due to the potential for increased journey times.

6.65 The assessment does not indicate a prevailing road safety issue which could be made worse by the demolition and construction works and reports the effect on accidents and safety to be slight negative and not significant in terms of EIA.

6.66 Vulnerable groups in society will be affected most by the increase in traffic levels. Those such as young children and the elderly may experience negative health impacts. The elderly may experience annoyance from increased noise, whereas young children are at higher risk of road accidents and health impacts associated with potential air pollution.

6.67 Cyclists and pedestrians using the local road network may experience increased fear of accidents and injuries. Any increase in traffic also increases the risk of accidents resulting in injuries and potentially death of road users, especially for more vulnerable road users, such as the young and the elderly.

6.68 The impact magnitude of traffic and transport effects on human health is considered to be low due to no significant effects being reported in the transport chapter. Road users, pedestrians and cyclists are all considered to be of high sensitivity; therefore, health effects associated with increased traffic during the demolition and construction stage would be **Not Significant to Slight, Negative** in nature and **Not Significant** in terms of EIA.

Amenity Effects

6.69 The landscape and visual impact assessment (LVIA) in EIAR Volume 2, Chapter 1: Landscape and Visual Impact Assessment reports that the site is located in an area that has had successive recent developments of a similar scale to the proposed development. Landscape and visual effect during demolition and construction are generally reported as minor, negative in nature and not significant in terms of EIA.

6.70 Visual disturbances can become a focus for concern and anxiety. The built environment can impact on public health and the way that people utilise their environment. The built environment can also influence physical activity which in turn can cause health impacts. The natural environment is known to have a restorative function in that it reduces stress and anxiety levels.

6.71 Light pollution from the built environment can also have a negative health impact through annoyance, discomfort and loss of visual environment and visibility.

6.72 Residents may experience feelings of decreased quality of life during the demolition and construction stage which can cause anxiety and concern as well as decreased wellbeing; however, as the area has undergone a period of change, transitioning from an agricultural to an industrial and commercial area it is thought nearby residents would be considered to be more resilient to change.

6.73 In terms of amenity effects on population and human health, the magnitude of effect is considered to be low on a receptor of medium sensitivity; therefore, the effect would be **Imperceptible, Negative** in nature and **Not Significant** in terms of EIA.

Operation Effects

Employment Generation

6.74 Once operational the proposed development would employ approximately 45 full time equivalent (FTE) staff members on-site at each data center building providing a total staffing level of 135 FTE. Additional to this would be the ad-hoc attendance of maintenance contractors and visitors. It is anticipated that the data centers would be in operation on a shift basis with reduced numbers presented during night shifts.

6.75 Health benefits associated with employment would be felt most if employment is taken up by those who are currently unemployed or who are in short-term temporary employment. The scale of the employment opportunities is unlikely to have any health benefits at the population level, although individuals may benefit if they find employment and are moving from an unemployed status.

6.76 The magnitude of effect of increased employment on population and human health is considered to be medium on a receptor of medium sensitivity; therefore, the effect would be **Not Significant to Slight**, **Positive** in nature and **Not Significant** in terms of EIA.

Air Quality Effects

6.77 The air quality assessment in Chapter 8: Air Quality of this EIAR Volume considers the air quality effects during operation from the MFGP and emergency generators.

6.78 As discussed above, air quality impacts have the potential to affect health in a variety of ways, in particular targeting vulnerable groups such as children, the elderly and those with respiratory problems.

6.79 With regards to the MFGP, the air quality assessment reports that the maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be below the relevant NO_2 air quality standards (AQS). In Phase 1 the MFGP would be in operation from approximately Q4 2023 to Q1 2025 using HVO as the fuel source and the associated air quality effects are considered to be short term, negative and imperceptible not significant in terms of EIA.

6.80 The maximum result also indicates that the ambient level concentrations due to emissions arising from the MFGP during Phase 2 when it operates using natural gas would also be below the relevant NO_2 AQS. The effects of the Phase 2 MFGP are considered permeant, negative and imperceptible, i.e., not significant in terms of EIA.

6.81 Modelling of the emergency generators has been undertaken within the air quality assessment to represent a worst-case scenario. Emergency generators would not be expected to operate for more than 24-48 hours per year. It is predicted that annual mean concentrations for 71 hours of operation would be below the relevant NO_2 AQS. The localised air quality effects of the emergency generators are considered long term to permanent, negative and imperceptible, i.e. not significant in terms of EIA.

6.82 The magnitude of effect of air quality effects on human health is considered to be low on a receptor of high sensitivity; therefore, the effect would be **Not Significant to Slight**, **Negative** in nature and **Not Significant** in terms of EIA.

Noise Effects

6.83 There would be noise impacts during operation of the proposed development from the plant and servicing that have the potential to cause effects to human health.

6.84 The noise and vibration assessment in Chapter 9: Noise and Vibration of this EIAR volume reports that based on the predicted mitigated noise levels and distanced to receptors, the predicted operational noise rating levels meet the required limits and would be considered **Not Significant to Slight, Negative** in nature and **Not Significant** in terms of EIA.

6.85 Therefore, in terms of operation noise effects on human health the impact magnitude is considered to be low due to noise levels not exceeding operation noise limits. The effect would be **Not Significant to Slight, Negative** in nature and **Not Significant** in terms of EIA.

Transport and Accessibility Effects

6.86 The transport assessment in Chapter 7: Transport and Accessibility of this EIAR Volume reports that during the operation stage, there would be an additional 164 vehicle movements per day and 12 deliveries. This equates to an estimated increase of under30 % in Profile Park in 2024. It is also noted that an additional 54 HGV deliveries will be required in the short term for the first two years of operation associated with HVO fuel deliveries to power the MFGP. These additional deliveries equate to an estimated increase of over 30 % in Profile Park in 2024. These movements could result in severance or an increase in fear and intimidation. Total traffic flows on Profile Park are minor and a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic is considered to be slight, negative in nature and not significant in terms of EIA.

6.87 The assessment also reports that pedestrians would be safely accommodated by footpaths of approximately 3 m provided on both sides of Profile Park and an informal pedestrian crossing on the approach to the R134 New Nangor Road/Profile Park roundabout. The overall effect on pedestrians would be slight, negative in nature and not significant in terms of EIA.

6.88 As previously stated, vulnerable groups in society would be affected most by the increase in traffic levels. Those such as young children and the elderly may experience negative health impacts. However, the impact magnitude of traffic and transport effects on human health is considered to be low due to no significant effects being reported in the transport assessment. Road users, pedestrians and cyclists are all considered to be of high sensitivity; therefore, health effects associated with increased traffic during the operation stage would be **Not Significant to Slight, Negative** in nature and **Not Significant** in terms of EIA.

Amenity Effects

6.89 The LVIA in EIAR Volume 2, Chapter 1: Landscape and Visual Impact Assessment reports that on completion, the data center buildings would be a new feature within the landscape, similar in size and visual appearance to surrounding developments. The size, scale and operation of the buildings are consistent with surrounding land uses and therefore it is anticipated that the proposed development would not be out of context and that landscape and visual impacts during operation would be not be significant in terms of EIA.

6.90 Residents may experience feelings of decreased quality of life which can cause anxiety and concern as well as decreased wellbeing; however, as the current immediate visual environment is dominated by similar size and scale buildings to that of the proposed development those nearby residents would be considered to be more resilient to change.

6.91 Therefore, in terms of amenity effects on population and human health the magnitude of effect is considered to be low on a receptor of medium sensitivity; therefore, the effect would be **Imperceptible, Negative** in nature and **Not Significant** in terms of EIA.

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

6.92 Given no significant effects are identified, no additional mitigation measures are proposed.

Completed Development Stage

6.93 Given no significant effects are identified, no additional mitigation measures are proposed.

Enhancement Measures

6.94 A number of mitigation measures are proposed in Volume 1, Chapter 7 Transport and Accessibility, Chapter 8 Air Quality and Chapter 9, Noise and Vibration Landscape and Volume 2, Chapter 1: Landscape and Visual Impact Assessment.

6.95 In addition to those recommendations set out within the other aforementioned assessment EIAR chapters, that may help minimise any negative impacts to health, and maximise positive impacts; it is proposed that the procurement of local employment wherever possible is encouraged. If feasible, and available, local suppliers should also be used for goods and services. Jobs created should be advertised and made available in the local area initially in order to maximise this opportunity. This would result in a more positive effect on local employment and the local economy.

Demolition and Construction Residual Effects

6.96 The residual demolition and construction remain as reported in the assessment of effects section:

- Employment Generation: **Not Significant to Slight (Positive), Not Significant** in terms of EIA.
- Introduction of Resident Population: **Not Significant to Slight (Positive), Not Significant** in terms of EIA.
- Air quality effects: **Not Significant to Slight (Negative), Not Significant** in terms of EIA;
- Noise effects: **Not Significant to Slight (Negative), Not Significant** in terms of EIA;
- Transport effects: **Not Significant to Slight (Negative), Not Significant** in terms of EIA; and
- Amenity effects: **Imperceptible (Negative), Not Significant** in terms of EIA.

Operation Residual Effects

6.97 The residual operation effects remain as reported in the assessment of effects section:

- Employment Generation: **Not Significant to Slight (Positive), Not Significant** in terms of EIA.
- Air quality effects: **Not Significant to Slight (Negative), Not Significant** in terms of EIA;
- Noise effects: **Not Significant to Slight (Negative), Not Significant** in terms of EIA;
- Transport effects: **Not Significant to Slight (Negative), Not Significant** in terms of EIA; and
- Amenity effects: **Imperceptible (Negative), Not Significant** in terms of EIA.

Summary of Residual Effects

6.98 Table 6.8 provides a summary of the outcomes of the population and human health assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 6.8: Summary of Residual Population and Human Health Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
Local Residents and Economy	Creation of Employment	None required	Not significant – Slight	+	L	D/I	R	St

Table 6.8: Summary of Residual Population and Human Health Effects

Local Residents and Economy	Introduction of Resident Population	None required	Not significant – Slight	+	L	D/I	R	St
Local residents	Air quality effects	None required	Not significant – Slight	-	L	D/I	IR	St
Local residents	Noise effects	None required	Not Significant – Slight	-	L	D	IR	St
Local residents	Transport effects	None required	Not Significant – Slight	-	L	D	IR	St
Local residents	Amenity	None required	Imperceptible	-	L	D	R	St
Operation								
Local Residents and Economy	Creation of Employment	None required	Not significant – Slight	+	L	D	IR	Lt
Local residents	Air quality effects	None Required	Not significant – Slight	-	L	D/I	IR	Lt
Local residents	Noise effects	None Required	Not significant – Slight	-	L	D	IR	Lt
Local residents	Transport effects	None required	Not Significant – Slight	-	L	D	IR	Lt
Local residents	Amenity	None required	Imperceptible	-	L	D	IR	Lt

Notes:

* - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, ID = Indirect;

L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = Medium-term, Lt = Long-term, P = Permanent, R = Reversible.

** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound.

Cumulative Effects

Intra-Project Effects

6.99 As explained in Chapter 2: EIA Process and Methodology of this EIAR Volume, intra-project cumulative effects are discussed in Chapter 16: Intra Cumulative Effects of this EIAR Volume.

Inter-Project Effects

6.100 Table 6.9 provides a summary of the likely inter-project cumulative effects resulting from the proposed development and the cumulative developments.

Table 6.9: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 [SD20A/0283]	Yes	The construction stage (2021-2023) would overlap with the construction stage (2022) of the proposed development.	Yes	The operation of the cumulative scheme would overlap with the opening year of the proposed development (2024).
UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	Yes	Peak construction is 2021. Construction phase would overlap with the construction and operation stage of the proposed development.	No	The cumulative scheme would not be operational, when the proposed development would be operational. The opening year of the cumulative scheme is 2028.
UBC Properties - Grange Castle South Business Park, Dublin 22 [An Bord Pleanála Reference – 308585]	No	The opening year of this cumulative scheme is anticipated to be 2021; therefore, the demolition and construction stage would not overlap with the demolition and construction stage of the proposed development.	No	The cumulative scheme would be operational at the same time as the proposed development; however, the air quality, noise and transport assessments have reported no significant operational cumulative effects.
Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 [SD17A/0377]	No	The cumulative scheme has already been constructed.	No	The proposed amendments to the cumulative scheme would not generate additional effects.
Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 [SD18A/0134]	No	The cumulative scheme has already been constructed.	Yes	The opening year is 2020. Therefore, the operation phase will overlap with the construction and operation stage of the proposed development.
Cyrus One Townlands within Grange Castle South Business Park,	No	The cumulative scheme has already been constructed.	No	The proposed amendments to the cumulative scheme would not generate additional effects.

Table 6.9: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Baldonnel, Dublin 22 [SD20A/0295]				
Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 [An Bord Pleanála Ref - 309146]	Yes	Construction phase 2021-2022 (likely to be 2022/2023 due to timing of approval). Construction stage would overlap with the construction stage of the proposed development.	Yes	Building A partially open, Building B and the proposed GIS substation is scheduled to be complete by Q4 of 2022. Operation stage would overlap with the operation stage of the proposed development.
Site proposed electrical connection and substation to EirGrid to the south	Yes	Construction stage would overlap with the construction stage of the proposed development.	Yes	The EirGrid connection would power the site data centers.
Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	Yes	Construction Period 2023-2025 would overlap with the operation stage of the proposed development	Yes	Gas fired power plant emission likely to overlap with proposed development.
Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD21A/0186]	Yes	Two-year construction period (not defined 2023-2025). Assumed that the construction stage will overlap with both the construction and operation stage of the proposed development.	Yes	Opening year is 2025.

6.101 Overall, there would be six likely demolition and construction cumulative effect and five operation effects.

Demolition and Construction Cumulative Effects

6.102 Demolition and construction cumulative effects would arise from the following development:

- Microsoft - Grange Castle Business Park [SD20A/0283] in respect of transport and accessibility effects;
- UBC Properties - Townlands within Grange Castle South Business Park [SD20A/0121] in respect of transport and accessibility effects;
- Cyrus One - Grange Castle South Business Park [An Bord Pleanála Ref - 309146] in respect of transport and accessibility effects;
- Centrica Business Solutions – Profile Park [SD21A/0167] in respect of air quality and transport and accessibility effects;
- Equinix (Ireland) Ltd – Plot 100 [SD21A/0186] in respect of air quality and transport and accessibility effects; and
- Site proposed electrical connection and substation to EirGrid to the south in respect of transport and accessibility effects.

6.103 The demolition and construction stage of the cumulative developments listed above would overlap with the construction stage of the proposed development. To reduce the transport and accessibility effect the appointed demolition and construction contractor(s) and applicant would consult neighbouring developments on the programme and the scheduling of vehicle movements would be undertaken. Through these mitigation measures the effects of accidents and safety, driver delay and pedestrian severance, delay, amenity, fear, and intimidation, on human health would be minimised.

Operation Cumulative Effects

6.104 Operation cumulative effects would arise from the following developments:

- Microsoft - Grange Castle Business Park [SD20A/0283] in respect of transport and accessibility effects;
- Cyrus One - Grange Castle Business Park [SD18A/0134] in respect of transport and accessibility effects;
- Cyrus One - Grange Castle South Business Park [An Bord Pleanála Ref - 309146] in respect of transport and accessibility effects;
- Equinix (Ireland) Ltd – Plot 100 [SD21A/0186] in respect of transport and accessibility effects;
- Centrica Business Solutions [SD21A/0167] in respect of air quality.

6.105 The operation stage cumulative developments listed above would overlap with the operation stage of the proposed development. Within the traffic and transport assessment, daily trip generation and distribution traffic flows have been incorporated within the baseline assessment.

6.106 The Air Quality Assessment considered the cumulative effects from the Centrica application in terms of NO_2 concentrations at relevant sensitive receptors. The cumulative assessment concludes that the ambient level concentrations due to emissions arising from the MFGP and Centrica power plant would be below the relevant NO_2 AQS, where the combined PC would be below the maximum allowable PC recommended by EPA AG4 guidance. Therefore, in terms of population human health, the cumulative effects would be minimised.

Summary of Assessment

Background

6.107 This chapter has detailed the potential population and human health effects associated with the demolition and construction stage and operation stage of the proposed development. The assessment has been undertaken considering the relevant national and local guidance and regulations.

6.108 The baseline assessment has been made using publicly available information from the 2016 South Dublin County Census, within which three areas were examined: South Dublin County, Clondalkin Village Electoral Division and Clondalkin Village SA. For the purpose of this population and human health assessment census data for Clondalkin Village SA was compared against the census data for Clondalkin Village ED and South Dublin County.

6.109 At the time of the 2016 Census, the Clondalkin Village SA population was 257. In terms of the population breakdown, Clondalkin Village has a lower-than-average younger population (0-19) and a significantly higher elderly population compared with Clondalkin Village SA and South Dublin County. When assessing population health. Clondalkin Village has a lower % of residents rating their health as good compared

with Clondalkin Village ED and South Dublin County. The highest proportion of employment in Clondalkin Village SA is within the agriculture, forestry and fishing sector and the building and construction industry, compared with Clondalkin Village ED and South Dublin County as a whole.

Demolition and Construction Effects

6.110 Demolition and construction stage effects for population and human health were considered in terms of employment generation, introduction of resident population, air quality, noise, transport and accessibility and amenity effects.

6.111 Overall, it is considered that the demolition of the existing site and construction of the proposed development would result in a negative effect on population and human health receptors and would **not give rise to significant effects** on population and human health.

Operation Effects

6.112 Operation effects for population and human health were considered in terms of employment generation, air quality, noise, transport and accessibility and amenity effects.

6.113 Overall, it is considered that the operational development would result in a neutral effect on population and human health receptors and would **not give rise to significant effects** on population and human health.

Cumulative Effects

6.114 The cumulative effects of the proposed development and neighbouring schemes has been considered with the relevant technical topic assessments of the EIAR.

6.115 The demolition and construction stage of a number of cumulative developments would overlap with the construction stage of the proposed development. The increase in traffic resulting from the cumulative development is not predicted to result in any significant effects on population and human health.

6.116 The operation stage of a number of cumulative schemes would overlap with the operation stage of the proposed development. The increase in traffic resulting from the cumulative development is not predicted to result in any significant effects on population and human health.

6.117 The permanent site electrical connection and gas fired power plant emissions from the Centrica Business Solutions cumulative development would also not result in significant effects in terms of air quality.

6.118 Whilst there is an increase in traffic and NO_2 emissions resulting from the cumulative developments, overall, **there are no significant effects anticipated as a result of the cumulative impacts** and therefore no mitigation proposed.

7 TRANSPORT AND ACCESSIBILITY

Introduction

7.1 This chapter of the EIAR (Environmental Impact Assessment Report) reports on the likely significant Transport and Accessibility effects to arise from the demolition and construction stage and the operation stage of the proposed development.

7.2 The chapter describes the Transport and Accessibility policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely Transport and Accessibility effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects. Where relevant, the assessment follows the methodology set out in the Institute of Environmental Management and Assessment Guidelines for the Environmental Assessment for Road Traffic.[1]

7.3 The chapter is supported by the following technical appendices in ES Volume 3:

- Appendix 7.1: Traffic Flow and Distribution Diagrams;
- Appendix 7.2: Accident Data;
- Appendix 7.3: Cumulative Schemes Daily Traffic Flow Diagrams; and
- Appendix 7.4: Proposed Development Trip Generation.

Methodology

7.4 The assessment has been informed by the following legislation, policies and published guidance:

- International Legislation:
  - National Planning Framework (NPF) 2019[2];
- Regional Policy:
  - South Dublin County Council Development Plan 2016-2022[3];
- National guidance and industry standards:
  - IEMA Environmental Assessment for Road Traffic, 1993[4]; and
  - EPA – Guideline on the Information to be contained in Environmental Impact Assessment Reports DRAFT, August 2017[5].

International Legislation

National Planning Framework (NPF) 2019

7.5 The National Planning Framework (NPF) was published in February 2018, and updated in January 2019, 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.

7.6 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 is included under National Strategic Outcome 6:

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

7.7 The NPF also states that *"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 facilities. 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."*

National Strategic Outcome 5 relates to sustainable mobility and main target is "to expand attractive public transport alternatives to car transport to reduce congestion and emissions and enable the transport sector to cater for the demands associated with longer term population and employment growth in a sustainable manner through the following measures:

- Deliver the key public transport objectives of the Transport Strategy for the Greater Dublin Area 2016 to 2035;
- Provide public transport infrastructure and services to meet the needs of smaller towns, villages and rural areas; and
- Develop a comprehensive network of safe cycling routes in metropolitan areas to address travel needs and to provide similar facilities in towns and villages where appropriate".

Regional Policy

South Dublin County Council Development Plan 2016-2022

7.8 The South Dublin County Development Plan 2016-2022 has been prepared in accordance with the requirements of the Planning and Development Act 2000 (as amended) and sets out an overall strategy for the proper planning and sustainable development of the County.

7.9 One of the major challenges facing the County during the life of this Plan is the need to promote and provide for sustainable transport options, whilst maintaining the effectiveness of the County's road network.

National Guidance and Industry Standards

IEMA Environmental Assessment for Road Traffic, 1993

7.10 As agreed with SDCC Highways, IEMA (Institute of Environmental Management and Assessment) methodology has been used for the appraisal of traffic impacts for the proposed development. It should be noted that Republic of Ireland forms part of the IEMA Regional Network.

7.11 The purpose of the IEMA Guidelines is to provide the basis for a systematic, consistent and comprehensive coverage for the appraisal of traffic impacts for a wide range of development projects.

[1] Institute of Environmental Management and Assessment, 1993. Guidelines for the Environmental Assessment for Road Traffic.
[2] National Planning Framework, 2018
https://www.gov.ie/en/publication/daa56-national-planning-framework-ireland-2040-our-plan-npf-2018/
[3] South Dublin County Council Development Plan, 2016-2022.
https://sdcc.ie/en/download-it/publications/south-dublin-county-council-development-plan-2016-2022-written-statement.pdf
[4] IEMA Environmental Assessment for Road Traffic, Institute of Environmental Assessment, 1993.
[5] Environmental Protection Agency, August 2017, Guidelines on the Information to be contained in Environmental Impact Assessment Reports.

7.12 The EIA process should be a continuous activity running throughout the planning and design stages of a project.

7.13 To ensure the comprehensive coverage of the environmental impacts arising from changes in traffic levels, the IEMA Guidelines identify a check list of potential impacts such as driver severance and delay, pedestrian severance and delay, pedestrian amenity, accidents and safety, hazardous and dangerous roads etc.

7.14 According to the IEMA Guidelines the assessment of the environmental impacts of traffic requires the following stages:

- Determination of existing and forecast traffic levels and characteristics;
- Determining the time period suitable for assessment;
- Determining the year of assessment; and
- Identifying the geographical boundaries of assessment.

7.15 Further, the study area will be defined by identifying any link or location where it is considered that significant environmental effects may occur as a result of the proposed scheme.

7.16 The IEMA Guidelines state two rules to be considered when assessing the impact of development traffic on a highway link:

- Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles (HGVs) will increase by more than 30%); and
- Include any other specifically sensitive areas where traffic flows will increase by 10% or more.

7.17 Less than a 30% increase is considered to result in imperceptible changes in the environmental effects of traffic. The IEMA Guidelines considered that projected changes in traffic flows of less than 10% create no discernible environmental effect.

7.18 Specifically, sensitive areas referred to above may include accident 'black spots', conservation areas, hospitals or links with high pedestrian flows.

EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017

The guidelines have the primary objective of improving the quality of EIARs. The guidance presents the terminology of effects which has been applied to this report, where appropriate.

Consultation

7.19 Table 7.1 summarises the consultation that has been undertaken with respect to the Transport Assessment.

Table 7.1: Summary of Consultation

Consultee and Form/ Date of Consultation	Summary of Comments	Where in this Chapter Comments are Addressed
South Dublin County Council (SDCC) Consultation Meeting 23/06/2021	Accepted the proposed approach to the assessment of potential effects for traffic and transport. It was explained to SDCC that the transport assessment within the EIA would follow the IEMA document 'Guidelines for the Environmental Assessment of Road Traffic' (1993) to assess the transport impacts and effects of the proposed development. Baseline traffic flows would ascertain from the 2019 AWS TIA, and used as a basis for the transport assessment in the EIAR. SDCC agreed that this approach would be acceptable.	Contained herein

Assessment Scope

7.20 The IEMA Environmental Assessment for Road Traffic Guidance (1993) has been followed in undertaking the assessment. The EPA terminology has been applied where appropriate.

Technical Scope

7.21 The technical scope of the assessment has considered the potential impacts of the traffic generation during the demolition and construction stage and the operation stage.

7.22 The assessment will consider the potential impacts of operation and demolition and construction traffic generation on relevant receptors.

Spatial Scope

7.23 In accordance with the IEMA Guidelines, the study area has been defined by identifying any link or location where it is considered that significant environmental effects could occur as a result of the proposed development.

7.24 The local highway network study area has been informed by the following two rules, as set out in IEMA Guidelines:

- Rule 1: include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles (HGVs) will increase by more than 30%); and
- Rule 2: include any other specifically sensitive areas where traffic flows have increased by 10% or more.

7.25 The assessment has been undertaken when the perceived environmental impact is at its greatest during the operation stage, in 2024 and during the demolition and construction stage in 2022. The assessment has considered the Do Nothing scenario, which assumes no proposed development, against the Do Something scenario, which includes the same baseline traffic as the Do Nothing but also includes proposed development traffic.

7.26 The study area (Figure 7.1) incorporates new and existing sensitive receptors on each arm of the following junctions along the R134 New Nangor Road:

- Junction 1: Adamstown Road (R120)/Nangor Road (R134);
- Junction 2: Nangor Road (R134)/Baldonnel Rad (L2001);
- Junction 3: Nangor Road (R134)/Kilcarbery Park/Profile Park;
- Junction 4: Nangor Road (R134)/Grange Castle Business Park North/Grange Castle Gold Course; and
- Junction 5: Grange Castle Road (R136)/Nangor Road (R134).

Figure 7.1: Study Area

Temporal Scope

7.27 The assessment has considered impacts arising during demolition and construction stage and the operation stage which would be expected to be temporary and permanent respectively.

7.28 The assessment will consider the future years at which the peak demolition and construction traffic of the development occurs and when the proposed development is built out and fully operational. It has been assumed that the peak demolition and construction traffic would occur in 2022, whilst according to the indicative phasing programme the proposed development would be fully operational in 2024. The assessment scenarios are anticipated to be:

- Existing Baseline 2021;
- Demolition and Construction Baseline (2022 'Do Nothing');
- Demolition and Construction Baseline (2022 'Do Nothing') + cumulative development;
- Operational Year Baseline (2024 'Do Nothing') + cumulative development; and
- Operational Year Baseline (2024 'Do Nothing') + cumulative development + proposed development (2024 'Do Something').

Baseline Characterisation Method

Desk Study

7.29 In order to establish baseline Transport and Accessibility conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- The approved SD20A/0121 Traffic Impact Assessment[6];
- Google Maps; and
- Road Safety Authority.

Field Study

7.30 Specific traffic surveys have not been undertaken for this TA due to the current COVID-19 pandemic leading to significantly reduced and therefore non-representative traffic flows on the local highway network. As an alternative, it is considered that the traffic data contained within the recently submitted Grange Castle Business Park South, Baldonnel, Dublin 22 Traffic Impact Assessment (Ref SD20A/0121) enables this EIAR to proceed in accordance with the agreed EIAR scope of assessment.

7.31 A Manual Classified Turning Count was undertaken on Tuesday 17 December 2019 by Irish Traffic Surveys (ITS) between 07:00 and 19:00. The weekday peak hour background traffic flows have been found to occur at:

- AM peak (07:30 to 08:30); and
- PM peak (16:30 and 17:30).

7.32 The junctions where traffic surveys were carried out and are within the study area are the following:

- Junction 1: Adamstown Road (R120)/Nangor Road (R134);
- Junction 2: Nangor Road (R134)/Baldonnel Road (L2001);
- Junction 3: Nangor Road (R134)/Kilcarbery Park/Profile Park;
- Junction 4: Nangor Road (R134)/Grange Castle Business Park North/Grange Castle Gold Course; and
- Junction 5: Grange Castle Road (R136)/Nangor Road (R134).

Assessment Method

Methodology

7.33 In the case of the proposed development the sensitive receptors have been considered to be pedestrians and cyclists, road users and the local highway network. The study area includes links and junctions which provide the most direct access routes to the application site and are, therefore, most likely to be affected by traffic arriving and departing the site. Any links that do not meet defined selection criteria, have not been considered as part of the study area and have been excluded from further analysis in the assessment of significance of effect section.

Assessment Scenarios

Demolition and Construction Stage

7.34 The demolition and construction traffic assessment has been limited to the roads immediately adjacent to the application site and any roads further afield where the 30% increase in traffic threshold is breached. Potential demolition and construction traffic impacts from the proposed development have been assessed based upon the number of vehicle movements identified in the previous approved

[6] Proposed Data Centres, Grange Castle Business Park South, Baldonnel, Dublin 22 Traffic Impact Assessment, prepared by CS CONSULTING GROUP for UBC Properties, May 2020.

SD20A/0121 application. The assessment focuses on the most intensive year in terms of the number of demolition and construction vehicle movements, which has been considered against the 2021 Baseline.

7.35 The demolition and construction stage will take place during 2022 to 2024. It has been assumed that the most intensive year in terms of vehicle movements would be 2022.

Operation Stage

7.36 The proposed development is anticipated to be completed and fully operational in 2024, when all occupants will be on-site. The assessment would consider the full quantum of development at this future year.

7.37 Estimated trip generation for the proposed development was provided for the assessment.

7.38 Trips were distributed onto the local highway network based upon the directional splits from the 2019 traffic survey data that was used in support of the SD20A/0121 application.

Pedestrian Severance, Delay, Amenity, Fear and Intimidation

7.39 Pedestrian severance, delay, amenity, fear and intimidation has been assessed by considering baseline traffic flows, future year traffic flows, as well as the potential impact of the proposed development in terms of change in traffic flows on each link within the study area. Consideration has been given to daily traffic flows (24-hour Annual Average Daily Traffic (AADT)) in respect of pedestrian severance, amenity, fear and intimidation for the demolition and construction stage and the operation stage.

Driver Delay

7.40 The assessment considers the duration of delays or benefits occurring to road users on the local highway network based upon the estimated increase in traffic resulting from the proposed development for the demolition and construction stage and the operation stage.

Accidents and Safety

7.41 The likely increase or decrease in the number of accidents resulting from the changes in traffic flows and composition for the demolition and construction stage and the operation stage has been considered. Personal Injury Accident (PIA) data has been obtained from the Road Safety Authority website for the five-year period 2011 to 2016. It should be noted that 2016 is the latest year when accident data is available.

Cumulative Stage

7.42 A review of cumulative schemes and their potential impacts on traffic flows on the local highway network has been undertaken. Predicted traffic flows generated by each of the following cumulative schemes have been considered:

- Microsoft – Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 (SD20A/0283);
- UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 (SD20A/0121);
- UBC Properties -Grange Castle South Business Park, Dublin 22 (VA06S.308585);
- Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 (SD17A/0377);
- Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 (SD18A/0134);
- Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 (SD20A/0295 - amendment to SD18A/0134);
- Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 (VA06S.309146);
- Centrica Business Solutions, Profile Park, Baldonnel, Dublin 22 (SD21A/0167);
- Equinix (Ireland) Ltd, Plot 100 Profile Park, Nangor Road, Clondalkin, Dublin 22 (SD21A/0186); and
- SID Application to provide the proposed development (VDC DUB) permanent electrical connection to the EIR grid.

7.43 All the aforementioned cumulative schemes are located in close proximity to the site.

7.44 The traffic data associated with the selected cumulative developments has been sourced from their respective Traffic Impact Assessment reports on the South Dublin County Council planning portal. Details of the construction or operational phases of the cumulative developments included in this assessment are identified in Table 7.18.

Assessment Criteria

7.45 The EPA and IEMA Guidelines were reviewed in order to identify appropriate significance criteria applicable to the assessment.

7.46 Paragraph 4.5 of the IEMA Guidelines states that: *"For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible".*

7.47 Under EPA guidelines quality effects are described as either:

- Positive – a change which improves the quality of the environment (such as reduction of traffic, travel time or patronage, or provision of a new service, access or facility);
- Neutral – no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error; or
- Negative – a change which reduces the quality of the environment (such as increase of traffic, travel time, patronage or loss of service or facility).

Pedestrian Severance, Delay, Amenity, Fear and Intimidation

7.48 The significance of pedestrian severance, delay, amenity, fear and intimidation effects has been determined by considering future baseline traffic flows obtained from the traffic surveys, as well as the potential impact of the proposed development in terms of change in traffic flows on each link within the study area by reference to the IEMA Guidelines and applying professional judgment.

Pedestrian Severance

7.49 The IEMA Guidelines acknowledge that the measurement and prediction of severance is extremely difficult and that the correlation between the extent of severance and the physical barrier of a road is not clear. It notes that there are no predictive formulae which give simple relationships between traffic factors and levels of severance. However, the IEMA Guidelines do accept that in general, marginal changes in traffic flows are, by themselves, unlikely to create or remove severance.

7.50 Factors which need to be considered when determining severance comprise road width, traffic flows, speed of traffic, the presence of pedestrian crossing facilities and the number of pedestrian movements across the affected route.

7.51 The IEMA Guidelines suggest that:

- Changes in flow of up to 30% would produce slight changes in severance;
- Changes in flow of up to 60% would produce moderate changes in severance; and
- Changes in flow of up to 90% would produce substantial changes in severance. It is recognised that these are guidelines only and are highly dependent on existing ambient traffic levels. They are not considered to be definitive measures of severance and should be used with care and regard paid to specific local conditions. The guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

Pedestrian Delay

7.52 The IEMA Guidelines note that changes in the volume, composition and or speed of traffic may affect the ability of people to cross-roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes. The IEMA Guidelines do not set any thresholds for absolute or actual changes in delay, recommending instead that assessors use their judgment to determine the significance of the impact.

7.53 The IEMA Guidelines refer to a report published by the Transport Research Laboratory (TRL) as providing a useful approximation for determining pedestrian delay. The TRL research[7] concludes that the mean pedestrian delay was found to be eight seconds at flows of 1,000 vehicles per hour, and below 20 seconds at 2,000 vehicles per hour for various types of crossing condition.

7.54 A two-way flow of 1,400 vehicles per hour has been adopted as a lower threshold for assessment (equating to a mean 10 second delay for a link with no pedestrian facilities) in the TRL report. Below this flow, pedestrian delay is unlikely to be a significant factor. This is deemed a robust starting point for narrowing down the modelled routes within the study area and ensuring the routes selected exceeded the suggested threshold of analysis in IEMA Guidelines. It should be noted that for controlled forms of pedestrian crossing the pedestrian delays are less.

7.55 As a result, any road with a two-way flow of less than 1,400 vehicles is deemed to have a negligible effect. Roads above this are assessed on the basis of professional judgment.

Pedestrian Amenity

7.56 IEMA Guidelines define pedestrian amenity as the relative pleasantness of a journey and may be influenced by fear and intimidation if they are relevant. As with pedestrian delay, pedestrian amenity is considered to be affected by traffic volumes and composition along with pavement width and pedestrian activity. The IEMA Guidelines suggest that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flows are halved or doubled.

7.57 The Guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

Pedestrian Fear and Intimidation

7.58 A number of factors are considered relevant in determining changes in the level of fear and intimidation experienced by pedestrians and cyclists including volume of traffic; percentage of HGVs; speed of traffic; proximity to people; and the availability and quality of pedestrian infrastructure.

7.59 The IEMA Guidelines sets out the criteria in Table 7.2 for measuring the effects of fear and intimidation.

Table 7.2: Pedestrian Fear and Intimidation Criteria

Degree of Hazard	Average Traffic Flow over 18hr day (vehicles per hour)	Total 18-hour HGV Flow	Average Speed (mph)
Extreme	1,800+	3,000+	20+
Great	1,200–1,800	2,000–3,000	15-20
Moderate	600–1,200	1,000–2,000	10-15

7.60 The IEMA Guidelines stress the need for professional judgment when applying the above criteria. Accordingly, the guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

[7] Transport Research Laboratory, 1991. The Estimation of Pedestrian Numbers.

Driver Delay

7.61 IEMA Guidelines note that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network is predicted to be at or close to the capacity of the system. Professional judgment has been applied to determine the significance of residual effects.

Accidents and Safety

7.62 There is no formal published guidance for the assessment of accidents and safety. Therefore, professional judgment has been applied to assess the implications of local circumstances and the proposed development's likely effect which may increase or decrease the risk of accidents.

Receptor Sensitivity/Value Criteria

Highway Network

7.63 The potential receptors are the users of transport networks within the relevant study area. The sensitivity of a road can be defined by the vulnerability of the user groups who are likely to use it, i.e. the elderly or children. A sensitive area may be where pedestrian activity is high, near a school, or an accident black spot. it also takes into account the existing nature of the road, i.e. an existing residential area is likely to be more sensitive than an A road.

7.64 Professional judgement has been used to define the value of receptors in accordance with LA 1048 Section 3.1.

7.65 The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in Table 7.3.

Table 7.3: Receptor Sensitivity Criteria

Sensitivity	Criteria
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident clusters, retirement homes, roads without footways that are used by pedestrians.
Medium	Receptors of moderate sensitivity to traffic flow: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, recreation facilities.
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, tourist attractions and residential areas with adequate footway provision.
Very Low	Receptors with very low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.

Impact Magnitude Criteria

7.66 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 7.4.

Table 7.4: Impact Magnitude Criteria

Impact	Assessment Criteria			
	Low	Medium	High	Very High
Severance	Increase in total traffic flows of 30% or under	Increase in total traffic flows of 30%–60%	Increase in total traffic flows of 60% - 90%	Increase in total traffic flows of 90% and above

[8] LA 104 Environmental Assessment and Monitoring, Rev 01, DMRB, July 2019.

Table 7.4: Impact Magnitude Criteria

Impact	Assessment Criteria			
	Low	Medium	High	Very High
Pedestrian Severance, Delay, Amenity, Fear and Intimidation	This has been assessed on a case by case basis using professional judgement subject to the sensitivity and vulnerability of the receptor. Threshold for judging the significance of changes to pedestrian amenity where the traffic flows is halved or doubled.			
Driver Delay	This has been assessed on a case by case basis using professional judgement subject to the sensitivity and vulnerability of the receptor. Impacts are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system.			
Accidents and Safety	Accident data for the local area have been reviewed and professional judgement have been applied to assess the implications of potential increase/decrease in traffic.			

Scale of Effect Criteria

7.67 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 7.5. The matrix has been informed by the EPA Guidelines.

Table 7.5: Scale of Effect Criteria

Magnitude	Sensitivity of Receptors			
	Very Low	Low	Medium	High
Low	Imperceptible	Not Significant	Slight	Slight
Medium	Not Significant	Slight	Slight	Moderate-Significant
High	Slight	Slight	Moderate-Significant	Very Significant
Very High	Slight	Moderate-Significant	Very Significant	Profound

7.68 Based on professional judgement, moderate-significant, very significant and profound effects are considered significant in terms of EIA.

7.69 Where the existing baseline HGV or total traffic flows are very minor, a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic may still be considered to be negligible or slight. In these instances, appropriate professional and experienced judgements have been made.

7.70 The description of effects set out in Table 7.6 are in accordance with EPA Guidance.

Table 7.6: Description of Effects

Effect Characteristic	Description
Significance	
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects	
Momentary	Effects lasting from seconds to minutes.
Brief	Effects lasting less than a day.
Temporary	Effects lasting less than a year.
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years.
Reversible	Effects that can be undone, for example through remediation or restoration.
Probability of Effects	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
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 effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
'Do-nothing' effects	The environment as it would be in the future should the subject project not be carried out.
'Worst case' effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminant effects	When the full consequences of a change in the environment cannot be described.
Irreversible effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

Nature of Effect Criteria

7.71 The nature of the effect has been described in accordance with EPA Guidance as either positive, neutral, or negative as follows:

- Positive - A change which improves the quality of the environment;
- Neutral – No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error;
- Negative – A change which reduces the quality of the environment.

Assumptions and Limitations

7.72 The assessment has relied on 2019 traffic survey data extracted from the approved SD20A/0121 Traffic Impact Assessment. It has been assumed that these data sets have been reported correctly.

7.73 It has been assumed that the AM and PM peak from each cumulative scheme will occur at the same peak periods with the 2019 traffic survey data.

7.74 TEMPRO growth rates have been applied to 2019 baseline data to forecast 2022 and 2024 future baseline traffic data.

Baseline Conditions

Existing Baseline

7.75 The following paragraphs provide an overview of the current baseline transport and accessibility conditions within the study area considering pedestrian and cycle facilities and access; public transport accessibility; and the operation of the existing highway network. Consideration is also given to the existing baseline flows where available. This analysis provides the baseline context against which the transport movements and accessibility of the proposed development have been assessed.

Local Highway Network

7.76 The site is accessed off Profile Park which is a street-lit dual carriageway providing access to the businesses within Profile Park and forms a junction with the R134 New Nangor Road and Grange Castle Business Park. Profile Park is subject to a 50km/hr speed limit.

7.77 The site is located adjacent to the R134 New Nangor Road which is a street-lit single carriageway road and is subject to a 40km/h speed limit. The R134 connects the R120 to the west and R136 to the east.

7.78 The R136 is a street-lit dual carriageway road subject to an 80km/h speed limit. The R136 connects the N4 to the north with the N7 to the south. The R136 accommodates two lanes for general traffic and a bus lane in each direction, a shared foot/ cycle path of approximately 3m are present on both sides of the highway.

7.79 Traffic data from various sources including traffic surveys commissioned in December 2019 has been used to inform the assessment and to provide baseline traffic flows. Table 7.7 presents the baseline traffic figures 2019 AADT,% HGV and link speed limits.

7.80 2019 baseline AM and PM peak hour traffic flow and distribution diagrams are presented in Technical Appendix 7.1.

Table 7.7: 2021 Baseline Traffic Data

Location	Direction	Speed Limit/kph	2021 Baseline	
			24hr AADT	% HGV
R120 Adamstown Road (N)	SB	80	5,026	5
	NB	80	4,341	11
R134 New Nangor Road (W)	EB	40	6,397	8
	WB	40	5,269	9

Table 7.7: 2021 Baseline Traffic Data

Location	Direction	Speed Limit/kph	2021 Baseline	
			24hr AADT	% HGV
R120 Adamstown Road (S)	SB	80	4,069	6
	NB	80	4,511	4
R134 New Nangor Road (E)	EB	40	5,674	8
	WB	40	5,258	9
Baldonnel Road (S)	SB	60	3,387	10
	NB	60	2,917	9
R134 New Nangor Road (W)	EB	40	6,003	8
	WB	40	5,117	10
Kilcarbery Park (N)	SB	40	1,212	19
	NB	40	1,167	26
R134 New Nangor Road (E)	EB	40	6,911	9
	WB	40	6,484	11
Profile Park	SB	50	276	20
	NB	50	248	14
R134 New Nangor Road (W)	EB	40	5,947	8
	WB	40	5,539	9
Grange Caste Business Park (N)	SB	40	2,658	11
	NB	40	2,639	11
R134 New Nangor Road (E)	EB	40	7,766	11
	WB	40	7,547	12
Grange Caste Business Park (S)	SB	40	125	0
	NB	40	120	0
R134 New Nangor Road (W)	EB	40	6,986	10
	WB	40	6,781	11
R136 Grange Caste Road (N)	SB	80	8,321	4
	NB	80	9,005	4
R134 New Nangor Road (E)	EB	40	7,693	7
	WB	40	6,653	7
R136 Grange Caste Road (S)	SB	80	13,127	7
	NB	80	14,302	6
R134 New Nangor Road (W)	EB	40	7,804	11
	WB	40	7,294	11

Public Transport

Bus Services

7.81 The nearest bus stops are located in both directions on the R134 Nangor Road, within 600 m of the site, from which frequent routes operate between the site and Dublin city centre. The bus stops are served by three bus services, which are presented in Table 7.8.

National Rail

7.82 Clondalkin/Fonthill railway station is located at approximately 3km to the northeast of the site from which frequent commuter services operate to/from Dublin city.

7.83 Citywest Campus Luas Tram Stop is approximately 4km to the southeast of the site from which frequent tram services to Dublin city and beyond can be accessed.

Walking and Cycling Network

Pedestrians and Cyclists

7.84 The pedestrian and cycle environment in the site vicinity is of a high standard, with wide, well-lit lengths of dedicated and segregated off-road cycle and pedestrian routes.

7.85 Pedestrian and cyclist access to the proposed development will be via Profile Park where footpaths of approximately 3m are provided on both sides of the road.

7.86 Profile Park intersects with the R134 New Nangor Road at a four-arm roundabout. Pedestrian crossing facilities with dropped kerbs and tactile paving are provided an all arms of the roundabout, except the northern arm (Kilcabery Park).

7.87 A shared use footway/cycleway of approximately 5 m is provided on the northern side of the R134 New Nangor Road, whilst shared foot/cycle paths of approximately 3 m are present on both sides of the R136.

7.88 Signal-controlled toucan crossings with dropped kerbs and tactile paving are provided on all arms of the R134 New Nangor Road/R136.

Accident Data

7.89 All reported accidents between 2012 to 2016, within the locality of the application site are identified in Technical Appendix 7.2.

7.90 A summary of the accidents is presented in Table 7.9.

Table 7.9: 2012 to 2016 Accident Data

Year	Severity			
	Slight	Serious	Fatal	Total Accidents
2012	1	0	0	1
2013	1	0	0	0
2014	2	0	1	3
2015	6	0	0	6
2016	4	0	0	4

7.91 One fatal accident occurred at the R134 New Nangor Road/R136 junction in 2014, with the remaining accidents within the study area reported as slight.

7.92 Most of the accidents occurred at the R134 New Nangor Road/R136 junction, with three slight accidents reported at the Profile Park/R134 New Nangor Road junction.

Future Baseline

7.93 The assessment has considered future years of 2022 (peak demolition and construction stage) and 2024 (fully operational year).

7.94 The proposed development will house data processing equipment, that will serve various businesses and enterprises that deliver on-line data services to the area. The building will have 24/7 operation with secure access, few visitors and occasional deliveries. The proposed development will have a small administrative component (offices and maintenance) for support personnel for the facility. Average staff on site per day will be approximately 90 for the full development.

Table 7.8: Bus Services

Service/ Bus Stop	Bus Route	Frequency (minutes)		
		Monday	Saturday	Sunday
13	Grange Castle - Harristown	EB: 15mins (05:50-23:30) WB: 15mins (05:30-23:30)	EB: 15mins (06:10-23:30) WB: 15mins (06:10-23:30)	EB: 15mins (07:00-23:30) WB: 15mins (07:00-23:30)
68	Hawkins Street to Newcastle/Greenogue Business Park	EB: 60mins (06:00-00:15) WB: approximately 60mins (06:00-00:15)	EB: 60mins (06:35-00:15) WB: approximately 60mins (06:40-23:30)	EB: 75mins (10:15-00:25) WB: 75mins (09:00-23:30)
68X	Newcastle/Greenogue Business Park to Hawkins Street	One service at 07:30	N/A	N/A

7.95 There would be two entry points from Falcon Avenue, with a security barrier and guard house to restrict general access to the site. HGVs and deliveries will access the site via the West Entry. South main Entry will provide a separate access for employees, visitors via car, pedestrian or cycle access aligned to the existing path and cycle routes around the site with a two-bay loading dock.

7.96 The proposed development will be served by 137 car parking spaces that will be located generally to the east of the data center, of which six spaces will be disabled spaces and 14 of these spaces will be provided for electrical charging vehicles. Covered bicycle parking provision will be provided within the site for 66 cycles.

Local Highway Network

7.97 The 2024 Baseline 'Do Nothing' traffic flows for the highway network are shown in Table 7.11. Unit 5.5 of the TII Project Appraisal Guidelines (Link-Based Traffic Growth Forecasting) has been used to apply growth factors to 2019 traffic data to generate the future baseline. The future baseline also includes cumulative schemes. The factors applied are:

Table 7.10: Growth Factor

Years	Growth Factor
2019-2021	1.010
2019-2022	1.015
2019-2024	1.025

Table 7.11: 2024 Baseline ('Do Nothing') Traffic Data

Location	Direction	2024 Baseline
		24hr AADT
R120 Adamstown Road (N)	SB	5,261
	NB	4,548
R134 New Nangor Road (W)	EB	6,804
	WB	5,604
R120 Adamstown Road (S)	SB	4,244
	NB	4,769
R134 New Nangor Road (E)	EB	6,045
	WB	5,574
Baldonnel Road (S)	SB	3,675
	NB	3,224
R134 New Nangor Road (W)	EB	6,264
	WB	5,337
Kilcarbery Park (N)	SB	1,230
	NB	1,184
R134 New Nangor Road (E)	EB	7,390
	WB	6,906
Profile Park	SB	411
	NB	382
R134 New Nangor Road (W)	EB	6,323
	WB	5,859
Grange Caste Business Park (N)	SB	2,698
	NB	2,678
R134 New Nangor Road (E)	EB	8,314
	WB	8,018
Grange Caste Business Park (S)	SB	127
	NB	122
R134 New Nangor Road (W)	EB	7,522
	WB	7,240
R136 Grange Caste Road (N)	SB	8,468
	NB	9,187
R134 New Nangor Road (E)	EB	7,899
	WB	6,833
R136 Grange Caste Road (S)	SB	13,618
	NB	14,773
R134 New Nangor Road (W)	EB	8,352
	WB	7,760

Public Transport

7.98 No public transport improvements within the study area are proposed to be implemented by 2024. Therefore, it has been assumed that the future public transport baseline in 2024 would be the same as the existing public transport baseline.

7.99 All vehicular traffic will access the site to the south via the four-arm roundabout on Profile Park which leads to a roundabout on the R134 New Nangor Road.

Walking and Cycling

7.100 No improvements to the walking and cycling facilities within the study area are proposed to be implemented by 2024.

7.101 Pedestrians and cyclists will continue to access the site via Profile Park, with pedestrian and cycle routes aligned with existing routes around the site.

Sensitive Receptors

7.102 The receptors identified as sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised in Table 7.12. These have been based on the criteria identified in Table 7.3.

Table 7.12: Summary of Sensitive Receptors

Receptor	Sensitivity
Pedestrians and cyclists	High
Local highway network	Low
Road users	Medium

Assessment of Effects

7.103 The following section describes the potential transport and accessibility impacts and effects which could arise as a result if the proposed development during the demolition and construction stage and the operation stage.

Demolition and Construction Effects

7.104 It has been assumed that the demolition and construction traffic for the proposed development of 41,105sqm will be proportional (approximately 51%) to the construction traffic used for the site in the approved SD20A/0121 application (80,269sqm).

Local Highway Network

7.105 It has been assumed that the peak demolition and construction period would be in 2022 when there would be a maximum of 220 demolition and construction vehicle movements per day, as identified in Table 7.13.

Table 7.13: Maximum Daily Demolition and Construction Stage Trip Generation

Total Vehicles	Arrivals		Departures		Total	
	Car	HGV	Car	HGV	Arrivals	Departures
Daily	157	63	157	63	220	220

7.106 Light and heavy vehicle construction traffic has been distributed across the surrounding network in the same manner as in the previous approved SD20A/0121 application. Light construction traffic has been distributed based upon the 2019 traffic surveys, whilst heavy construction traffic would travel to the site from the N7 national road and from the M50 motorway orbital motorway, via the R136 and R134 regional roads, and depart along the same routes.

7.107 Table 7.14 identifies two highway links which would have an increase over 30% in demolition and construction vehicle movements.

Table 7.14: % Increase between Do Nothing and Do Something

Location	Direction	2022 Do Nothing	2022 Do Something	% Increase
		24hr AADT	24hr AADT	
R120 Adamstown Road (N)	SB	5,352	5,363	0
	NB	4,655	4,655	0
R134 New Nangor Road (W)	EB	7,100	7,125	0
	WB	5,814	5,814	0
R120 Adamstown Road (S)	SB	4,314	4,314	0
	NB	4,903	4,918	0
R134 New Nangor Road (E)	EB	6,094	6,120	0
	WB	5,553	5,553	0
Baldonnel Road (S)	SB	3,664	3,664	0
	NB	3,195	3,195	0
R134 New Nangor Road (W)	EB	6,554	6,580	0
	WB	5,567	5,567	0
Kilcarbery Park (N)	SB	1,218	1,218	0
	NB	1,172	1,172	0
R134 New Nangor Road (E)	EB	7,456	7,645	3
	WB	6,904	7,067	2
Profile Park	SB	415	603	45
	NB	387	575	49
R134 New Nangor Road (W)	EB	6,369	6,395	0
	WB	5,836	5,836	0
Grange Caste Business Park (N)	SB	2,671	2,671	0
	NB	2,652	2,652	0
	EB	8,354	8,543	2

Table 7.14: % Increase between Do Nothing and Do Something

Location	Direction	2022 Do Nothing	2022 Do Something	% Increase
		24hr AADT	24hr AADT	
R134 New Nangor Road (E)	WB	7,997	8,159	2
Grange Caste Business Park (S)	SB	126	126	0
	NB	121	121	0
R134 New Nangor Road (W)	EB	7,570	7,759	2
	WB	7,226	7,389	2
Grange Caste Road (N)	SB	8,387	8,396	0
	NB	9,114	9,135	0
R134 New Nangor Road (E)	EB	7,850	7,886	0
	WB	6,779	6,813	1
Grange Caste Road (S)	SB	13,559	13,691	1
	NB	14,668	14,788	1
R134 New Nangor Road (W)	EB	8,392	8,581	2
	WB	7,765	7,928	2

7.108 In accordance with the IEMA Guidelines, the assessment has focused on Profile Park and the application site accesses, where a potential increase in traffic of greater than 30% has been identified (as shown in red).

Pedestrian Severance, Delay, Amenity, Fear and Intimidation

7.109 The demolition and construction stage would generate movements by HGVs and construction workers. It has been considered that these would have a temporary minor impact on the local road network. In addition, a Construction Environmental Management Plan (CEMP) would be prepared by the contractor, when appointed, that would require construction traffic including both construction plant and materials deliveries to be programmed to avoid peak traffic periods on the surrounding local and strategic road network.

7.110 Due to the length of the proposed demolition and construction stage, any demolition and construction impacts are considered short-term in accordance with EPA Guidance. However, demolition and construction vehicle movements would fluctuate throughout the 30-month demolition and construction stage. Signs and temporary barriers would be used to inform the public of changes to walking, cycling or highway routes during the demolition and construction stage.

7.111 Pedestrians are sensitive to traffic flows and considered to have a high receptor sensitivity.

7.112 Across the assessed highway network, only flows on Profile Park are anticipated to exceed the 30% severance threshold. However, the total traffic flows on Profile Park are minor and a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic is considered to be low. Traffic on Profile Park would increase by 376 24hr AADT from 802 24hr AADT 2022 Do Nothing to 1,178 24hr AADT in 2022 Do Something. Pedestrians can be safely accommodated by footpaths of approximately 3m provided on both sides of Profile Park. Pedestrians can cross the road via the informal pedestrian crossing with dropped kerbs and tactile paving on the approach to the R134 New Nangor Road/Profile Park roundabout. The speed limit on Profile Park is 50kph.

7.113 Therefore, it is considered that overall, the impact magnitude is low and the overall effect would therefore be **Slight, Negative** and **Not Significant** in terms of EIA.

Driver Delay

7.114 It is anticipated that there may be some delay to road users at times due to demolition and construction vehicles entering/exiting the application site. However, the CEMP would commit to ensuring deliveries are co-ordinated to ensure vehicles would not be waiting on the local highway, and that wherever feasible deliveries would be undertaken outside peak hours.

7.115 Due to the length of the proposed demolition and construction stage any demolition and construction impacts are considered short-term. However, demolition and construction vehicle movements would fluctuate throughout the 60-month demolition and construction stage.

7.116 Road users are considered to have a medium sensitivity to traffic flow.

7.117 The impact magnitude would be low due to the potential increase in HGV and private vehicle demolition and construction traffic movements. In addition, measures would be implemented in the CEMP to manage the volume of demolition and construction traffic and proposed safety measures. The effect would therefore be **Slight, Negative** and **Not Significant** in terms of EIA.

Accidents and Safety

7.118 Impacts from the demolition and construction stage of the proposed development would be temporary.

7.119 The accident analysis does not indicate a prevailing road safety issue which could be made worse by the demolition and construction works.

7.120 Road users, pedestrians and cyclists are all recognised as receptors to accidents and safety, pedestrians and cyclists are considered to have a high sensitivity.

7.121 The impact magnitude is considered to be low due to the traffic flows associated with the demolition and construction works. The effect on accidents and safety would therefore be **Slight, Negative** and **Not Significant** in terms of EIA.

Operation Effects

7.122 The proposed development access hierarchy gives precedence to walking, cycling and public transport over private vehicles. The proposed development is focussed on people, including considered provision for people to be able to travel actively, sustainably and safety.

7.123 It has been assumed that the proposed development will be fully operational in 2024.

Proposed Development Trip Generation

7.124 The total vehicle trip generation for the proposed development is presented in Table 7.15.

Table 7.15: Proposed Development Trip Generation- Operation Stage

Total Vehicles	Arrivals		Departures		Two-Way	
	Total Vehicles	Deliveries*	Total Vehicles	Deliveries*	Total Vehicles	Deliveries
Daily	82	6	82	6	164	12

7.125 The total daily trip generation profile for the proposed development during the operation stage can be found in Appendix 7.4.

7.126 *It should be noted that the multifuel generation plant will power DUB 11 directly up to approximately Q1 2025 using HVO as the fuel source and this would require an additional 54 HGV a day. The duration of any effects would be considered as short-term.

Local Highway Network

7.127 All vehicular traffic will access the site via the four-arm roundabout on Profile Park which leads to a roundabout on the R134 New Nangor Road.

7.128 Table 7.16 presents the baseline traffic figures 2024 Do Nothing and Do Something Annual Average Daily Traffic flow (AADT). The table also identifies the% change between the Do Nothing and the Do Something. The future baseline includes background growth (including cumulative schemes).

7.129 In accordance with the IEMA Guidelines, the assessment is focused on links where a potential increase in traffic of greater than 30% has been identified. Table 7.16 identifies the greatest% change on Profile Park with an increase of 17% and 18% (SB and NB respectively), below the 30% threshold.

Table 7.16: % Increase between 2024 Do Nothing and Do Something

Location	Direction	2024 Do Something	
		24hr AADT	% Increase
R120 Adamstown Road (N)	SB	5,266	0
	NB	4,548	0
R134 New Nangor Road (W)	EB	6,814	0
	WB	5,604	0
R120 Adamstown Road (S)	SB	4,244	0
	NB	4,775	0
R134 New Nangor Road (E)	EB	6,056	0
	WB	5,574	0
Baldonnel Road (S)	SB	3,675	0
	NB	3,224	0
R134 New Nangor Road (W)	EB	6,275	0
	WB	5,337	0
Kilcarbery Park (N)	SB	1,230	0
	NB	1,184	0
R134 New Nangor Road (E)	EB	7,460	1
	WB	6,966	1
Profile Park	SB	481	17
	NB	453	18
R134 New Nangor Road (W)	EB	6,333	0
	WB	5,859	0
Grange Caste Business Park (N)	SB	2,698	0
	NB	2,678	0
R134 New Nangor Road (E)	EB	8,384	1
	WB	8,077	1
Grange Caste Business Park (S)	SB	127	0
	NB	122	0

Table 7.16: % Increase between 2024 Do Nothing and Do Something

Location	Direction	2024 Do Something	
		24hr AADT	% Increase
R134 New Nangor Road (W)	EB	7,592	1
	WB	7,299	1
Grange Caste Road (N)	SB	8,473	0
	NB	9,198	0
R134 New Nangor Road (E)	EB	7,919	0
	WB	6,854	0
Grange Caste Road (S)	SB	13,658	0
	NB	14,807	0
R134 New Nangor Road (W)	EB	8,423	1
	WB	7,820	1

7.130 A review of the increase in traffic resulting from the multifuel generation plant has identified a potential increase of 30% (SB) and 33% (NB) on Profile Park, as shown in Table 7.17. However, the effects will be short-term and the total traffic flows on Profile Park are minor therefore a small increase in vehicles produces a large change in magnitude whereas in real terms the increase in traffic is considered to be low with **No Significant Effects** anticipated. The distribution of this traffic across the rest of the highway network is considered minimal.

Table 7.17: % Increase between 2024 Do Nothing and Do Something (including multifuel generation plant traffic)

Location	Direction	2024 Do Something	
		24hr AADT	% Increase
Profile Park	SB	535	30
	NB	507	33

Pedestrian Severance, Delay, Amenity, Fear and Intimidation

7.131 Pedestrians would access the site from one access/egress point from Profile Park Road to the south, which leads to a roundabout on the R134 New Nangor Road.

7.132 Impacts from the operation of the proposed development would be permanent whilst the site remains operational although would be reversible should the site cease operation.

7.133 Pedestrians are considered to have a high sensitivity to changes in traffic flows.

7.134 Table 7.16 identifies the% increase in traffic when comparing the 2024 Do Nothing with the Do Something scenario. No increase of traffic over 30% is anticipated as a result of the proposed development with no increase in severance or fear and intimidation anticipated. Pedestrians can be safely accommodated by footpaths of approximately 3m provided on both sides of Profile Park, whilst they can cross the road via the informal pedestrian crossing with dropped kerbs and tactile paving on the approach to the R134 New Nangor Road/Profile Park roundabout. Further, the speed limit of 50 Kph and the pedestrian routes of high standards on both sides of the road, it is considered that over all the highway network assessed, the impact magnitude is low.

7.135 The overall effect would therefore be **Slight, Negative** and N**ot Significant** in terms of EIA.

Driver Delay

7.136 Classified traffic turning count survey of the junction of Profile Park with the R134 New Nangor Road was carried out in December 2019. The AM Peak hour total through the junction was 1,347 vehicles between 07:30 to 08:30. The PM peak hour total throughput of the junction was 1,190 vehicles between 16:30 to 17:30.

7.137 The development net total vehicle generation is estimated to be a small increase on this baseline junction load (4% in AM Peak and 4.7% in PM Peak), which is unlikely to cause negative effects on the junction performance.

7.138 As journeys would distribute from this point to the wider highway network, effects thereon would be more disperse beyond this junction.

7.139 Impacts from the operation of the proposed development are considered to be permanent whilst the site remains operational although would be reversible should the site cease operation.

7.140 Road users are considered to have a medium sensitivity to changes in traffic flows.

7.141 The impact magnitude would be low due to the anticipated small increase in peak hour traffic resulting from the proposed development. The effect on driver delay would therefore be **Slight, Negative** and **Not Significant** in terms of EIA.

Accidents and Safety

7.142 The proposed development would be designed in accordance with appropriate design standards.

7.143 Impacts from the operation of the proposed development would be permanent whilst the site remains operational although would be reversible should the site cease operation.

7.144 The accident analysis does not indicate a prevailing road safety issue which could be made worse by the new development site.

7.145 Road users, pedestrians and cyclists are all recognised as receptors to accidents and safety, pedestrians and cyclists are considered to have a high sensitivity.

7.146 The impact magnitude is considered to be low due to the low traffic flows associated with the proposed development, the high standard of design of the proposed development and commitment to safety and reducing danger and fear associated with traffic. The effect on accidents and safety would therefore be **Slight, Negative** and **Not Significant** in terms of EIA.

Additional Mitigation

Demolition and Construction Stage

7.147 No additional mitigation measures beyond the CEMP and measures already described in the 'Potential Impacts and Likely Effects' would be required for the demolition and construction stage.

Operation Stage

7.148 No additional mitigation measures beyond the measures already described in the 'Assessment of Effects' would be required for the operation stage.

Enhancement Measures

7.149 No additional enhancement measures beyond the measures already described in the 'Assessment of Effects' would be required for the demolition and construction stage.

Demolition and Construction Residual Effects

7.150 No additional mitigation would be required; therefore, the residual demolition and construction effects remain as reported in the assessment of effects section:

- **Slight, Negative** and **Not Significant** in terms of EIA for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- **Slight, Negative** and **Not Significant** in terms of EIA for Driver Delay; and
- **Slight, Negative** and **Not Significant** in terms of EIA for Accidents and Safety.

Operation Residual Effects

7.151 No additional mitigation would be required; therefore, the residual operation effects remain as reported in the assessment of effects section:

- **Slight, Negative** and **Not Significant** in terms of EIA for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- **Slight, Negative** and **Not Significant** in terms of EIA for Driver Delay; and
- **Slight, Negative** and **Not Significant** in terms of EIA for Accidents and Safety.

Summary of Residual Effects

7.152 Table 7.18 provides a tabulated summary of the outcomes of the Transport and Accessibility assessment of the proposed development. Where **Significant Positive** effects are likely these are highlighted in bold green and where **Significant Negative** effects are predicted these are highlighted in bold red.

Table 7.18 Summary of Residual Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	R IR	D ID	M B T St Mt Lt P**
Demolition and Construction Stage								
Pedestrians	Change in Pedestrian Severance, Delay, Amenity, Fear and Intimidation	None	Slight	-	L	R	D	T to St
Road users	Change in Driver Delay	None	Slight	-	L	R	D	T to St
Road users, pedestrians and cyclists	Change in Accidents and Safety	None	Slight	-	L	R	D	T to St
Operation Stage								
Pedestrians	Change in Pedestrian Severance, Delay, Amenity, Fear and Intimidation	None	Slight	-	L	R	D	Lt to P
Road users	Change in Driver Delay	None	Slight	-	L	R	D	Lt to P
Road users, pedestrians and cyclists	Change in Accidents and Safety	None	Slight	-	L	R	D	Lt to P

Notes:

* - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, ID = Indirect;

L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = Medium-term, Lt = Long-term, P = Permanent

** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound

Cumulative Effects

Intra-Project Effects

7.153 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in EIAR Volume 1, Chapter 16: Cumulative Effects.

Inter-Project Effects

7.154 Table 7.19 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 7.19: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Microsoft – Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 (SD20A/0283)	Yes	The construction stage (2021-2023) would overlap with the construction stage (2022) of the proposed development.	Yes	Operation stage (assumed 2024) would overlap with the opening year of the proposed development (2024).Considered to be in close proximity to the application site.
UBC Properties – Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 (SD20A/0121)	Yes	Peak construction is 2021. Construction phase would overlap with the construction and operation stage of the proposed development.	No	Development will not be operational by the fully operational year of the proposed development, therefore no effects considered likely. Opening year of the cumulative scheme is 2028.
UBC Properties – Grange Castle South Business Park, Dublin 22 (VA06S.308585)	No	Opening year of this cumulative development is anticipated to be 2021, therefore demolition and construction stage will not overlap with the opening year of the proposed development, therefore no effects considered likely.	No	The Grange Castle South Business Park EIAR describes a very low trip generation which professional judgement indicates would result in imperceptible associated traffic expected on each link within the study area. The proposed Clutterland substation does not require any full-time staff to operate it on a daily basis.
Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 (SD17A/0377)	No	The cumulative development has already been constructed.	No	It was not possible to locate all supporting transport documents but those available indicate that the proposed amendments under this application SD17A/0377 will not generate additional traffic to the previously permitted SD12A/0002.
Cyrus One – Grange Castle Business Park, Clondalkin, Dublin 22 SD18A/0134)	No	The cumulative development has already been constructed.	Yes	The opening year is 2020. Therefore, the operation phase will overlap with the construction and operation stage of the proposed development.
Cyrus One Townlands within Grange	No	According to the reports the	No	It was not possible to locate all supporting transport documents but

Table 7.19: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Castle South Business Park, Baldonnel, Dublin 22 (SD20A/0295)		construction works should be complete. Number of trips anticipated to be generated are very low (approximately 25HGVs between January 2021 and June 2021).		those available indicate that the proposed amendments under this cumulative scheme will not generate additional traffic to the previously permitted SD18A/0134.
Cyrus One – Grange Castle South Business Park, Baldonnel, Dublin 22 (VA06S.309146)	Yes	Construction phase 2021-2022 (likely to be 2022/2023 due to timing of approval). Construction stage would overlap with the construction stage of the proposed development.	Yes	Building A partially open., Building B and the proposed GIS substation is scheduled to be complete by Q4 of 2022. Operation stage would overlap with the operation stage of the proposed development.
Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 (SD21A/0167)	Yes	Construction Period 2023-2025 would overlap with the operation stage of the proposed development	No	Opening year 2025 – 10 vehicles daily.
Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (SD21A/0186)	Yes	Two-year construction period (not defined 2023-2025). Assumed that the construction stage will overlap with both the construction and operation stage of the proposed development.	Yes	Opening year is 2025.
SID Application to provide the proposed sites (VDC DUB 1) permanent electrical connection to the EIR grid	Yes	Construction stage would overlap with the construction stage of the proposed development.	No	The operation stage will generate very low trip generation which is expected to result in imperceptible associated traffic impact on each road link within the study area.

Demolition and Construction Cumulative Effects

7.155 The assessment undertaken includes all the cumulative schemes that overlap with the demolition and construction stage of the proposed development, as identified in Table 7.18.

7.156 In relation to each of the cumulative schemes, the demolition and construction stage of Microsoft, Grange Castle Business Park (SD20A/0283), UBC properties, Townlands within Grange Castle South Business Park (SD20A/0121), Cyrus One Grange Castle South Business Park (VA06S.309146), Centrica Business Solutions, (SD21A/0167), Equinix (Ireland) Ltd, Plot 100 Profile Park, (SD21A/0186) and the SID development cumulative scheme would overlap with the operation stage of the proposed development. Cumulative assessment has been carried out by identifying the demolition and construction programme/start date of the cumulative schemes.

7.157 Trip generation and distribution for the demolition and construction stage has been extracted from the supporting Traffic Impact Assessments.

7.158 The appointed demolition and construction contractor(s) and Applicant would consult neighbouring schemes on the programme and local effects of the demolition and construction works, such as pedestrian routes, for example. In addition, collaboration around the scheduling of vehicle movements would be undertaken so that if works coincide with other demolition and construction activity already taking place within the immediate vicinity of the application site, the cumulative effect of dismantling and construction traffic can be minimised and would not be significant in terms of EIA.

Operation Cumulative Effects

7.159 The assessment undertaken includes all the cumulative schemes that overlap with the operation stage of the proposed development and may generate additional traffic on the local highway network

7.160 As identified in Table 7.18 the operation stage of Microsoft, Grange Castle Business Park (SD20A/0283), Cyrus One, Grange Castle Business Park (SD18A/0134), Cyrus One Grange Castle South Business Park (VA06S.309146) and Equinix (Ireland) Ltd (SD21A/0186) cumulative schemes would overlap with the operation stage of the proposed development. Cumulative assessment has been carried out by identifying the operation stage programme/start date of the cumulative schemes. Other schemes identified in Table 7.18 that overlap with the operation stage would very low trip generation, so effects are unlikely.

7.161 Trip generation and distribution for the operation stage has been extracted from the supporting Environmental and Traffic Impact Assessments.

7.162 Daily trip generation and distribution diagrams for the cumulative scheme and the proposed development can be found in Technical Appendix 7.3

7.163 The traffic flows from these developments have been included within the Do Nothing baseline of the assessment, and are therefore not considered to be significant.

7.164 The SID application will be operational during the operation stage of the proposed development, however no significant daily traffic flows in relation to the operation of the SID application are anticipated.

Summary of Assessment

Background

7.165 This chapter has detailed the potential Transport and Accessibility effects due to the demolition and construction stage and the operation stage of the proposed development. The assessment of the demolition and construction stage and the operation stage have been undertaken taking into account the relevant national and local guidance and regulations.

7.166 The pedestrian and cycle environment in the site vicinity is of a high standard, with wide, well-lit lengths of dedicated and segregated off-road cycle and pedestrian routes. This would allow for future employees of the application site to walk, cycle or use public transport and complete their journeys by alternatives to the private vehicle.

Demolition and Construction Effects

7.167 It has been assumed that the demolition and construction traffic for the proposed development of 41,105 sqm will be proportional (≈51%) to the construction traffic used for the site in the approved SD20A/0121 application (80,269sqm).

7.168 The peak demolition and construction period would be in 2022 with a maximum of 220 demolition and construction vehicle movements per day.

7.169 In accordance with the IEMA Guidelines, the assessment has focused on Profile Park and the application site accesses, where a potential increase in traffic of greater than 30% has been identified.

7.170 There would be some increase in demolition and construction traffic during the two to four year programme of works. However, the effects of the demolition and construction traffic on the sensitive receptors would be temporary to short-term as follows:

- Slight, Negative and Not Significant in terms of EIA for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- Slight, Negative and Not Significant in terms of EIA for Driver Delay; and
- Slight, Negative and Not Significant in terms of EIA for Accidents and Safety.

7.171 A CEMP would require construction traffic including both construction plant and material deliveries to be programmed to avoid peak traffic periods on the surrounding local and strategic road network and minimise any effect on the local highway network and road, pedestrian and cycle users. No additional mitigation would be required for the demolition and construction stage.

7.172 Therefore, it is considered that the demolition and construction stage would result in a slight negative effect on Transport and identified receptors, and as such **would not give rise to significant effects** on Transport and Accessibility in terms of EIA.

Operation Effects

7.173 The proposed development will be fully operational in 2024 and is anticipated to generate 164 two-way vehicle trips. The operation of the MFGP up to Q1 2025 using HVO as the fuel source would require an additional short term 54 HGV a day.

7.174 In accordance with the IEMA Guidelines, the assessment has focused on Profile Park and the application site accesses, where a potential increase in traffic of greater than 30% has been identified in 2024 when comparing the Do Nothing with the Do Something scenario.

7.175 There would be in an increase in traffic resulting from the operation of the proposed development. The effects of the operation stage would be permanent during the operation of the proposed development, however, should the site cease operation the effect would be reversible. All effects are considered likely.

- Slight, Negative and Not Significant in terms of EIA for Pedestrian Severance, Delay, Amenity, Fear and Intimidation;
- Slight, Negative and Not Significant in terms of EIA for Driver Delay; and
- Slight, Negative and Not Significant in terms of EIA for Accidents and Safety.

7.176 Overall, it is considered that the operational proposed development would result in a slight negative effect on Transport and identified receptors, and as such **would not give rise to significant effects** on Transport and Accessibility in terms of EIA.

7.177 No additional mitigation would be required for the operation stage.

Cumulative Effects

7.178 The cumulative effects of the proposed development, and neighbouring schemes has been considered within the traffic assessment.

7.179 The demolition and construction stage of Microsoft, Grange Castle Business Park (SD20A/0283), UBC properties, Townlands within Grange Castle South Business Park (SD20A/0121), Cyrus One Grange Castle South Business Park (VA06S.309146), Centrica Business Solutions, (SD21A/0167), Equinix (Ireland) Ltd, Plot 100 Profile Park, (SD21A/0186) and the SID development cumulative scheme would overlap with the operation stage of the proposed development. The operation stage of Microsoft, Grange Castle Business Park (SD20A/0283), Cyrus One, Grange Castle Business Park (SD18A/0134), Cyrus One Grange Castle South Business Park (VA06S.309146) and Equinix (Ireland) Ltd (SD21A/0186 cumulative schemes would overlap with the operation stage of the proposed development.

7.180 Whilst there will be an increase in traffic resulting from the cumulative schemes during both the demolition and construction stage and the operation stage, overall, there are **no significant effects** in terms of EIA anticipated as a result of the cumulative impacts and therefore no mitigation is proposed.

8 AIR QUALITY

Introduction

8.1 This chapter of the EIAR reports on the likely significant air quality effects to arise from the demolition and construction stage and the operation stage of the proposed development.

8.2 The chapter describes the air quality policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely air quality effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

8.3 The potential exists for dust deposition and increased particulate matter concentrations to occur during the demolition and construction stage, as well as increased air emissions resulting from the operational phases of the proposed development. The main air pollutants of concern are dust and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}), typically generated during demolition and construction activities, and nitrogen oxides (NO_x) represented as nitrogen dioxide (NO_2) typically generated by combustion engine emissions and road traffic.

8.4 The chapter is supported by the following technical appendices in EIAR Volume 3:

- Appendix 8.1: Air Quality Modelling Inputs.
- Appendix 8.2: Air Quality Detailed Results.

Methodology

8.5 The assessment has been informed by the below legislation, policies, and published guidance and those outlined in Chapter 2: EIA Process and Methodology. The relevant policies are discussed throughout this chapter in more detail in the appropriate sections.

- International Legislation:
  - European Air Quality Framework Directive 2004/107/EC[1] and daughter Directive 2008/50/EC[2] on ambient air quality and cleaner air for Europe (CAFE), which set out a series of limit values for the protection of human health and critical levels for the protection of vegetation;
  - Directive 2010/75/EU industrial emissions (integrated pollution prevention and control)[3] known as Industrial Emissions Directive (IED);
  - Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants (MCPD)[4];
- National Legislation and Policy:
  - Air Pollution Act 1987[5];
  - Environmental Protection Agency Act, 1992[6];
  - Protection of The Environment Act 2003[7]
  - Air Quality Standards Regulations 2011[8] amended by the Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air (Amendment) Regulations 2016[9], which transposed the European Directive 2008/50/EC into Irish legislation;
  - European Union (Medium Combustion Plants) Regulations 2017[10] which transposed the European Directive 2015/2193 into Irish legislation;
  - The National Climate Action Plan 2021[11]
- Guidance and industry standards:
  - Institute of Air Quality Management (IAQM) guidance on the Assessment of Dust from Demolition and Construction, 2014[12];
  - Environmental Protection UK/IAQM (EPUK/IAQM) guidance on Land Use and Development Control for Air Quality, 2017[13];
  - Environmental Protection Agency (EPA) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)[14];
  - U.S. Environmental Protection Agency (USEPA) Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard[15]; and
  - UK Environment Agency Specified generators: dispersion modelling assessment [16, 17].

8.6 Specific Irish and European guidance and industry standards have been used to inform this assessment where available. International guidance and protocols from the UK or USA were used to supplement methodologies gaps where specific national guidance was not available, with a particular focus on UK guidance and protocols due to geographical proximity and for methodology consistency.

Assessment Scope

8.7 Dispersion of air pollutants is impacted by several factors including the height and location of a release, the prevailing meteorology, and the arrangement of buildings in the immediate vicinity. This EIAR has been based on the architectural and engineering design and drawings that accompany this application.

Technical Scope

8.8 The assessment considers the effects of the proposed development using the methodology set out below within the context of the policy framework and baseline conditions. The assessment considers the following potential impacts and associated likely effects:

1 European Air Quality Directive 2004/107/EC. European Air Quality Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in ambient air.
2 European Commission. Directive 2008/50/EC. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
3 Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).
4 Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants.
5 Air Pollution Act, 1987. Number 6 of 1987
6 Environmental Protection Agency Act, 1992. Number 7 of 1992.
7 Protection of the Environment Act 2003. Number 27 of 2003.
8 Statutory Instruments S.I. No. 180/2011 - Air Quality Standards Regulations 2011.
9 Statutory Instruments S.I. No. 659 of 2016 – Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air (Amendment) Regulations 2016.
10 Statutory Instruments S.I. No. 595/2017 - European Union (Medium Combustion Plants) Regulations 2017.
11 Government of Ireland, 2021. Climate Action Plan. Department of the Environment, Climate and Communications
12 Holman et al, 2014. IAQM Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London.
13 Moorcroft and Barrowcliffe. et al., 2017, Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.
14 Environmental Protection Agency Office of Environment Enforcement (OEE), 2019. Air Dispersion Modelling from Industrial Installations Guidance Note (AG4).
15 USEPA, 2011. Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard.
16 Guidance Specified generators: dispersion modelling assessment. Available at: https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment [Accessed on 04/08/2021]
17 UK Environmental Agency. Guidance Specified generators: dispersion modelling assessment. Available at: https://consult.environment-agency.gov.uk/psc/mcp-and-sg-regulations/supporting_documents/Specified%20Generators%20Modelling%20GuidanceINTERIM%20FINAL.pdf [Accessed on 04/08/2021]

- Development works, the resulting dust impacts from the demolition and construction and the associated effects on human health receptors and amenity, as per the IAQM Guidance on assessment of dust from demolition and construction[12];
- Development works demolition and construction stage and operation stage traffic emission effects on human health receptors, as per the IAQM Guidance on land use and development control for air quality[13].
- Operation of the proposed development data center associated emissions arising from combustion plant effects on human health receptors beyond the site boundary.

8.9 The UK EPUK/IAQM guidance is applicable to assessing the effect of changes in exposure of member of the public resulting from developments where a proposal could affect local air quality and for which no other appropriate guidance exists in Ireland, as such this guidance has been adopted. The guidance considers the proximity to an Air Quality Management Area (AQMA), which is an area likely to approach or exceed the values set by air quality objectives. The guidance provides an indicative criterion to determine the level of an air quality assessment due to road traffic flows emissions:

- A change of Light Duty Vehicles (LDVs) flows of more than 100 Average Annual Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA) or more than 500 AADT elsewhere.
- A change of Heavy-Duty Vehicles (HDVs) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere.

8.10 The proposed development site and study area are not expected to approach or exceed the air quality objectives (as shown in the Baseline Conditions of this Chapter) and therefore the criteria outside an AQMA would apply to determine the significance of effects arising on local air quality due to the proposed development traffic flows.

8.11 The estimated demolition and construction stage vehicle movements for 12 hours working day would result in a combined LGV and HGV two-way 440 daily trips, of which 126 two-way trips would be HGV. However, when the movements are averaged over a full year period (24-hour AADT), these would be expected to be lower than 12-hour daily movements. Demolition and construction works' traffic flows would therefore not be expected to exceed the threshold of 500 AADT LGV movements or the 100 AADT HGVs for a detailed modelling assessment to be necessary according to EPUK/IAQM guidance. In addition, HGV movements would be controlled through the implementation of a Construction Environmental Management Plan (CEMP) as described in Chapter 5: Construction Description, which would be secured by means of an appropriately worded planning condition. The effects of demolition and construction related traffic emissions would be short-term, negative, and imperceptible with relation to human health. Accordingly, demolition and construction traffic emissions have not been considered further within this chapter.

8.12 The operational stage would be expected to generate 164 daily vehicles, i.e., well below the EPUK/IAQM criteria. The effects of completed development stage related traffic emissions would be long-term, negative, and not significant with relation to human health. Accordingly, operational stage traffic emissions have not been considered further within this chapter.

8.13 There are no protected European sites, designated under the EC Habitats Directive (92/43/EEC)[18], or National Heritage Areas (NHAs), designated under the Wildlife Acts[19], within the proposed development boundary. The nearest European sites to the Proposed Development are the Rye Water Valley/ Carton Special Area of Conservation (SAC), approximately 5.9 km north-west of the site, and Glenasmole Valley SAC, approximately 8.0 km south-east of the site. The Grand Canal proposed NHA is located approximately 1.3 km north of the site. The nearest protected European sites and NHAs are considered to fall outside the zone of influence of the proposed development and therefore the demolition and construction stage and operation stage air quality effects would be expected to be long-term, negative, and imperceptible and have not been considered further within this chapter.

8.14 The assessment includes a quantitative assessment of emissions of the Multifuel Generation Plant (MFGP) and the data center emergency generators. None of the other plant associated with the data center (i.e., chillers, substation) would give rise to significant emissions of air pollutants.

8.15 The potential impact to air quality during the operational phase is a breach of the ambient air quality standards (AQSs) associated with emissions from proposed development combustion engines (emergency generators and MFGP). The main pollutant of concern in relation to emissions from the combustion engines is NO_2 and the assessment concentrates on the impacts of NO_2 emissions on human health receptors. In relation to carbon monoxide (CO), sulphur (SO_2), PM_{10}, $PM_{2.5}$ and benzene no detailed modelling was undertaken as combustion engines emissions of these pollutants' would be significantly lower when compared with NOx emissions relative to their respective ambient air quality standard. Ensuring compliance with NO_2 air quality standards would ensure compliance of other pollutants.

8.16 It is considered that the proposed development would not give rise to any odour impacts and associated effects and odour is not assessed as part of the EIAR Chapter.

Spatial Scope

8.17 The study area for the demolition and construction stage assessment is defined as up to 350 m from the site boundary for the assessment of demolition and construction dust emissions, and 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s) as per the IAQM guidance on the Assessment of Dust from Demolition and Construction[12].

8.18 For the operation stage assessment, the study area encompasses the application site, representative off-site receptors identified as at risk of impacts from the proposed development and receptor Cartesian grids with the site at the centre, as recommended by EPA AG4 guidance[14]. The off-site receptors and receptor grids are presented in the Baseline Conditions section of this EIAR. The study area also considers identified neighbouring cumulative development and commercial activities adjacent to the site (see Chapter 1: Introduction).

Temporal Scope

8.19 The assessment has considered impacts arising during the demolition and construction stage which would be of expected to be temporary and short term (1-3 years) in nature and from the operation stage which would be expected to be long-term to permanent in nature (i.e., more than 10 years).

8.20 The assessment of the phased delivery of the proposed development has been undertaken in line with the information provided in Chapter 5: Construction Description of this EIAR Volume. The works are anticipated to be undertaken over a 30-month period, with a completion targeted of Q4 2024. Due to the size of the proposed development, it would be completed in two phases. The development phasing details relevant for the air quality assessment are as follow:

- Phase 1:
  - Construction and operation of Data Center DUB 11 with 22 emergency diesel generators, and North MFGP to support DUB 11. South MFGP building / slab constructed but not operational.
  - The MFGP would use Hydrotreated Vegetable Oil (HVO) as a fuel source, whilst a EirGrid GIS substation to the south of Falcon Avenue is permitted, and constructed.
- Phase 2:
  - DUB 12 operational and MFGP South generators installed and operational.
  - Main power supply from EirGrid Substation to the south of Falcon Avenue for main power supply.
  - Phase 2 will see DUB 11 and DUB 12 operational, with 36 emergency diesel generators, and the MFGP operational to full capacity with gas from Gas Network Ireland (GNI) as a fuel source. MFGP

18 https://www.npws.ie/legislation/eu-directives

19 https://www.npws.ie/legislation/irish-law

8.21 The above phasing has informed the identification of the potential worst-case scenarios for air quality to ensure that the worst possible emissions are reported at each receptor location. As part of the air quality assessment scenarios presented in Table 8.1 have been considered to assess the impacts of the operational stage.

Table 8.1: Air Quality Assessment Operation Stage Scenarios

Scenario 1 (~ Q4 2023 to Q1 2025)	• DUB 11 powered by northern block of MFGP using HVO as the fuel source. • MFGP running 24/7. • Emergency scenario below applies if there is the MFGP fails.
Scenario 2 (reasonable worst case from Q1 2025)	• DUB 11 and 12 powered from the EirGrid connection across Falcon Avenue. • MFGP powered by gas from GNI. In a reasonable worst case this is assessed to be operational 24/7 using natural gas. • Emergency scenario below applies if the gas connection from GNI to the MFGP fails and there is a local grid network failure from EirGrid.
Scenario 3 (reasonable best case from Q1 2025)	• DUB 11 and 12 powered from the EirGrid connection across Falcon Avenue • MFGP not in operation. • Emergency scenario below applies if there is a local grid network failure from EirGrid.
Emergency Scenario	• Diesel used for day tanks for emergency backup generators for the data center in the unlikely event of an outage of the MFGP and grid connection (depending on scenario). MFGP and emergency generators would not be operational at the same time.

Baseline Characterisation Method

Desk Study

8.22 To establish baseline air quality conditions in the study area, relevant data was reviewed and assessed. Local air quality monitoring data was obtained from EPA air quality continuous monitoring network[20] and from cumulative schemes EIAR[21].

8.23 Traffic flows were provided by the project transport consultant (Ramboll) as per Chapter 7: Transport and Accessibility.

8.24 The cumulative air quality impacts for the cumulative developments described in Chapter 2: EIA Process and Methodology have been extracted from the EIARs submitted as part of the planning applications.

Field Study

8.25 No site-specific field study was undertaken at the site as the data collected from other sources was deemed to be adequate and representative of the site and local air quality conditions.

Assessment Method

8.26 The assessment has been based on the planning application drawings and plans and the development description presented in Chapter 4: Proposed Development Description, as well as reported in Chapter 5: Construction Description.

8.27 Full details of both demolition and construction stage, and operation stage assessment methodology, data and modelling parameters are provided in Technical Appendix 8.1 in the EIAR Volume 3.

Methodology

Demolition and Construction Stage

8.28 During the demolition and construction stage, the main potential impacts would be dust annoyance and locally elevated concentrations of PM_{10}. These impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source. Separation distance is also an important factor as significant dust annoyance is usually limited to within a few hundred metres of its source. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

8.29 Likely effects associated with demolition and construction dust emissions, unlike other air borne pollutants, cannot be accurately predicted and quantified because they are highly dependent on local weather conditions and mitigation measures implemented at source. This assessment has followed the guidance published by the IAQM on the assessment of the effects of demolition and construction on air quality[12].

8.30 The guidance recommends that the risk of dust emission magnitude is combined with the sensitivity of the area surrounding the site to determine the risk of dust impacts from demolition and construction stage activities. The risk of dust arising in sufficient quantities to cause annoyance and/or health impacts is determined using four risk categories: high, medium, low, or negligible. Depending on the level of risk for each activity, appropriate mitigation is selected. Full details of the dust risk assessment methodology which includes the assessment criteria are provided in Technical Appendix 8.1 in the EIAR Volume 3.

Operation Stage

8.31 Air dispersion modelling was carried out using Atmospheric Dispersion Modelling System (ADMS 5)[22] to ensure that adequate stack height was selected to aid dispersion of the emissions and achieve compliance with the NO_2 human health ambient air quality standards beyond the site boundary, considering the existing baseline level on ambient air quality concentrations.

8.32 ADMS is recommended as an appropriate model to assess the impact of air emissions from industrial facilities in the EPA Guidance AG4[14]. ADMS uses representative meteorological data for the local area and plant emissions data to predict ambient concentrations of pollutants in the vicinity of the site. A detailed description of the ADMS 5 model is provided in Technical Appendix 8.1 in the EIAR Volume 3. The air dispersion modelling input data consisted of information on the physical environment, design details for all emission points on-site, building configuration, etc. Full details of the model parameters are presented in Technical Appendix 8.1 in the EIAR Volume 3.

8.33 The proposed development Scenario 1 will consist of the details described in Table 8.1 with the following number engine parameters:

- MFGP with 6 generators and associated 30 metres flues, using HVO as the fuel source.

The proposed development Scenario 1 Emergency Scenario will consist of:

- Building DUB 11with 22 diesel emergency back-up generators and associated 22.3 metres flues.

8.34 The proposed development Scenario 2 will consist of:

- MFGP with 11 generators and associated 30 metres flues, using natural gas as a fuel source.

8.35 The proposed development Scenario 2 and Scenario 3 Emergency Scenario will consist of:

- Building DUB 11and DUB12 with 36 diesel emergency back-up generators and associated 22.3 metres flues.

20 EPA, 2021, EPA Website: http://www.epa.ie/whatwedo/monitoring/air/ [Accessed on 30/06/2021]
21 South Dublin County Council, 2021. Available at: h http://www.sdublincoco.ie/Planning/Details?p=1&r=SD21A%2F0167&regref=SD21A%2F0167 [Accessed on 04/08/2021]

22 Available at: http://www.cerc.co.uk/environmental-software/ADMS-model.html [Accessed on 25/07/2021]

8.36 For dispersion modelling purposes it is assumed that for all relevant scenarios, the MFGP and emergency generators would to be operating continuously all year round for the assessment of NO_2 annual average and hourly impacts.

8.37 Controlled maintenance including periodic testing of the emergency diesel generators is required so that they are ready to be started at full load during an emergency power failure. The testing regime and testing times are not currently known, but based on professional experience, the generators are likely to be tested one generator at a time and sequentially with a periodic testing regime of weekly run test at reduced load and quarterly at full load. The periodic test would be expected run for a short period of time between 30 minutes to one hour. Given the expected short period of testing operation and the elevated exhaust improving dispersion, it is unlikely that the NO_2 ambient air quality standards would be exceeded. When in use in an emergency, all the generators could be operational at full load and therefore the impacts during an emergency are higher than those when individual or groups of generators are being routinely tested. The impacts during the testing regimes have been scoped out of the modelling assessment and the emergency operation have therefore been assessed as the worst-case scenario.

8.38 The operation of the emergency generators has been assessed according to the methodology published by the UK Environment Agency guidance[16,17]. The UK guidance is a conservative probabilistic approach which uses the emergency generators maximum hourly emissions to determine the number of hours that all the generators could operate simultaneously in any one year with a 1% chance of exceeding the 1-hour mean objective based on the worst modelled meteorological year. The USEPA methodology[15] to assess the 1-hour NO_2 ambient AQS considers that a probabilistic method is too conservative and proposes to model impacts from intermittent emissions based on an average hourly rate (i.e., maximum hourly rate factored to a certain number of more realistic operating hours), rather than maximum hourly emissions. Given the conservative approach of the UK guidance, this assessment considers the UK guidance more suitable for protection of sensitive receptors and to demonstrate compliance with the ambient AQS and therefore it has been used to assess the likelihood of exceedance of the 1-hour NO_2 ambient AQS.

8.39 Following the UK Environment Agency methodology, the hourly emissions and the allowable operating hours for emergency operation were estimated from a statistical analysis of the likelihood of breaching the 1-hour objective for NO_2 concentrations by using the hypergeometric distribution function. The allowable operating hours were calculated for a 1% probability of exceeding the one-hour mean objective at the most impacted receptor location. In accordance with the emissions from specified generators guidance, in an emergency when the operating period is greater than one hour, the calculated probability has been multiplied by 2.5. For compliance with the annual mean objectives, the predicted concentrations were scaled to the total annual operating hours that the generators were determined to run for the 1% probability of exceeding the one-hour mean objective.

8.40 The likelihood of exceeding the 1-hour mean objective also considers the baseline pollutant concentrations in the vicinity of the site. For the short-term assessment, the background concentration is assumed to be twice the annual mean background concentration. As the dispersion modelling was undertaken for NOx emissions, for estimating the number of exceedances of the hourly mean NO_2 objective, the exceedance concentration in the model was set as follows:

- Model exceedance concentration = (200 – twice annual mean background)/0.35.

8.41 For scenarios 1 to 3, guidance on air emissions risk assessments produced by the UK Environment Agency[23] was used to support an assessment of the overall impact of the emissions resulting from the installations to confirm that the emissions are acceptable (i.e., do not cause significant environmental pollution). Emissions of NOx from combustion sources include both nitric oxide (NO) and NO_2, with the majority being in the form of NO. During the process of combustion, atmospheric and fuel nitrogen is partially oxidised via a series of complex combustion reactions, because of high temperature, to NO. In ambient air, NO is oxidised to form NO_2, a more harmful form of NOx with more significant health impacts. For this assessment, the conversion of NOx to NO_2 has been estimated using the worst-case assumptions set out in the UK Environment Agency guidance:

- For the assessment of long term (annual mean) impacts at receptors 70% of NOx is converted to NO_2; and
- For the assessment of short term (hourly mean) impacts at receptors 35% of NOx is converted to NO_2.

8.42 The UK Environment Agency assumptions offer a worst-case assessment as the conversion rates may be conservative as the oxidation of NO to NO_2 is not an instantaneous process particularly at short distance from the emissions source where the maximum impacts are predicted to occur.

8.43 Tall buildings can have a substantial impact on the dispersion of pollutants from stacks, as a result of building downwash i.e., pollutants being drawn down in the wake of a building, giving rise to high concentrations close to the base of the buildings. The buildings include in the ADMS model are shown in Technical Appendix 8.1 in the EIAR Volume 3. An initial model run was undertaken to confirm the flues heights would ensure adequate dispersion

8.44 To undertake the assessment, the emergency generators and MFGP engines were allocated their own flues and the flues combined in ADMS in triples or quadruples when adjacent, according to the plan's configuration. The location and flue parameters used in the model are shown in Technical Appendix 8.1 in the EIAR Volume 3.

8.45 The dispersion modelling has been undertaken with five years of hourly sequenced meteorology data for the years 2015 to 2019 inclusive, from Casement Aerodrome which is approximately 1 km to the south of the site. Adopting the maximum hourly stack emissions across the five years of meteorological data will ensure the worst-case long and short-term concentrations from the stacks are considered within the assessment. The Casement Aerodrome windroses are presented in Technical Appendix 8.1 in the EIAR Volume 3.

8.46 For the emergency generators and the MFGP, emission rates, volumetric flowrates and stack parameters have been provided by the lead project consultant, Burns & McDonnell. Flue heights and diameters were taken from the CAD layout drawings. The emergency generators and MFGP model input data used in the model is provided in Table 8.2.

8.47 HVO is a fuel made from feedstocks including virgin and recycled vegetable oil; fat fractions from food wastes; algae and municipal waste and sludge, where these fats and oils undergo hydrotreating. HVO has an almost identical chemical composition to petroleum-diesel, but is derived from renewable resources. This similarity allows for HVO to be used in existing diesel engines without modification and is compatible with existing diesel infrastructure and stations. Literature and tests performed on stationary engines to assess the NOx emission benefits of HVO relative to diesel are limited. This assessment considered the findings of a back-to-back tests performed at Caterpillar's Large Engine Center on a Cat® 3516E 3,000 ekW diesel generator set running on diesel and HVO, detailed in Technical Appendix 8.1 in the EIAR Volume 3. The test showed that at a 50% load and lower, the HVO shows a NOx reduction of up to approximately 40%, but at higher loads no obvious reductions were visible. As the MFGP engines are expected to run at 90% load, this assessment therefore considered that the MFGP using HVO as the fuel source would have the same NOx emissions as if it was using diesel as a reasonable worst case. The assessment assumes a Selective Catalytic Reduction (SCR) efficiency with 95% NOx emission reduction was included in the MFGP design.

23 UK Environment Agency. Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit. [Accessed on 04/08/2021]

Table 8.2: Stack Emissions Modelling Input Parameters

Plant	Equipment	Temperature (°C)	Volume Flux (Am^3/s)	Height (m)	Diameter (m)	NO_2 Emission Rate at discharge conditions (g/s)
MFGP on HVO	WÄRTSILÄ 34SG 9.8 MW, SCR	355	33.0	30	1.2	1.4
MFGP on Gas	WÄRTSILÄ 34SG 9.8 MW, SCR	360	28.4	30	1.2	0.2
Emergency Generators	CAT 3516E, EM4789	422	10.0	22.3	0.6	4.2

8.48 It should also be noted that further assessment of the data center emissions will be required at the detailed design stage as part of the Environmental Permit application for the proposed development. The NOx emission concentrations from the MFGP and emergency generators comply with the requirements of the Medium Combustion Plant Directive (MCPD). The MFGP will include selective catalytic reduction (SCR) and the NOx emissions comply with the Industrial Emissions Directive.

Cumulative Stage

8.49 The cumulative impact scenario includes the impact of the proposed development, as outlined above, combined with emissions from nearby cumulative developments with granted permission or due to be decided, subject to availability of cumulative scheme information in the public domain. Cumulative effects have been included in this Chapter following the review the cumulative schemes EIARs submitted as part of the planning applications as outlined in Chapter 2: EIA Process and Methodology

8.50 Existing IE licensed emissions points, such as Pfizer, Takeda and Grange backup power, have air emission points emitting air pollutants on a continuous basis over the course of a year. Other nearby data center facilities, such as AWR, Cyrus One, Google Ireland and Microsoft, have emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis. The emergency generators emission points associated with the nearby data storage facilities were not considered for the purpose of this assessment.

Assessment Criteria

8.51 The criteria used to assess if an effect is significant or not, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

Demolition and Construction Stage

8.52 The sensitivities of people to dust soiling effect has been classified as low, medium, or high, in line with the IAQM guidance criteria, as set out in Table 8.2.

Table 8.2: Sensitivities of People to Dust Soiling Effect– Demolition and Construction Stage

Sensitivity	Criteria
Low	• The enjoyment of amenity would not reasonably be expected; or • Property would not reasonably be expected to be diminished in appearance, aesthetics, or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short-term car parks and roads.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • First occupants moving into residential dwellings on a large, phased housing development; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Indicative examples include parks and places of work.
High	• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include dwellings, museums, and other culturally important collections, medium- and long-term car parks and car showrooms.

Operation Stage

8.53 To protect human health, national and European statutory bodies defined health or environmental-based AQS for a range of air pollutants. There are no degrees of sensitivity of receptors to poor air quality, rather, the assessment is based on whether members of the public are likely to be present for the proposed averaging period of the objective and air quality significance criteria are assessed based on compliance with the appropriate standards or limit values.

8.54 The AQS are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects on human health (including sensitive sub-groups) or ecosystems. In general, these are concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects. Standards are values often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.

8.55 The applicable standards in Ireland include the Air Quality Standards Regulations 2011[8,10], which incorporate European Commission Directive 2008/50/EC[2], and set limit values for NO_2, PM_{10} and $PM_{2.5}$ relevant to this assessment, as described in Table 8.3.

Table 8.3: Human Health Air Quality Standard

Pollutant	Time Period	Value
NO_2	Annual Mean for protection of Human Health	40 $\mu g/m^3$

Table 8.3: Human Health Air Quality Standard		
Pollutant	**Time Period**	**Value**
	1-hour mean	200 µg/m^3 not to be exceeded more than 18 times a year
Particulate Matter (as PM_{10})	24 hours mean	50 µg/m^3 not to be exceeded more than 35 times per year
	Annual mean	40 µg/m^3
$PM_{2.5}$	Annual mean	25 µg/m^3

8.56 The AQS Regulations 2011 state that compliance with the limit values shall not be assessed at the following locations:

- where members of the public do not have access and there is no fixed habitation;
- on factory premises or at industrial installations; and
- on the carriageway/central reservation of roads except where there is normally pedestrian access.

Impact Magnitude Criteria

Demolition and Construction Stage

8.57 The criteria provided in the guidance produced by the IAQM[12] was used to assess the potential risk of impacts to air quality from demolition and construction stage activity in the absence of mitigation during demolition and construction stage of the proposed development. The methodology combines the magnitude of dust emissions together with the sensitivity of the receptor to identify low, medium, or high risk of dust impacts in the absence of mitigation for the four stages of construction: demolition, earthworks, construction and trackout.

Operation Stage

8.58 The operation of the emergency generators has been assessed according to the methodology published by the UK Environment Agency [16,17] to determine the statistical likelihood of exceedance of the NO_2 hourly limit value. The allowable hours for emergency operation are estimated from a statistical analysis of the likelihood of breaching the hourly mean NO_2 AQS (considering baseline pollutant concentrations).

8.59 The hypergeometric probability distribution test (see Appendix 8.1 in Volume 3 for more details) provides an estimate of the probability of breaching the AQO given random use of the generators for a total number of operating hours per year. Table 8.4 shows how the calculated probabilities are judged; the 1% probability is normally used as the benchmark to calculate the allowable operating hours during emergency operation; if the generators had a life of less than 20 years then it may be possible to use the 5% probability level although this does not increase the allowable operating hours significantly.

Table 8.4: Probability Significance for hourly mean NO_2 AQS	
Probability	**Significance**
1%	Indicates exceedance is highly unlikely
5%	Indicates that exceedance is unlikely provided generator lifetime is less than 20 years
>5%	Indicates potential for exceedance

8.60 To assess the potential impacts and associated likely effects of the MFGP and emergency generators, the 5 years worst case NO_2 modelled concentration at sensitive receptors, known as process contribution (PC), were added to the background concentrations to obtain the process environmental contribution (PEC). The PEC was then compared with the relevant ambient AQS to assess the significance of the air quality effects associated with the proposed development emissions.

8.61 To consider the model uncertainty, this assessment also refers to the recommendations outlined within the EPA AG4 guidance[14]. The guidance recommends that if the facility is operated continually at close to the maximum licenced mass emission rate the PC should be less than 75% of the ambient AQS and less than this where background levels account for a significant fraction of the ambient air quality standard based on the formula:

- Maximum Allowable Process Contribution= 0.75*(AQS-Background)

8.62 Based on the above and the average background concentrations in the study area described in the baseline conditions section of the Chapter, the annual mean PC should not exceed the value of 17.0 µg/m^3 and the 1-hour average PC should not exceed the value of 137.3 µg/m^3.

Scale of Effect Criteria

Demolition and Construction Stage

8.63 The IAQM guidance recommends that no assessment of the significance of dust effects is made without mitigation in place, as mitigation is assumed to be secured by industry best practice, planning conditions, legal requirements or required by regulations. With appropriate mitigation in place, the effect of demolition and construction stage dust emission impacts on air quality is always assessed as not significant. The purpose of the demolition and construction stage dust assessment has therefore been to identify the appropriate level of mitigation to employ.

8.64 Using the IAQM assessment methodology to identify the appropriate level of mitigation, and on the assumption that the identified mitigation measures are applied and are commensurate with the risk of potential dust impacts, the guidance indicates that that the potential for dust effects to arise during the demolition and construction stage would be at worst 'slight adverse' and would be temporary in nature.

Operation Stage

8.65 The potential impact to air quality from the proposed development plant is a breach of the ambient air quality standards as a result of air emissions from the proposed development plant engines.

8.66 In determining the significance of reported effects, consideration has been given to the type of effect i.e., direct, indirect, or secondary, the geographical extent of the effect and the duration of the effect i.e. temporary which is considered to be either short term (up to seven years) or medium term (7-15 years), long term (15 to 60 years) or permanent (>60 years or more).

Nature of Effect Criteria

8.67 The nature of the effect has been described as either negative, neutral, or positive as outlined in Chapter 2: EIA Process and Methodology.

Assumptions and Limitations

8.68 The assessment has relied on data extracted from the EPA and planning application EIAR air quality assessments. It has been assumed that the data sets have been reported correctly.

8.69 There are many components that contribute to the uncertainty in predicted concentrations. Although the model has been extensively validated against field data sets and their use has gained wide acceptance, no computer-based model is able to totally replicate actual conditions as it is required to simplify real-world conditions into a series of algorithms. The model used in this assessment is also dependent upon several sources of data which will have inherent uncertainties associated with them.

8.70 Tall buildings can have a substantial impact on the dispersion of pollutants from stacks, as a result of building downwash i.e., pollutants being drawn down in the wake of a building, giving rise to high concentrations close to the base of the buildings. ADMS5 can take account of this potential impact by

the inclusion of rectangular buildings in the model. The buildings included within the modelling were based on the interpretation of the development parameters and plans.

8.71 The terrain within the study area is relatively flat with slopes less than 10 %, and therefore terrain effects have not been included within the modelling.

8.72 Emission rates, volumetric flowrates and flue parameters have been based on data provided by the project Architect consultant, Burns & McDonnell. It has been assumed that the up-to-date data sets have been provided and reported correctly.

8.73 Overall, when considering the assumed number of operating hours; the approach taken to meteorological conditions; and the assumed NOx to NO_2 relationship, the assessment is expected to over-predict the impacts of the proposed development. The approach used therefore provides a robust assessment.

Baseline Conditions

Existing Baseline

8.74 Under the Ambient Air Quality and Cleaner Air for Europe Directive (2008/50/EC), Ireland designated four air quality zones for the purpose of air quality management and assessment[24]. In terms of air monitoring, the development site is within Dublin Zone A.

NO_2

8.75 Air Quality monitoring is carried out by the EPA and local authorities at Dublin Zone A urban and suburban background locations. A summary of the closest and most representative monitoring locations is presented in Table 8.5 and the locations shown in Figure 8.1.

Table 8.5: Measured Annual Average NO_2 Concentrations (µg/m³)

Station	Type	Distance from Site (km)	2015	2016	2017	2018	2019	5 years Average
Ballyfermot	Suburban Background	≈ 6.5	16	17	17	17	20	17
Rathmines	Urban Background	≈ 11.8	18	20	17	20	22	19
Dun Laoghaire	Suburban Background	≈ 21.1	16	19	17	19	15	17
Swords	Suburban Background	≈ 21.8	13	16	14	16	15	15
AQS			**40**					

8.76 Measured NO_2 concentrations at the closest background automatic monitoring station to the site, Ballyfermot, have been well below the ambient AQS with an average annual mean concentration of approximately 17 µg/m³ between 2015-2019.

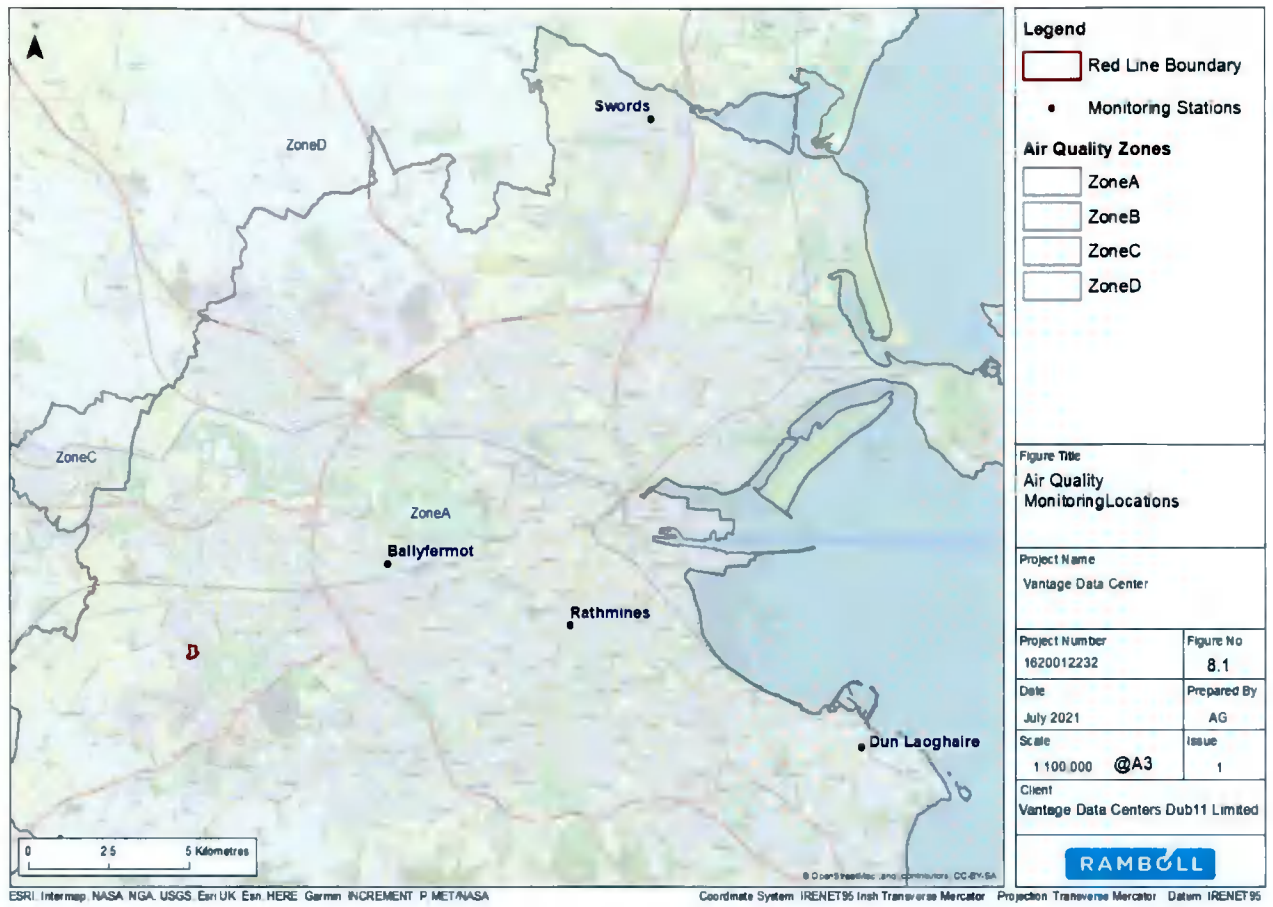


Figure 8.1: Air Quality Monitoring Locations

Particulates (PM_{10} and $PM_{2.5}$)

8.77 Measured continuous PM_{10} monitoring carried out within Dublin Zone A background locations have been well below the ambient AQS with an average annual mean concentration of approximately 15 µg/m³

8.78 Measured continuous $PM_{2.5}$ monitoring carried out within Dublin Zone A locations have been well below the ambient AQS with an average annual mean concentration of approximately 11 µg/m³.

Assessment of Monitoring Data

8.79 Ballyfermot background station is the closest station to the site and would therefore be considered representative of the air quality within study area. Measured NO_2 and PM_{10} at Ballyfermot have been well below the relevant AQS and therefore background concentrations at the site and within the study area would be expected to be below the AQS.

8.80 Measured $PM_{2.5}$ within Dublin Zone A have been well below the relevant AQS and therefore $PM_{2.5}$ background concentrations at the site and within the study area would be expected to be below the AQS.

8.81 For the purposes of this assessment, Ballyfermot NO_2 average background concentration measured between 2015-2019 with the value of 17 µg/m³ has been used to estimate the PEC.

Sensitive Receptors

8.82 The site is surrounded by large commercial areas occupied by industrial uses to the north and south within the Kilcarbery Park, Grange Castle Business Park and Profile Park. The closest occupied residential properties are located at the north eastern site boundary and approximately 480 m south-east of the

24 https://www.epa.ie/air/quality/zones/ [Accessed on 04/08/2021]

proposed site boundary along the Baldonnel Road. Residential development is primarily located in Deansrath, Clondalkin, approximately 800 m the east of the site. The residential property within the site boundary is no longer in residential use and is proposed to be demolished as part of the development.

8.83 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and hourly mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes and temporary residence caravan parks. The locations of existing receptors were chosen to represent locations where impacts from the proposed development are likely to be the greatest.

8.84 The existing receptors identified as being sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised Table 8.6 and displayed on Figure 8.2. Existing receptor locations were modelled at a height of 1.5 m and 4.5 representing typical two storey property with exposure at ground floor and top floor level.

Table 8.6: Summary of Sensitive Receptors

Receptor ID	Location	X (m)	Y (m)	Type Exposure
R1	New Nangor Road	703782	730868	Residential
R2	Nangor Road	703515	730878	Commercial/Industrial
R3	Nangor Lea, Nangor Road	704067	730927	Residential
R4	Castlegrange Green	704731	731119	Residential
R5	Oldcastlepark Lawn Caravan park	704658	731156	Residential
R6	Oldcastlepark Lawn Caravan park	704652	731171	Residential
R7	Kilbride House, Baldonnel Road	703686	730091	Residential
R8	Casement Aerodrome, Baldonnel	703654	730026	Commercial/Residential
R9	Casement Aerodrome, Baldonnel	703482	730024	Commercial/Residential
R10	Aungierstown, Baldonnel Road	703286	730109	Residential
R11	Aungierstown, Baldonnel Road	703257	730117	Residential
R12	Aungierstown, Baldonnel Road	703200	730136	Residential
R13	Aungierstown, Baldonnel Road	703129	730165	Residential
R14	Baldonnel Road	703027	730288	Residential
R15	Baldonnel Road	703014	730327	Residential
R16	Baldonnel Road Residential	702964	730384	Residential
R17	Baldonnel Road	703024	730476	Residential
R18	Baldonnel Road	702940	730528	Residential
R19	Baldonnel Road	702897	730569	Residential
R20	Baldonnel Road	702876	730595	Residential
R21	Baldonnel Road Comex Mc Kinnon	702850	730615	Commercial/Residential

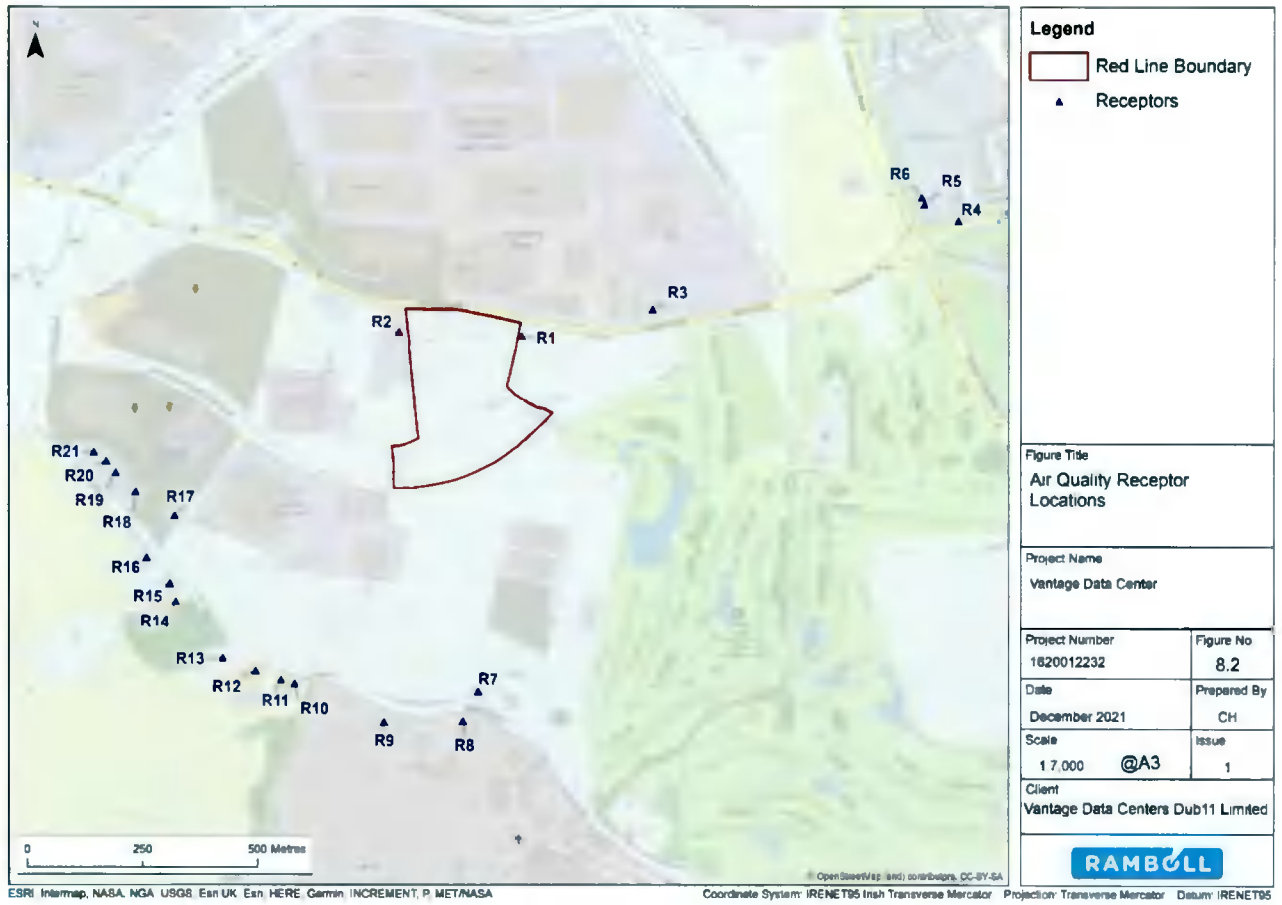


Figure 8.2: Air Quality Receptor Locations

8.85 Concentrations were also predicted for a grid of receptors (contours) mapped with sufficient resolution to ensure all localised "hot-spots" were identified and to visually demonstrate the pattern of dispersion, as recommended by EPA AG4 guidance. The grids were based on a Cartesian grid with the site at the centre and are described in Table 8.7.

Table 8.7: Receptor Grids

Grid	Measure	Spacing (m)
Outer Grid	5x5 km	500
Middle Grid	3x3 km	100
Inner Grid	500x500 m	20

Assessment of Effects

Demolition and Construction Effects

8.86 The main activities with potential to cause emissions of dust construction will include:

- Demolition of existing buildings;
- Earthworks and site preparation, including the Baldonnel Stream Enhancements;
- Construction of building structures, including foundations;
- Materials Handling such as storage of materials in stockpiles and spillage;
- Construction of on and off-site highway improvements; and
- Hard and soft landscaping.

8.87 Dust impacts would be greatest in dry weather following long periods without rain and with the wind blowing towards sensitive receptors. Depending on wind speed and turbulence it is likely that most of the dust will be deposited within 100 m of the source. Meteorological data for Casement Aerodrome, shown in Technical Appendix 8.1 in EIAR Volume 3, suggests that prevailing winds are typically south-westerly.

8.88 The risk of potential air quality impacts from demolition, earthworks, construction and trackout (the transport of dust and dirt from the application site onto the public road network) was assessed according to guidance developed by the IAQM to identify the appropriate level of mitigation.

8.89 Using the evaluation criteria within the IAQM's Guidance, the potential dust emission magnitude has been identified for each stage of the proposed development as shown in Table 8.8 based on information presented in Chapter 5: Construction Description of this Volume.

Table 8.8: Dust Emission Impact Magnitude for Proposed Development Works

Activity	Dust Emission Magnitude	Justification
Demolition	Small	Demolition of the former residential property within the site. The total building volume is estimated to be <20,000 m^3. Demolition activities would occur at height of more than 10 m above ground level.
Earthworks	Large	Total site area over 10,000 m^2.
Construction	Large	The proposed development would have a total estimated construction volume of over 100,000 m^3.
Trackout	Medium	HDV movements over the course of the worst-case phase would be up to 10-50 HDV movements in one day. Unpaved road length would be between 50 m- 100m.

8.90 The closest sensitive receptors to construction activity within 350 m of the site would be residential property directly adjacent to the north east boundary of the site, identified as Receptor R1 in Table 8.6, and the car garage, identified as receptor R2.

8.91 The next stage of the process is to define the sensitivity of the assessment area to dust soiling and human health impacts. This process combines the sensitivity of the receptor with the distance from the source to determine the overall sensitivity. The sensitivity of the area to dust impacts (considering distance to construction activity) is provided in Table 8.9.

Table 8.9: Sensitivity of Study Area to Dust Impacts

Sensitivity to Dust Soiling	Sensitivity to Human Health Impacts
Medium: 1-10 sensitive receptors within 20 m of the site.	Low: 1-10 sensitive receptors within 20 m of the site. Average measured PM_{10} concentrations are below 24 $\mu g/m^3$ (see Baseline Conditions section).

8.92 The dust emission magnitude determined in Table 8.8 has been combined with the sensitivity assessment in Table 8.9 to define the risk of impacts for each stage of the proposed development works in the absence of mitigation, as shown in Table 8.10.

Table 8.10: Risk of Dust Impacts in Absence of Mitigation at Proposed Development

Sensitivity of Study Area	Dust Emission Magnitude for Each Phase of Works			
	Demolition (Small)	Earthworks (Large)	Construction (Large)	Trackout (Medium)
Dust Soiling (Medium)	Low Risk	Medium Risk	Medium Risk	Low Risk
Human Health (Low)	Negligible Risk	Low Risk	Low Risk	Low Risk

8.93 Therefore, using professional judgement, the overall risk of dust impacts in the absence of mitigation has been assessed as the highest resulting risk, i.e. as being Medium Risk.

Embedded Mitigation and Standard Good Practice

8.94 The control of dust and construction traffic emissions from a demolition and construction site relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. A summary of the mitigation measures recommended IAQM guidance to reduce impacts from medium risk sites is provided Table 8.11. The mitigation measures for both direct impacts and those from traffic would be detailed within the site's CEMP. It is noted that these measures have already been accounted for in EIAR Chapter 5: Construction Description of this Volume.

Table 8.11: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display name and contact details of responsible person for dust issues on the site boundary (e.g. hoarding) in addition to head/regional office contact information. • Display the head or regional office contact information.
Dust Management Plan	• Develop and implement a Dust Management Plan (DMP) which is included as part of the CEMP.
Site Management	• Record all complaints and incidents in a site log. • Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. • Make the complaints log available to the Local Authority if requested. • Record any exceptional dust incidents on- or off-site. • Hold regular liaison meeting with other high-risk construction sites within 500 m.
Monitoring	• Undertake daily on and off-site visual inspections where there are nearby receptors. • Carry out regular inspections to ensure compliance with the DMP and record results in the site logbook.

Table 8.11: Dust Mitigation Measures for Medium Risk Sites

Phase	Mitigation Measure
	• Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and Maintaining the Site	• Plan site layout to locate dust generating activities as far as possible from receptors. • Use solid screens around dusty activities and around stockpiles. • Avoid site runoff of water and mud. • Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period. • Keep site fencing barriers and scaffolding clean using wet methods. • Remove dusty materials from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below • Minimise emissions from stockpiles by covering, seeding, fencing, or damping down.
Operating Vehicle/ Machinery and Sustainable Travel	• Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. • Ensure vehicles switch off engines when stationary. • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Produce a Construction Logistics Plan (CLP) to manage the sustainable delivery of goods and materials. • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Operations	• Only undertake cutting, grinding, or sawing equipment with suitable dust suppression equipment or techniques. • Ensure adequate water supply for effective dust and particulate matter suppression. • Use enclosed chutes, conveyors, and covered skips. • Minimise drop heights of materials. • Ensure suitable cleaning material is available at all times to clean up spills.
Waste Management	• Avoid bonfires. • Avoid explosive blasting using appropriate manual or mechanical techniques. • Bag and remove any biological debris.
Measures Specific to Demolition	• Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure effective water suppression during demolition. • Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition.
Measures Specific to Construction	• Ensure aggregates are stored in bunded areas and are not allowed to dry out. • Avoid concrete scabbling where possible. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos. • For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Measures Specific to Trackout	• Use water-assisted dust sweepers to clean access and local roads. • Avoid dry sweeping of large areas.
	• Ensure vehicles entering and leaving the site are appropriately covered. • Record inspections of haul roads in site log, including any remedial action taken. • Implement a wheel washing system. • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit. • Access gates to be located at least 10 m from the receptors where possible.
Measures Specific to Earthworks	• Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil. • Only remove the cover in small areas during work and not all at once.

8.95 The IAQM's guidance recommends that no assessment of the significance of demolition and construction stage effects is made without mitigation in place. With the implementation of the CEMP, CLP (i.e. the measures outlined in Chapter 5: Construction Description), the demolition and construction dust and on-site vehicle emissions effects in the study would be **Negative**, **Temporary to Short-term** and **Imperceptible** i.e. **Not Significant** in terms of EIA.

Operation Effects

Phase 1

Multifuel Generation Plant

8.96 The maximum predicted annual mean concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario 1 MFGP is provided in Table 8.12.

Table 8.12: Scenario 1 MFGP Maximum Annual Mean Concentrations

Receptor	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	2.3	5.7	17.4	19.7	49.2
R2	0.1	0.3	17.4	17.5	43.8
R3	2.0	5.0	17.4	19.4	48.5
R4	0.9	2.3	17.4	18.3	45.8
R5	1.0	2.5	17.4	18.4	46.0
R6	1.0	2.5	17.4	18.4	46.0
R7	0.1	0.3	17.4	17.5	43.8
R8	0.1	0.2	17.4	17.5	43.7
R9	0.1	0.2	17.4	17.5	43.7
R10	0.1	0.2	17.4	17.5	43.7
R11	0.1	0.2	17.4	17.5	43.7
R12	0.1	0.2	17.4	17.5	43.7
R13	0.1	0.3	17.4	17.5	43.8
R14	0.2	0.6	17.4	17.6	44.1

Table 8.12: Scenario 1 MFGP Maximum Annual Mean Concentrations

Receptor	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R15	0.3	0.7	17.4	17.7	44.2
R16	0.3	0.9	17.4	17.7	44.4
R17	0.5	1.2	17.4	17.9	44.7
R18	0.6	1.5	17.4	18.0	45.0
R19	0.6	1.6	17.4	18.0	45.1
R20	0.6	1.6	17.4	18.0	45.1
R21	0.6	1.5	17.4	18.0	45.0
AQS	**40**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.97 The maximum predicted annual mean PC concentrations occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.98 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be comfortably below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be below 75% of the ambient NO_2 annual AQS at all assessed receptors, with maximum PEC predicted at receptor R1 where concentrations would be approximately 49% of the NO_2 annual AQS.

8.99 The geographical variation in annual mean NO_2 PC concentrations (without background) of the MFGP emissions are shown in Figures 8.3.

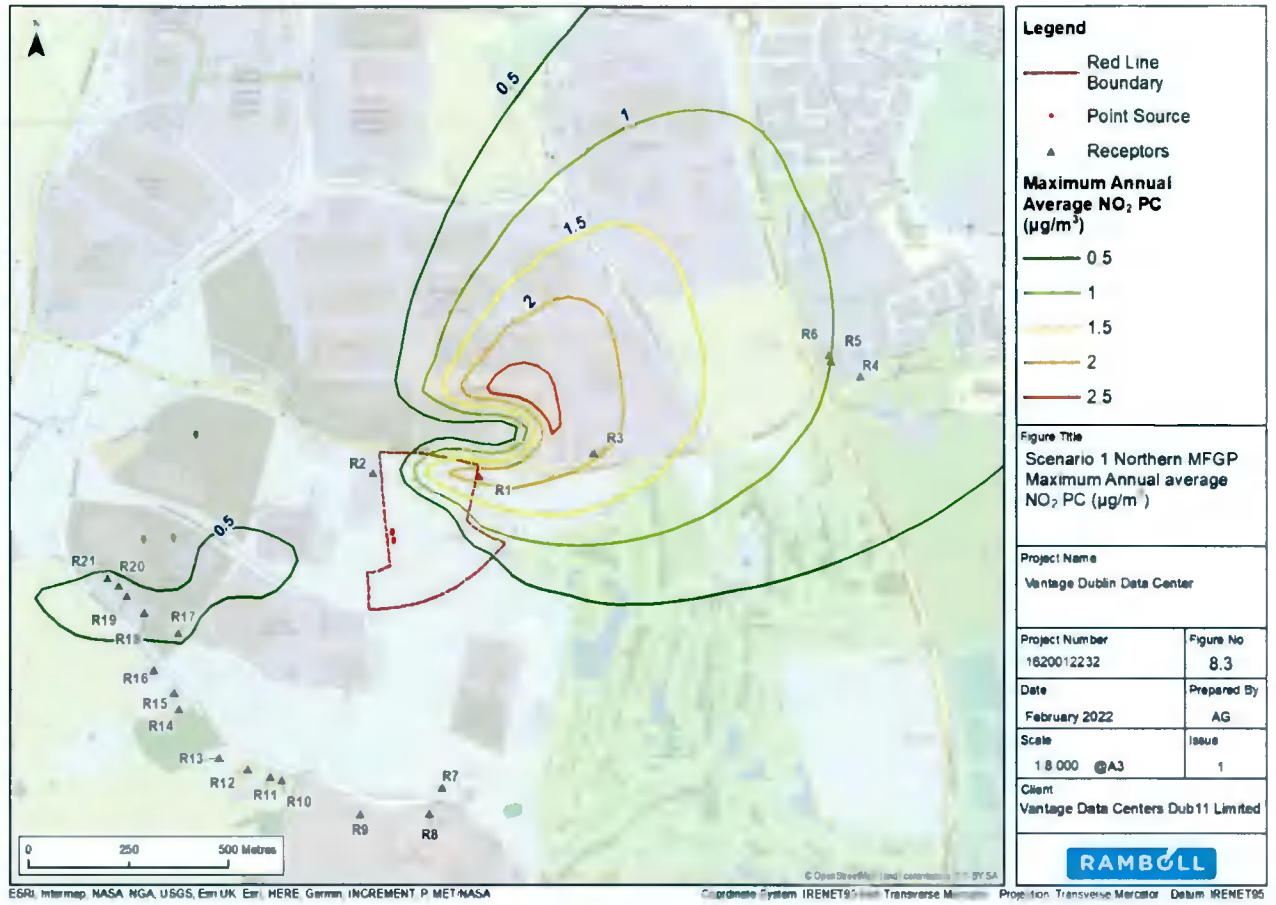


Figure 8.3: Scenario 1 Northern MFGP Maximum Annual Average NO_2 PC (µg/m³).

8.100 The maximum predicted 1-hour 99.8th percentile concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario 1 MFGP plant is provided in Table 8.13.

Table 8.13: Scenario 1 MFGP Maximum 1-Hour Mean (99.8th Percentile) Concentrations

Receptor	NO_2 99.8th %ile PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	10.6	5.3	34.8	45.4	22.7
R2	5.3	2.7	34.8	40.1	20.1
R3	7.8	3.9	34.8	42.6	21.3
R4	3.5	1.8	34.8	38.3	19.2
R5	3.7	1.9	34.8	38.5	19.3
R6	3.7	1.9	34.8	38.5	19.3
R7	5.3	2.6	34.8	40.1	20.0
R8	4.8	2.4	34.8	39.6	19.8
R9	4.1	2.0	34.8	38.9	19.4
R10	4.5	2.3	34.8	39.3	19.7
R11	4.7	2.3	34.8	39.5	19.7
R12	5.0	2.5	34.8	39.8	19.9

Table 8.13: Scenario 1 MFGP Maximum 1-Hour Mean (99.8th Percentile) Concentrations

Receptor	NO_2 99.8th %ile PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R13	5.5	2.8	34.8	40.3	20.2
R14	5.6	2.8	34.8	40.4	20.2
R15	5.7	2.8	34.8	40.5	20.2
R16	5.9	3.0	34.8	40.7	20.4
R17	7.2	3.6	34.8	42.0	21.0
R18	6.6	3.3	34.8	41.4	20.7
R19	6.5	3.2	34.8	41.3	20.6
R20	6.2	3.1	34.8	41.0	20.5
R21	6.1	3.1	34.8	40.9	20.5
AQS	**200**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.101 The maximum predicted 1-hour mean PC concentrations occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.102 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be below the relevant NO_2 AQS. For the worst-case year modelled, maximum predicted PEC (including background) would be approximately 23% of the ambient NO_2 1-hour AQS.

8.103 The geographical variation in the 1-hour mean (99.8th percentile) concentrations (without background) of the MFGP emissions are shown in Figures 8.4.

8.104 Given the temporary operation of the Scenario 1 MFGP from approximately Q4 2023 to Q1 2025 the air quality localised effects are **Temporary to Short-term**, **Negative** and **Imperceptible,** i.e. **Not Significant** in terms of EIA.

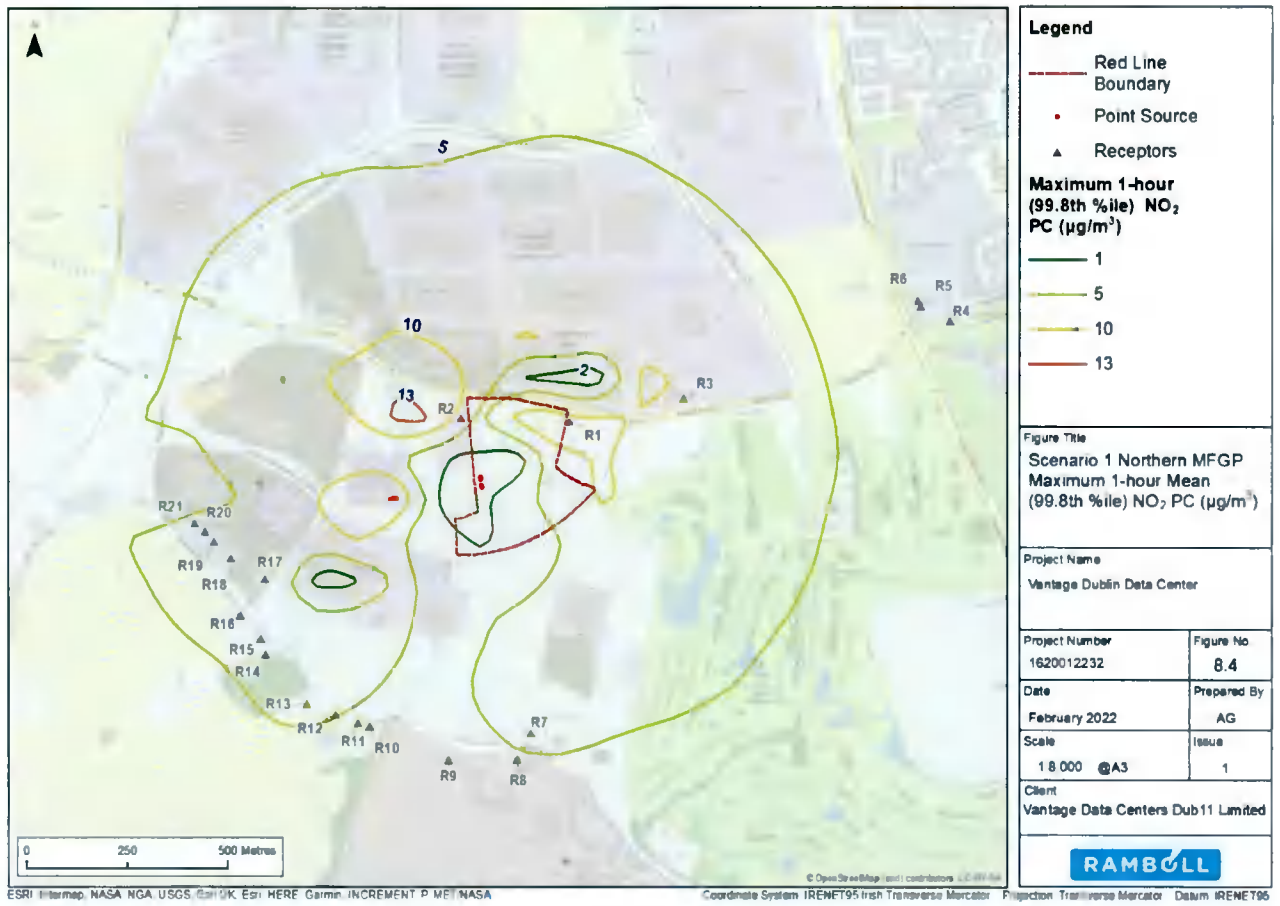


Figure 8.4: Phase 1 Northern MFGP Maximum 1-hour mean (99.8th percentile) NO_2 PC (µg/m³).

Emergency Generators

8.105 The modelling has been undertaken to determine the DUB 11 emergency operation with a 1% probability of exceeding the 1-hour objective. The detailed results of the dispersion modelling at the sensitive receptors identified in Table 8.6 are shown in Technical Appendix 7.2 in Volume 3.

8.106 Table 8.14 shows the results of the modelling for the highest impacted receptor for any of the assessed receptor locations.

Table 8.14: Scenario 1 DUB11Emergency Generators Emergency Operation

Plant	Operating hours for 1% probability of exceeding the 1-hour mean objective
DUB 11 Emergency Generator	780

8.107 The DUB 11. Emergency Generators would operate for 780 hours to reach a 1% probability of exceeding the objective the 1-hour mean objective.

8.108 Table 8.15 shows the maximum predicted annual mean NO_2 concentrations at the worst-case receptor with the highest predicted concentration for the DUB 11 Emergency Generator maximum of 780 emergency operation hours. It should be recognised however that it is extremely unlikely that the generators will be required to operate for maximum number of hours determined emergency generators would not be expected to operate for more than 24-48 hours per year.

Table 8.15: Scenario 1 DUB11 Emergency Generators Maximum Annual Mean Concentrations for 680 hours Operation

Receptor	Operating hours for 1% probability	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	780	6.7	16.8	17.4	24.1	60.3

8.109 The maximum predicted 1-hour mean PC concentrations for 780 hours operation of the DUB 11 emergency generators occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.110 The maximum results indicate that the ambient level concentrations due to emissions arising from the DUB 11 emergency generator would be below the relevant NO_2 AQS. For the worst-case year modelled and receptor, predicted PEC (including background) would be approximately 60% of the ambient NO_2 annual AQS.

8.111 The localised air quality effects of the DUB 11 emergency generators are **Long-term**, **Negative** and **Imperceptible**, i.e. **Not Significant** in terms of EIA.

Phase 2

Multifuel Generation Plant

8.112 The maximum predicted annual mean concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario 2 MFGP are provided in Table 8.16.

Table 8.16: Scenario 2 MFGP Maximum Annual Mean Concentrations

Receptor	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	0.6	1.6	17.4	18.0	45.1
R2	0.1	0.2	17.4	17.5	43.7
R3	0.5	1.3	17.4	17.9	44.8
R4	0.2	0.5	17.4	17.6	44.0
R5	0.2	0.6	17.4	17.6	44.1
R6	0.2	0.6	17.4	17.6	44.1
R7	0.0	0.1	17.4	17.4	43.6
R8	0.0	0.1	17.4	17.4	43.6
R9	0.0	0.1	17.4	17.4	43.6
R10	0.0	0.1	17.4	17.4	43.6
R11	0.0	0.1	17.4	17.4	43.6
R12	0.0	0.1	17.4	17.4	43.6
R13	0.0	0.1	17.4	17.4	43.6
R14	0.1	0.2	17.4	17.5	43.7
R15	0.1	0.2	17.4	17.5	43.7
R16	0.1	0.3	17.4	17.5	43.8
R17	0.2	0.4	17.4	17.6	43.9
R18	0.2	0.4	17.4	17.6	43.9
R19	0.1	0.4	17.4	17.5	43.9
R20	0.1	0.4	17.4	17.5	43.9
R21	0.1	0.3	17.4	17.5	43.8
AQS	**40**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.113 The maximum predicted annual mean PC concentrations occurs at receptor R1, the residential property adjacent to the north east site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.114 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be approximately 45% of the ambient NO_2 annual AQS.

8.115 The geographical variation in annual mean NO_2 PC concentrations (without background) of the MFGP emissions are shown in Figures 8.4.

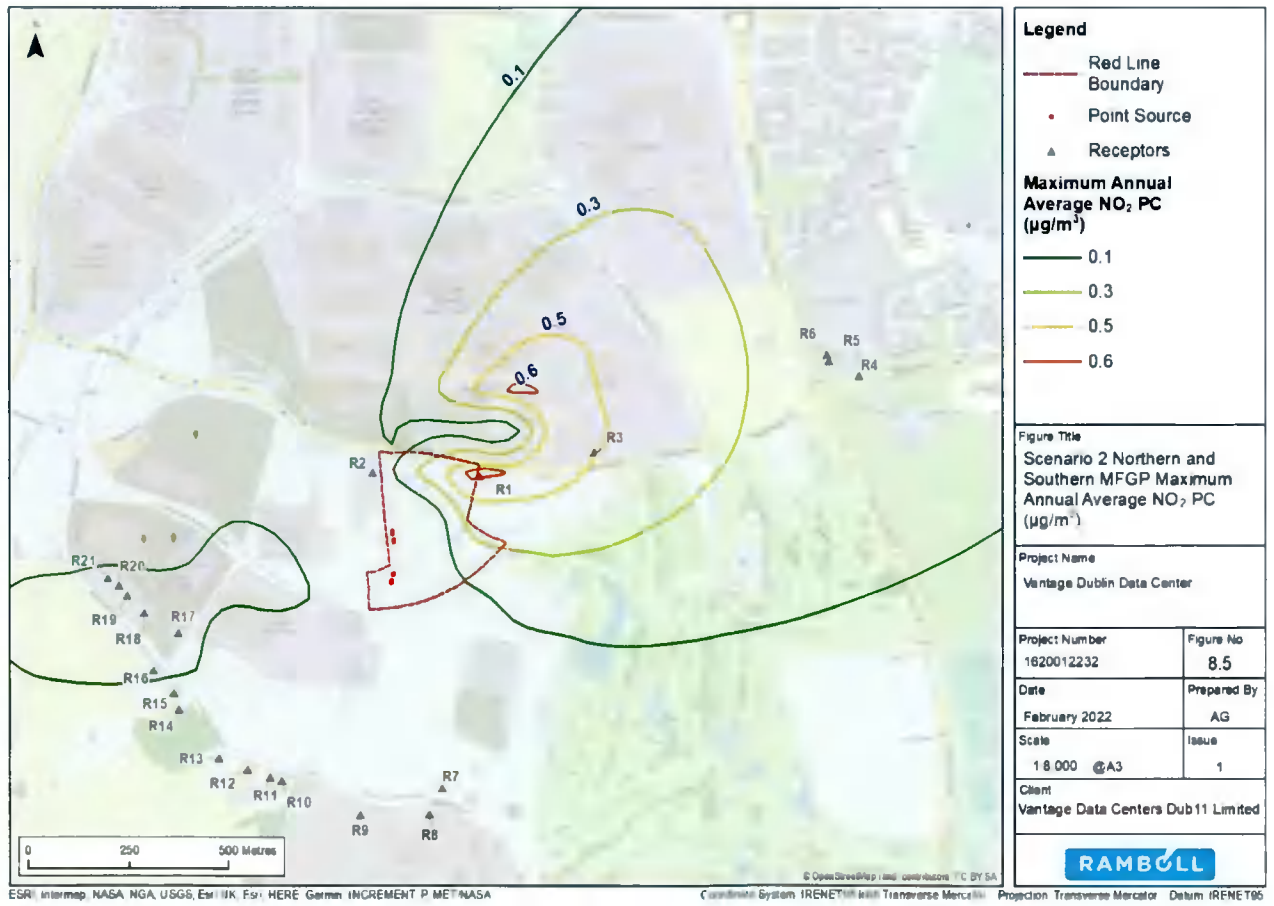


Figure 8.5 Scenario 2 Northern and Southern MFGP Maximum Annual Average NO_2 PC (µg/m³).

8.116 The maximum predicted 1-hour 99.8th percentile concentrations for the 5 years meteorological data at the assessed receptor locations for Scenario MFGP are provided in Table 8.17.

Table 8.17: Scenario 2 MFGP Maximum 1-Hour Mean (99.8th Percentile) Concentrations

Receptor	NO_2 99.8th %ile PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	1.9	0.9	34.8	36.7	18.3
R2	2.7	1.4	34.8	37.5	18.8
R3	1.5	0.8	34.8	36.3	18.2
R4	0.7	0.4	34.8	35.5	17.8
R5	0.8	0.4	34.8	35.6	17.8
R6	0.8	0.4	34.8	35.6	17.8
R7	1.4	0.7	34.8	36.2	18.1
R8	1.2	0.6	34.8	36.0	18.0
R9	1.1	0.5	34.8	35.9	17.9
R10	1.1	0.6	34.8	35.9	18.0
R11	1.2	0.6	34.8	36.0	18.0
R12	1.3	0.7	34.8	36.1	18.1
R13	1.3	0.6	34.8	36.1	18.0
R14	1.3	0.6	34.8	36.1	18.0
R15	1.4	0.7	34.8	36.2	18.1
R16	1.4	0.7	34.8	36.2	18.1
R17	1.6	0.8	34.8	36.4	18.2
R18	1.5	0.7	34.8	36.3	18.1
R19	1.4	0.7	34.8	36.2	18.1
R20	1.3	0.7	34.8	36.1	18.1
R21	1.3	0.6	34.8	36.1	18.0
AQS	**200**				

PC: process contribution
PEC: predicted environmental concentration (i.e. including background)

8.117 The maximum predicted 1-hour mean PC concentrations occurs at receptor R2, the commercial property to the west of the site boundary, where the PC is below the maximum allowable PC recommended by EPA AG4 guidance.

8.118 The maximum results indicate that the ambient level concentrations due to emissions arising from the MFGP would be below the relevant NO_2 AQS. For the worst-case year modelled, predicted PEC (including background) would be approximately 19% of the ambient NO_2 1-hour AQS.

8.119 The geographical variation in the 1-hour mean (99.8th percentile) concentrations (without background) of Scenario 2 MFGP emissions are shown in Figures 8.4.

8.120 The localised air quality effects of the of the MFGP are considered **Long-term to Permanent**, **Negative**, and **Imperceptible**, i.e., **Not Significant** in terms of EIA.

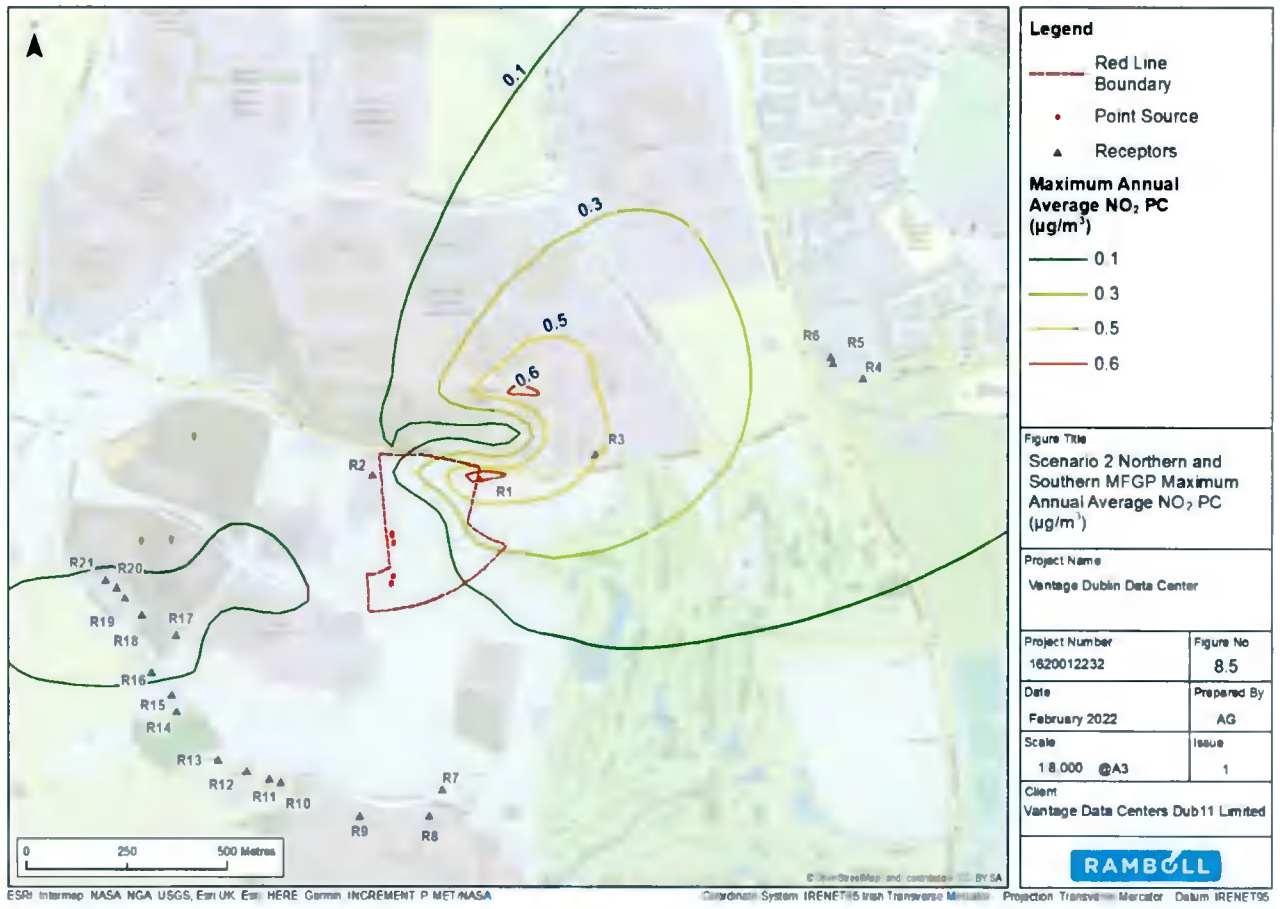


Figure 8.6: Scenario 2 Northern and Southern MFGP Maximum 1-hour mean MFGP (99.8th percentile) NO_2 PC (µg/m³).

Emergency Generators

8.121 The modelling has been undertaken to determine the DUB 11 and DUB 12 emergency operation with a 1% probability of exceeding the objective. The detailed results of the dispersion modelling at the sensitive receptors identified in Table 8.6 are shown in Technical Appendix 8.2 in Volume 3.

8.122 Table 8.18 shows the results of the modelling for the highest impacted receptor for any of the assessed receptor locations.

Table 8.18: DUB11 and DUB12 Emergency Generators Emergency Operation

Plant	Operating hours for 1% probability of exceeding the 1-hour mean objective
DUB 11 and DUB 12 Emergency Generator	82

8.123 The DUB 11and DUB 12 Emergency Generators would operate for 82 hours to reach a 1% probability of exceeding the 1-hour mean objective.

8.124 Table 8.19 shows the maximum predicted annual mean NO_2 concentrations at the worst-case receptor with the highest predicted concentration for the DUB 11 and DUB 12 Emergency Generator maximum of 82 emergency operation hours. It should be recognised however that it is unlikely that the generators will be required to operate for maximum number of hours determined emergency generators would not be expected to operate for more than 24-48 hours per year.

Table 8.19: DUB11 and DUB12 Emergency Generators Maximum Annual Mean Concentrations for 106 hours Operation

Receptor	Operating hours for 1% probability	NO_2 PC (µg/m³)	PC % AQS	NO_2 Average Background (µg/m³)	Annual Mean PEC (µg/m³)	PEC % AQS
R1	82	1.1	2.9	17.4	18.5	46.4

8.125 The maximum results indicate that the ambient level concentrations due to emissions arising from the emergency generators would be below the relevant NO_2 AQS. For the worst-case year modelled and receptor, predicted PEC (including background) would be approximately 46% of the ambient NO_2 annual AQS.

8.126 The localised air quality effects of the emergency generators are considered **Long-term to Permanent**, **Negative**, and **Imperceptible**, i.e., **Not Significant** in terms of EIA.

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

8.127 No significant negative effects are predicted and consequently no additional mitigation is required.

Operation Stage

8.128 No significant negative effects are predicted and consequently no additional mitigation is required.

Enhancement Measures

8.129 No enhancement measures are proposed in respect of air quality.

Demolition and Construction Residual Effects

8.130 With the IAQM recommended mitigation measures include within the CEMP, the residual demolition and construction effects remain as reported in the assessment of effects section

- **Negative**;
- **Temporary to Short-term**; and
- **Imperceptible.**

8.131 These are **Not Significant** in terms of EIA.

Operation Residual Effects

8.132 As no additional mitigation would be required, the residual operation effects of the Phase 1 MFGP remain as reported in the assessment of effects section:

- **Temporary to Short-term**;
- **Negative**; and
- **Imperceptible.**

8.133 These are **Not Significant** in terms of EIA.

8.134 As no additional mitigation would be required, the residual operation effects of the Phase 2 MFGP remain as reported in the assessment of effects section:

- **Long-term to Permanent**;
- **Negative**; and
- **Imperceptible.**

8.135 These are **Not Significant** in terms of EIA.

8.136 As no additional mitigation would be required, the residual operation effects of the Phase 1 and 2 emergency generators remain as reported in the assessment of effects section:

- **Long-term to Permanent**;
- **Negative**; and
- **Imperceptible.**

These are **Not Significant** in terms of EIA.

Summary of Residual Effects

8.137 Table 8.20 provides a tabulated summary of the outcomes of the air quality assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 8.20: Summary of Residual Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
Existing Off-site Human Health and Amenity	Dust Soiling and PM_{10} due to demolition and construction works	None required	Imperceptible	-	L	D	R	T to St
Existing Off-site Human Health	Change in NO_2, PM_{10} and $PM_{2.5}$ levels due to vehicle emissions	None required	Imperceptible	-	L	D	R	T to St
Operation								
Existing Off-site Human Health	Change in NO_2, PM_{10} and $PM_{2.5}$ levels due to vehicle emissions	None required	Not significant	-	L	D	IR	Lt to P
Existing Off-site Human Health	Change in NO_2 levels due to Phase 1 MFGP	None required	Imperceptible	-	L	D	R	T to St
Existing Off-site Human Health	Change in NO_2 levels due to Phase 2 MFGP	None required	Imperceptible	-	L	D	IR	Lt to P
Existing Off-site Human Health	Change in NO_2 levels due to Phase 1 and Phase 2 emergency generators	None required	Imperceptible	-	L	D	IR	Lt to P

Notes:
* - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, ID = Indirect;

Table 8.20: Summary of Residual Effects

L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = Medium-term, Lt = Long-term, P = Permanent.

** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound.

Cumulative Effects

Intra-Project Effects

8.138 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in Chapter 16: Cumulative Effects.

Inter-Project Effects

8.139 A review of potential cumulative schemes has been undertaken as listed in Chapter 1: Introduction and Chapter 2: EIA Process and Methodology.

8.140 The demolition and construction stage cumulative effects exercise has been undertaken for cumulative schemes within 350 m of the proposed development as demolition and construction stage effects of cumulative schemes beyond 350 m are not expected to combine with the demolition and construction effects of the proposed development according to IAQM guidance.

8.141 Table 8.21 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 8.21: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Takeda	No	Development constructed.	Yes	Gas fired power plant emission to the north west of the site likely to overlap with proposed development.
Pfizer	No	Development constructed.	Yes	Gas fired power plant emission north east of the site likely to overlap with proposed development.
Google data center	No	Development constructed.	No	Development located to the south west of the site. Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22	No	Development constructed.	No	Development located to the north of the site. Cumulative effects assessed and considered unlikely and not significant.

Table 8.21: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
[SD20A/0283]				
UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	No	Development located to the west beyond 350m of the site.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
UBC Properties - Grange Castle South Business Park, Dublin 22 [An Bord Pleanála Reference – 308585]	No	Scheme located west of the site at the edge of the 350m distance considered. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	No significant air emissions expected.
Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 [SD17A/0377]	No	Development located beyond the 350m of the site and constructed.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Equinix (Ireland) Ltd, Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD21A/0186]	Yes	Development located to the southeast of the site. There will be a potential for overlap with the site's development works. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 [SD18A/0134]	No	Development located to the west beyond the 350m of the site.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.

Table 8.21: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0295]	No	Development located to the west beyond the 350m of the site.	No	Emergency only emission points which would only operate under exceptional circumstances (except for testing purposes) and therefore would not be expected to be in operation on a day-to-day basis.
Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 [An Bord Pleanála Ref - 309146]	No	Development located to the west beyond the 350m of the site.	No	No significant air emissions expected.
Site proposed electrical connection and substation to EirGrid to the south	No	Development located immediately to the south of the site. There will be a potential for overlap with the site's development works. Scheme anticipated to employ dust mitigation techniques as the proposed development.	No	No significant air emissions expected.
Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	Yes	Development located immediately to the south of the site. There will be a potential for overlap with the site's development works. Scheme anticipated to employ dust mitigation techniques as the proposed development.	Yes	Gas fired power plant emission likely to overlap with proposed development.

Demolition and Construction Cumulative Effects

8.142 Demolition and construction significant cumulative effects are unlikely to occur as the Equinix and Centrica Business Solutions development is anticipated to employ similar dust mitigation techniques such that the individual construction stage effects are **not significant**, alone or in combination.

Operation Cumulative Effects

8.143 Cumulative effects have been included in this Chapter following the review the cumulative scheme EIAR submitted as part of the:

- Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22, Planning Application reference SD20A/0283[25], hereafter referred to as Microsoft; and
- Centrica Business Solutions Profile Park, Baldonnel, Dublin 22 planning application reference SD21A/0167[26], hereafter referred to as Centrica.

8.144 The Microsoft application assessed the NO_2 impacts for the continuous operation of the gas generators, testing of the back-up diesel generators, operation of the back-up generators, and the cumulative impact from the Pfizer facility and Takeda facility at the worst-case residential receptors and concluded that "*Operations from the Grange Castle Server Centre including the proposed gas generator compound development will not result in any off-site exceedance of the applicable ambient air quality standards*". The cumulative operations geographical variation contour figures for annual mean show that predicted concentrations hot spots are within the Microsoft site and the pollutants dispersion follows the prevailing wind direction towards the north east. A reproduction of the Microsoft contours figures is shown in Technical Appendix 7.2 in Volume 3. Similarly, the 99.8th percentile 1-hour concentrations predicted concentrations hot-spots are within the Microsoft site and to the south west of Microsoft. The Microsoft, Pfizer, and Takeda annual average and 1-hour worst case predicted concentrations therefore would not overlap with the proposed development worst case predicted concentrations and cumulative impacts with the proposed development would be unlikely and imperceptible.

8.145 The Centrica application proposes to develop a gas fired plant with capacity to generate up to 125MW of electricity at the site located in Profile Park to the south of the proposed development. The air quality assessment included the impacts of the Centrica application gas fired plant and the cumulative impacts of the existing IE licensed emissions points Pfizer, Takeda, and Grange backup power. The Centrica application is therefore considered to be representative of all the cumulative developments as it includes the permitted permanent point sources emissions and the potential future point source in the study area.

8.146 The Centrica application reported the maximum results outside its red line boundary "*even if no residential receptors were near the location of this maximum*" which is considered too conservative. However, the geographical variations contour figures allow to infer the predicted NO_2 concentrations at relevant sensitive receptors. A reproduction of the Centrica contours figures is shown in Technical Appendix 7.2 in Volume 3.

8.147 The Centrica application maximum predicted concentrations alone or cumulative with Pfizer, Takeda and the Grange Castle Backup Power Facility are summarised in Table 8.22.

25 South Dublin County Council, 2021. Microsoft, 2020. Microsoft Operations Ireland Ltd Grange Castle Business Park Dub14 & Dub15 Data Centres & Central Administration Building Environmental Impact Assessment Report Volume I Written Statement. Available at: http://www.sdublincoco.ie/Planning/Details?p=1&r=SD20A%2F0283&regref=SD20A%2F0283 [Accessed on 04/08/2021]

26 South Dublin County Council, 2021. Tobin Consulting Engineers, 2021. Profile Park Power Plant Environmental Impact Assessment report (EIAR). Available at: http://www.sdublincoco.ie/Planning/Details?p=1&r=SD21A%2F0167&regref=SD21A%2F0167 [Accessed on 04/08/2021]

Table 8.22: Maximum Predicted Cumulative Schemes Assessment

Development	Averaging Period	Maximum reported NO_2 PC outside site boundary (µg/m³)	Maximum concentration at sensitive receptors (µg/m³)
Centrica Power Plant (alone)	Annual Mean	12.0	1-2 (Receptor R1) 2-4 (Receptor R3)
	1-hour (99.8th %ile)	115.9	50-70 (Receptor R1 and R3)
Centrica Power Plant, Pfizer, Takeda, and the Grange Castle BackUp Power Facility	Annual Mean	12.3	Not available
	1-hour (99.8th %ile)	115.9	

8.148 The Centrica cumulative maximum annual average results with Pfizer, Takeda and the Grange Castle Backup Power Facility are marginally higher than with Centrica power plant alone and the 99.8th percentile 1-hour results are equal. Similar to Microsoft results, the Centrica results show that cumulative impacts of the proposed development with Pfizer, Takeda and the Grange Castle Backup Power Facility would be unlikely and imperceptible.

8.149 The Centrica maximum cumulative results at the proposed development worst case sensitive receptor results are presented in Table 8.23.

Table 8.23: Proposed Development Cumulative Results

Averaging period	Receptor	AQS (µg/m³)	Proposed Development NO_2 PC (µg/m³)	Centrica NO_2 PC (µg/m³)	Cumulative			
					NO_2 PC (µg/m³)	PC % AQS	Annual Mean PEC (µg/m³)	PEC % AQS
Phase 1/Scenario 1								
Annual Mean	R1	40	2.3	2	4.3	10.7	21.7	54.2
1-hour (99.8th %ile)	R1	10.6	70	80.6	200	40.3	115.4	57.7
Phase 2/Scenario 2								
Annual Mean	R1	40	0.6	2	2.6	40	6.6	20.0
1-hour (99.8th %ile)	R2/R1*	200	2.7	70	72.7	200	36.4	107.5

* Phase 2 worst case receptor for 1-hour (99.8th %ile) average period for the proposed development emissions would be receptor R2. Centrica contour figures, however, do not show predicted concentrations at this receptor location and therefore Centrica results are receptor R1, as the second worst case receptor, results are presented for Centrica NO_2 PC.

8.150 The maximum cumulative annual average results indicate that the ambient level concentrations due to emissions arising from Phase 1 MFGP and Centrica power plant would be below the relevant NO_2 AQS, where the combined PC would be below the maximum allowable PC recommended by EPA AG4 guidance. For the worst-case year modelled, the predicted PEC (including background) would be approximately 54% of the ambient NO_2 annual AQS at the worst-case receptor.

8.151 The maximum 1-hour average results indicate that the ambient level concentrations due to emissions arising from Phase 1 MFGP and Centrica power plant would be below the relevant NO_2 AQS, where the combined PC would be below the maximum allowable PC recommended by EPA AG4 guidance. For the worst-case year modelled, the predicted PEC (including background) would be approximately 58% of the ambient NO_2 1-hour AQS at the worst-case receptor.

8.152 Centrica power plant construction is expected to commence in 2022 and the plant is expected to be fully operational in 2024/2025 subject to timely receipt of the necessary statutory consents. Based on the proposed development phasing, with Phase 1 MFGP using HVO as the fuel source to be replaced by gas by early 2025. During Phase 1 there is potential for both plant operations to overlap for a short period of less than a year. However, during Phase 2 the MFGP plant will be run on natural gas operating 24 hours a day, seven days a week. During Phase 2, both plant operations would overlap.

8.153 Given the temporary operation of the Phase 1 MFGP from approximately Q4 2023 to Q1 2025, the cumulative air quality effects of Phase 1 MFGP is considered short term, negative and imperceptible, i.e. not significant in terms of EIA.

8.154 Given the long-term operation of the Phase 2 MFGP, the cumulative air quality effects of Phase 2 MFGP is considered long term, negative and imperceptible, i.e. not significant in terms of EIA

8.155 Phase 2 MFGP operation maximum results indicate that the ambient level concentrations due to emissions arising the MFGP operation on natural gas and Centrica power plant are below the relevant NO_2 AQS, where the combined PC would be below the maximum allowable PC recommended by EPA AG4 guidance. For the worst-case year modelled, the annual average predicted PEC (including background) would be approximately 50% of the ambient NO_2 AQS and the 1-hour predicted PEC (including background) would be approximately 54% of the ambient NO_2 1-hour AQS at the worst-case receptor.

8.156 The cumulative air quality effects of Phase 2 MFGP are considered **long term, negative** and **not significant** in terms of EIA.

Summary of Assessment

Background

8.157 This chapter has detailed the potential air quality effects due to the construction and operation stages of the proposed development. The assessment of construction and operation stages has been undertaken considering the relevant national and local guidance and regulations. Potential sources of emissions have been identified and assessed in the context of existing air quality and the nature and location of receptors.

8.158 The main air pollutants of concern are dust and particulate matter with an aerodynamic diameter of less than 10 microgram (PM_{10}), typically generated during demolition and construction activities and nitrogen dioxide (NO_2), typically generated by road traffic and combustion engines.

8.159 Air quality monitoring data was obtained from the EPA monitoring stations to establish the status of existing air quality. The data was used as the basis for air quality modelling and predictions.

8.160 NO_2 concentrations at the site and within the study area would be expected to be similar to measured concentrations at the closest monitoring sites and therefore likely to comfortably meet the relevant air quality objectives.

Demolition and Construction Effects

8.161 During the demolition and construction works, there is the potential for vehicle emissions and dust emissions to arise at existing off-site human health receptors, as well as a loss of amenity at nearby existing residential and commercial properties.

8.162 The predicted annual average demolition and construction traffic flows are not expected to exceed the Institute of Air Quality Management (IAQM) guidance threshold such as to require formal assessment. In addition, traffic flows would be controlled through the implementation of the Construction

Environmental Management Plan (CEMP). The effects of demolition and construction related traffic emissions would be temporary and not of a scale that would give rise to significant effects.

8.163 Based on criteria set out in the IAQM guidance, the construction works would present a medium risk of negative effects from dust impacts in the absence of appropriate mitigation. With the implementation of suitable mitigation measures, already incorporated within the proposed development's CEMP, it is anticipated that dust effects could be mitigated to at worst result in temporary negative, but not significant, effects at existing off-site receptors.

8.164 Overall, the demolition of existing buildings on the site and construction of the proposed development would result in an imperceptible effect on air quality and identified receptors, and as such would **not give rise to significant negative effects** on air quality in terms of EIA.

Operation Effects

8.165 The predicted annual average completed development traffic flows are not expected to exceed the Institute of Air Quality Management (IAQM) guidance threshold such as to require formal assessment. The effects of operation stage related traffic emissions would be long-term and not of a scale that would give rise to significant effects.

8.166 Concentrations of NO_2 have been predicted for several worst-case locations representing existing sensitive receptors in the study area.

8.167 The potential impact to air quality during the operation stage of the proposed development is a breach of the ambient air quality standards because of air emissions from the proposed development MFGP and emergency engines. The modelled predicted concentrations are below the relevant objectives at all the existing receptor locations for the operation stages.

8.168 It is considered that the operation of the proposed development Phase 1 with the multifuel generation plant, expected to be operational up to approximately Q1 2025 using HVO as the fuel source, would result in a temporary to short term Negative Imperceptible effect i.e. **Not Significant in terms of EIA** on air quality and identified receptors. The operation of Phase 2 with the multifuel generation plant running on natural gas, would result in a negative imperceptible effect i.e. **Not Significant in terms of EIA** on air quality and identified receptors. The operation of the proposed development emergency generators would result in an imperceptible effect on air quality and identified receptor that is **Not Significant in terms of EIA**.

Cumulative Effects

8.169 Demolition and construction stages of approved cumulative schemes within 350 m of the proposed development are not expected to combine with the demolition and construction stage of the proposed development. Significant cumulative effects are unlikely to occur as each scheme is anticipated to employ similar dust mitigation techniques such that the individual construction stage effects are not significant, alone or in combination.

8.170 The assessment predicted the combined cumulative air quality concentrations arising from cumulative schemes in the study area. It is considered that the cumulative operation of the proposed development during Phase 1, when the MFGP will be run on HVO which is expected to be operational for up to 2 years would result in a temporary to short term negative imperceptible effect i.e. **Not Significant in terms of EIA** on air quality and identified receptors. During Phase 2, when the MFGP plant will be run on natural gas, the operation would be significantly longer, and is predicted to result in long term negative imperceptible effects i.e. **Not Significant in terms of EIA** on air quality and identified receptors.

8.171 Overall, no significant long term cumulative effects on air quality are anticipated as a result of the operation of the proposed development.

9 NOISE AND VIBRATION

Introduction

9.1 This chapter of the EIAR reports on the likely significant noise and vibration effects to arise from the demolition and construction stage and the operation stage of the proposed development.

9.2 The chapter describes the noise and vibration policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely noise and vibration effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

9.3 The chapter is supported by the following technical appendices in EIAR Volume 3:

- Appendix 9.1: Acoustic Terminology; and
- Appendix 9.2: Construction Noise Calculations.

Methodology

9.4 The assessment has been informed by the following legislation, policies and published guidance:

- International Legislation:
  - EU Directive 2002/49/EC[1]
- National Legislation and Policy:
  - Environmental Noise Regulations, SI number 140 of 2006[2]
  - Environmental Protection Agency Act 1992[3]
  - The National Climate Action Plan 2021[4]
- Regional Policy:
  - Dublin Agglomeration Environmental Noise Action Plan December 2018 – July 2023[5]
- Local Policy:
  - As Regional Policy, Volume 1 – Dublin City Council
- National guidance and industry standards:
  - EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)[6], which refers to the following British Standards:
  - BS5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites[7]; and
  - BS4142:2014+A1 2019 for industrial and commercial noise[8].

Assessment Scope

Technical Scope

Effects Assessed in Full

9.5 The technical scope of the assessment has considered the following:

- Demolition and construction noise from works being undertaken;
- Demolition and construction road traffic noise;
- Demolition and construction vibration; and
- Operational noise from plant and servicing.

9.6 In the context of this assessment, noise is defined as unwanted or undesirable sound derived from sources such as construction activities, road traffic, and building services plant. Vibration is defined as perceptible oscillations or ground and building structure transmitted from sources such as construction plant.

Effects Scoped Out

9.7 There are no predicted significant road traffic noise, or operational vibration effects associated with the operational phase of the proposed development, therefore these elements have been scoped out of the noise and vibration assessment.

Spatial Scope

9.8 The study area incorporates the application site, existing noise-sensitive receptors (NSR) situated along the application site boundaries; as well as NSRs located at further distances from the application site boundary.

9.9 For the purposes of construction and operational noise and construction vibration impact assessments, a number of NSRs have been identified from site investigations, satellite imagery and the proposed development plans. These NSRs are considered to represent a worst case, such that other receptors located at greater distances from the application site should not experience greater noise and vibration impacts.

9.10 The existing NSRs which have been considered in the assessment are provided in Table 9.1 and indicated on Figure 9.1.

Table 9.1: NSR and approximate distance from the proposed development phases

Receptor reference	Receptor	Type of Receptor	Approximate Distance from nearest proposed development phase
1	Detached house on north east application site boundary on New Nangor Road	Residential	75 m
2	Detached house off Baldonnel Rd to south west of application site	Residential	500 m
3	Detached house off Baldonnel Rd to south of application site, outside the department of defence.	Residential	445 m
4	Houses located south of Baldonnel Rd	Residential	480 m

[1] Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise - Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise
[2] Irish Statutory Instrument (S.I.) No. 140/2006 - Environmental Noise Regulations 2006
[3] Irish Environmental Protection Agency Act, 1992.
[4] Government of Ireland, 2021. Climate Action Plan. Department of the Environment, Climate and Communications
[5] Dublin Agglomeration Noise Action Plan 2018-2023(NAP) Relating to The Assessment and Management of Environmental Noise
[6] Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4, January 2016). EPA.
[7] British Standards Institute, 2009 + A1 2014. British Standard BS 5228: Code of Practice for Noise and Vibration Control on Construction and Open Sites. BSI
[8] British Standards Institute, 2014 + A1 2019. British Standard BS 4142: Methods for rating and assessing industrial and commercial sound. BSI

Figure 9.1: Nearest Noise Sensitive Receptors 1-4 (NSR)

Temporal Scope

9.11 In line with EPA guidance, as outline in EIAR Chapter 2: EIA Process and Methodology of this EIAR Volume, the duration of effects has been classified using the following: Momentary (seconds to minutes), Brief (<one day), Temporary (<one year), Short-term (one to seven years), Medium-term (seven to 15 years), Long-term (15 to 60 years), Permeant (>60 years). The assessment has considered impacts arising during the construction stage (up to 3 years) which would be expected to be short-term in nature and from the operation stage which would be expected to be long-term to permanent.

9.12 For the operation stage, consideration has been given to the following development phasing:

Table 9.2: Development Phasing

Phase	Detail	Indicative Construction Completion and Start of Operation
Phase 1	• Site infrastructure works, landscaping and Baldonnel Stream enhancements constructed. • Sustainable Drainage System (SuDS) drainage constructed. • AGI Plant/Gas Regulator constructed. • Step-up transformer constructed. • DUB 11 constructed and operational with 22 emergency generators. • North MFGP constructed and operational. South MFGP building / slab constructed but not operational. • Construction of the 20kV switchrooms.	Q4 2023
Phase 2	• DUB 12 constructed and operational • South MFGP generators installed and operational. • Remaining external works • Main power supply from EirGrid Substation to the south of Falcon Avenue for main power supply.	Q3/Q4 2024

9.13 The noise and vibration assessment considers the following specific operational scenarios:

Table 9.2: Noise and Vibration Assessment Operational Scenarios

Scenario 1 (~Q3 2023 to Q1 2025)	• DUB 11 powered by northern block of MFGP using HVO as the fuel source. • MFGP running 24/7 • Emergency scenario below applies if there is the MFGP fails.
Scenario 2 (reasonable worst case from Q1 2025)	• DUB 11 and 12 powered from the EirGrid connection across Falcon Avenue. • MFGP powered by gas from GNI. In a reasonable worst case this is assessed to be operational 24/7 using natural gas. • Emergency scenario below applies if the gas connection from GNI to the MFGP fails and there is a local grid network failure from EirGrid.
Scenario 3 (reasonable best case from Q1 2025)	• DUB11 and 12 powered from the EirGrid connection across Falcon Avenue • MFGP not in operation. • Emergency scenario below applies if there is a local grid network failure from EirGrid.
Emergency Scenario	• Diesel used for day tanks for emergency backup generators for the data center in the unlikely event of an outage of the MFGP and grid connection (depending on scenario). MFGP and emergency generators would not be operational at the same time.

9.14 These scenarios have been chosen as the power supply source changes, while Scenario 2 provides reasonable worst-case for the development as a whole, such that mitigation measures included for this phase would provide sufficient control for intermediary phases.

9.15 For Scenarios 1-3 the assessment also considers noise from emergency plant which would operate only in the event of a local grid network failure from EirGrid and for testing.

Baseline Characterisation Method

Desk Study

9.16 In order to establish baseline noise and vibration conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- Other previous planning applications in the public domain (planning portal);
- Satellite imagery (Google Maps);
- Architectural Drawings, Sections, Elevations; and
- Manufacturer supplied noise data for proposed plant installations.

Field Study

9.17 The existing noise environment was characterised by baseline noise surveys. These were taken in and around the application site to quantify the prevailing ambient and background noise levels during the daytime and night-time periods. The ambient and background noise levels have been used to inform the assessment criteria for plant noise emissions, building envelope and ventilation strategies and construction noise effects.

9.18 The surveys were taken outside of Covid-19 lockdown measures. However, the noise levels measured on site may have been lower due to reduced traffic levels. This is not considered to affect the assessments because the use of lower background levels would form a worst-case in terms of settling plant noise emission limits.

9.19 Attended and unattended measurements have identified the major noise sources around the application site. The locations of noise measurements are detailed in Figure 9.2. LT positions were unattended monitoring positions. ST positions were attended monitoring positions.

9.20 At each measurement location, a comprehensive suite of noise level metrics was recorded. The following noise level indices are relevant to this assessment:

- $L_{Aeq,T}$ The A-weighted equivalent continuous noise level over the measurement period;
- $L_{A90,T}$ The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise.

9.21 Vibration surveys were not undertaken as there are no active rail links or considerable vibration generating sources within 100m.

Figure 9.2: Noise Measurement Locations (LT positions were unattended monitoring positions and ST positions were attended monitoring positions)

Assessment Method

Methodology

Demolition and Construction Stage

9.22 Published Guidance: BS5228:2009+A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites

9.23 BS5228:2009+A1 2014 gives recommendations for basic methods of noise and vibration control relating to construction work. It also provides guidance concerning methods of predicting and measuring noise and vibration and assessing their impacts on those exposed to it. The prediction method considers the noise emission level of proposed plant, the separation distance between the source and the receiver and the effect of the intervening topography and structures.

9.24 The approach adopted in BS5228:2009+A1 2014, calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction

noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

9.25 BS5228:2009+A1 2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.3 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS5228:2009+A1 2014. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Table 9.3: BS5228:2009+A1 2014 Assessment Categories

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A (Note A)	Category B (Note B)	Category C (Note C)
Night-time (23:00 to 07:00)	45	50	55
Evenings and weekends (Note D)	55	60	65
Daytime (07:00 to 19:00) and Saturdays (07:00 to 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

9.26 Noise limits have been set for the purposes of the construction noise effects assuming daytime working (07:00-19:00). It should be noted that this assessment method is only valid for residential properties.

9.27 Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration.

9.28 The legislative background to vibration control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. The standard also provides guidance on measuring vibration and assessing its effects on the environment.

Demolition and Construction Noise Assessment

9.29 Proposed demolition and construction works on the site will involve the use of a variety of working methods, and operations will vary across the site throughout the construction period. Therefore, noise levels from the works are likely to vary over time as the distance from the noise sources and the type of construction activity change. Note BS5228-1:2009+A1:2014 states that calculations to receivers over 300m away should be treated with caution.

9.30 The exact working methodology and plant to be employed on site for the demolition/construction work have not yet been established. This level of detail will only be available post-planning when specialist contractors are engaged; therefore a realistic worst case has been assessed.

9.31 An estimate of the expected noise levels over a representative period has been prepared using typical types of plant commensurate for works of this nature, and noise emission data for plant obtained from BS5228-1:2009+A1:2014. As a 'worst case', the assessment has assumed that all plant will operate for each phase of work at a given location within the site.

9.32 Construction noise predictions have been based on the methodology contained within BS5228-1:2009+A1:2014. This enables predictions to be made of the noise emissions from the construction activities for given distances from the works.

9.33 The daytime construction noise criteria used for identifying potentially significant impacts has been identified as 65 dB $L_{Aeq,10hr}$, based on the measured noise levels at the site (Category A).

9.34 The following construction stages have been considered:

- Demolition;
- Enabling Works and Stream Enhancements;
- Substructure;
- Superstructure;
- Internal Fit-out; and
- External works.

Demolition and Construction Traffic Noise Assessment

9.35 There is potential for disturbance to occur as a result of heavy goods vehicles (HGVs) travelling on the public highway. Impacts of this nature are typically more likely to occur close to the construction site access, or on sections of road that are subject to low levels of preconstruction traffic.

9.36 The HGV movements on the roads nearest the site have been considered for the purposes of identifying significant impacts. This approach has been taken because they are bounded by noise-sensitive receptors in close proximity; therefore, they provide the worst case for the assessment.

9.37 The number of HGVs attributable to the demolition and construction works will be highest during demolition and earthworks.

9.38 This assessment has been undertaken using the haul route method outlined in BS5228-1:2009+A1:2014. The maximum number of trips will be included within the CEMP.

Demolition and Construction Vibration Assessment

9.39 BS5228-2:2009+A1:2014 states that for the majority of people vibration levels between 0.14 and 0.3 mm/s PPV are just perceptible. A vibration level of 1.0 mm/s is sufficient to cause complaint, but tolerable with prior warning; whereas a level of 10 mm/s is intolerable for anything more than a very brief exposure. Vibration levels exceeding 15 mm/s PPV are sufficient to result in minor cosmetic damage in light/unreinforced buildings. This magnitude of vibration is not considered likely as a result of the proposed construction activities being undertaken, and therefore an assessment of building damage has not been undertaken. No piling is proposed as part of the development.

9.40 Perceptibility of vibration is considered in the assessment.

Operation Stage

9.41 Published Guidance: BS4142:2014+A1:2019 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

9.42 BS4142:2014+A1 2019 provides a method for rating industrial and commercial sound and method for assessing resulting impacts upon people. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

9.43 The basis of BS4142:2014+A1:2019 is a comparison between the background noise level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

- Background Level, $L_{A90,T}$: defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, and quoted to the nearest whole number of decibels;
- Specific Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T;

- Residual Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- Rating Level, $L_{Ar,Tr}$: the specific sound level plus any adjustment made for the characteristic features of the noise.

9.44 The standard specifies that noise measurements of one hour should be used during the day (07:00-23:00) and 15 minutes at night (23:00-07:00).

9.45 Potential impacts are predicted from the difference between the representative background level at a noise sensitive receptor and the rating level from the noise source considered. The standard suggests that the greater the excess, the greater the magnitude of impact.

9.46 In determining the significance of the impact, BS4142:2014+A1:2019 requires a consideration of the context of the assessment i.e. the nature of the existing acoustic environment and the new noise source, and the sensitivity of the affected receptors.

Operational Noise Modelling Approach

9.47 The predicted noise levels likely to be generated during the operational phase of the proposed development due to new items of fixed plant have been calculated using the proprietary noise modelling software CadnaA®. The operational noise predictions have been undertaken in accordance with the noise prediction framework set out in ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation'.

9.48 The ISO 9613 noise prediction model assumes that individual sources act as point sources; the noise level reducing by 6 dB for every doubling of distance. Noise from line sources reduce by 3 dB per doubling of distance. The model takes into account the distance between the sources and the receptors and the amount of attenuation due to atmospheric absorption and ground cover.

9.49 The topography on and around the site has been modelled using topographical survey information. The acoustic ground absorbency has been modelled according to local conditions.

Cumulative Stage

9.50 For the purposes of assessing the cumulative effects, consideration has been given to all cumulative schemes that have the potential to result in a significant cumulative effect alongside the proposed development. Full details of all the cumulative schemes are given in Chapter 2: EIAR Process and Methodology. The baseline and assessment of significance, and the judgement of the magnitude of change stages are as above for the demolition and construction and operation stages. Only receptors for which the proposed development is predicted to result in a significant residual effect alone are included in this part of the assessment

Assessment Criteria

9.51 The criteria used to assess if an effect is significant or not, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

9.52 The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in Table 9.4.

Table 9.4: Receptor Sensitivity Criteria

Sensitivity	Criteria
Low	Industrial, commercial and retail premises
Medium	Places of worship, community facilities, offices
High	Specialist vibration sensitive equipment, residential properties, educational buildings, medical facilities, care homes, hotels

9.53 Table 9.5 details the distances at which certain construction activities are likely to give rise to a just perceptible level of vibration. These figures are based on historical field measurements to inform BS5228:2009+A1:2014.

Table 9.5: Distances at which vibration may just be perceptible

Construction Activity	Distance from Activity (m)
Heavy vehicles (e.g. dump trucks)	5-10
Excavation	10-15
Hydraulic breaker	15-20
Rotary bored piling	20-30
Driven piling	50-100
Continuous flight auger (CFA) piling	10-20

9.54 The distances provided in Table 9.5 have been used to assess potential vibration impacts at surrounding properties.

Impact Magnitude Criteria

Demolition and Construction Noise

9.55 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 9.6.

Table 9.6: Impact Magnitude Criteria – Demolition and Construction Noise

Magnitude of Impact	Façade noise level dB(A)
Low	<65
Medium	65-70
High	>70

Demolition and Construction Vibration

9.56 NSRs located at distances equal to or greater than those provided in Table 9.5, may be subject to perceivable vibration – this would result in a low magnitude of impact. NSRs located at distances less than those provided, may experience levels of vibration which could cause complaints, i.e. a medium magnitude of impact. High magnitudes of impact are unlikely to occur.

Operational Phase Building Services Plant

9.57 Plant rating noise limits have been set following the methodology contained within BS4142:2014+A1:2019. Based on guidance from BS4142:2014+A1:2019 and noise limits defined by the EPA, the following magnitudes of impact have been used:

Table 9.7: Impact Magnitude Criteria – Operational Building Services Noise Emissions

Magnitude of Impact	Description
	Noise due to the normal operation of the proposed development, shall not exceed the lesser of the following limits:
Low	• Daytime (07:00-19:00) 55 dB $L_{Ar,Tr}$ or 10 dB above background. • Evening (19:00-23:00) 50 dB $L_{Ar,Tr}$ or 0 dB above background. • Night time (23:00-07:00) 45 dB $L_{Ar,Tr}$ or 0 dB above background.

Table 9.7: Impact Magnitude Criteria – Operational Building Services Noise Emissions	
Medium	• Daytime (07:00-19:00) 60 dB $L_{Ar,Tr}$ or 10-15 dB above background. • Evening (19:00-23:00) 55 dB $L_{Ar,Tr}$ or 0-5 dB above background. • Night time (23:00-07:00) 50 dB $L_{Ar,Tr}$ or 0-5 dB above background.
High	• Daytime (07:00-19:00) 65 dB $L_{Ar,Tr}$ or > 15 dB above background. • Evening (19:00-23:00) 60 dB $L_{Ar,Tr}$ or > 5 dB above background. • Night time (23:00-07:00) 55 dB $L_{Ar,Tr}$ or > 5 dB above background.

Operational Phase Emergency Plant

9.58 Back-up emergency generators will be provided as part of the proposed development to serve each data hall. The generators will only operate in a situation where there is a failure in the electricity supply from the national grid and for routine testing. Routine testing will be conducted during regular weekday daytime periods only.

9.59 Section 4.4.1 of the Environmental Protection Agency (EPA) document "Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities" (NG4 - 2016) contains the following comments in relation to emergency plant items:

'In some instances, sites will have certain items of emergency equipment (e.g. standby generators) that will only operate in urgent situations (e.g. grid power failure). Depending upon the context, it may be deemed permissible for such items of equipment to give rise to exceedances in the noise criteria/limits during limited testing and emergency operation only. If such equipment is in regular use for any purposes other than intermittent testing, it is subject to the standard limit values for the site'.

9.60 With reference to other developments in the area, it is noted that an emergency noise emissions limit of 55 dB $L_{Aeq,1hr}$ is generally applied at nearby noise sensitive receptors. On this basis, the following magnitudes of impact have been adopted for this assessment:

Table 9.8: Impact Magnitude Criteria – Operational Emergency Services Noise Emissions	
Magnitude of Impact	**Description**
	Noise due to emergency plant operation at the proposed development, shall not exceed the lesser of the following limits:
Low	55-60 dB $L_{Aeq,1hr}$
Medium	60-65 dB $L_{Aeq,1hr}$
High	>65 dB $L_{Aeq,1hr}$

Scale of Effect Criteria

9.61 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 9.9 with specific reference to noise and vibration.

Table 9.9: Scale of Effect Criteria			
Magnitude of Impact	**Sensitivity of Receptors**		
	Low	**Medium**	**High**
Low	Imperceptible	Not significant	Slight
Medium	Not significant	Slight	Moderate
High	Slight	Moderate	Significant

9.62 Based on professional judgement, residual effects of moderate and significant are typically considered 'significant' and material to the planning decision process. Imperceptible, not significant, and slight residual effects are typically considered 'not significant'.

9.63 In determining the significance of reported effects, consideration has been given to the characteristic, duration, probability, type and nature of the effect, as defined in Chapter 2.

Assumptions and Limitations

General

9.64 The following assumptions and limitations apply to the assessments contained within this Chapter:

- The assessment has relied on data provided by Burns & McDonnell. It has been assumed that these data sets have been reported correctly;
- The measured baseline climate is a sample of the current noise climate at the application site and is representative of activities occurring during the surveys;
- A number of assumptions have been made to inform the appraisal of construction stage impacts, such as the techniques used to construct the buildings, the type of plant being used, the number of plant items operating, and the running time throughout the day. The assumptions provide a worst-case assessment;
- The construction phasing strategy for the application site has been set out in EIAR Chapter 5 and has been used to assess potential impacts;
- The specification for the building envelope of the generator building has been determined to achieve the noise limits set out in this report. This is subject to detailed design, along with other mitigation measures proposed for barriers, attenuation requirements for exhaust stacks, etc;
- Exhaust stack heights for the MFGP are modelled at 25m and the emergency diesel generators are modelled at 22.3m;
- Sound level data for the emergency diesel generators has been used as follows:
  - 'Inlet' and 'Canopy' applies to noise breaking out of the generator enclosure;
  - 'Discharge' applies to the noise exiting through the enclosure chimney; and
  - 'Exhaust' sound data has been applied to the top of the stacks.

  In the absence of specific measurement conditions of this data (an overall figure averaged from measurements all around the generator is provided) it is assumed the generator radiates equal sound levels from all faces;
- Noise from externally mounted or terminating plant is not expected to be tonal or intermittent at the receptors due to distance attenuation and masking by ambient noise. The spectral sound data does not indicate any strong tonal properties to the noise.

Approach to Assessment

9.65 The assessment of noise and vibration impacts has been undertaken using the detailed masterplan layouts and general arrangement (GA) plans/sections/elevations that have been prepared for the application site.

Baseline Conditions

Existing Baseline

9.66 The existing noise climate across the application site varies with location. The northern portion of the site generally experiences higher levels of noise due to the influence of the surrounding road network and other commercial/industrial uses. Elsewhere, the noise levels in central part and southern portion of the site are influenced more by other industrial uses and aircraft movements from the nearby Casement Aerodrome.

9.67 A summary of the noise measurements at each position is provided below. The typical $L_{A90,T}$ values have been derived from statistical analysis in line with BS4142:2014+A1 2019.

Table 9.10: Summary of Noise Measurements at Monitoring Position LT1

Measurement Period	Time Period	Log Average $L_{Aeq,T}$	Typical $L_{A90,T}$ dB
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	53	46
	Evening (19:00-23:00)	50	44
	Night time (23:00-07:00)	47	42

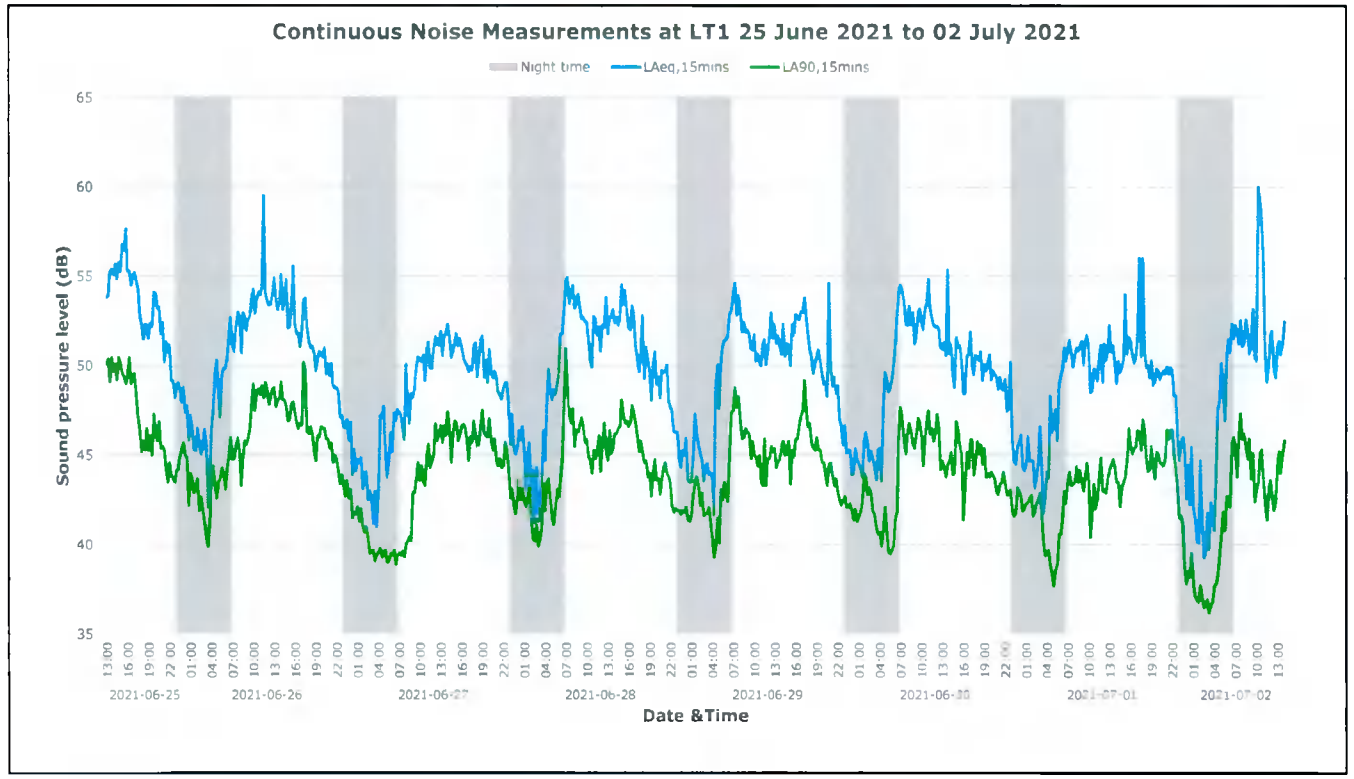


Figure 9.3: Continuous noise measurements at LT1

9.68 It is evident from the survey data recorded at LT1 that the noise levels did not vary significantly throughout the duration of the survey. The dominant noise sources were road traffic noise, aeroplanes and helicopters and more distant noise from other industrial land uses.

Table 9.11: Summary of Noise Measurements at Monitoring Position LT2

Measurement Period	Time Period	Log Average $L_{Aeq,T}$	Typical $L_{A90,T}$ dB
25/06/2021 to 02/07/2021	Daytime (07:00-19:00)	47	42
	Evening (19:00-23:00)	45	40
	Night time (23:00-07:00)	42	38

9.69 The noise climate at LT2 during the survey was dominated by road traffic noise and aircraft movements from the department of defence/Casement Aerodrome. Distant plant noise from the Google Data Center Campus was also audible at this position.

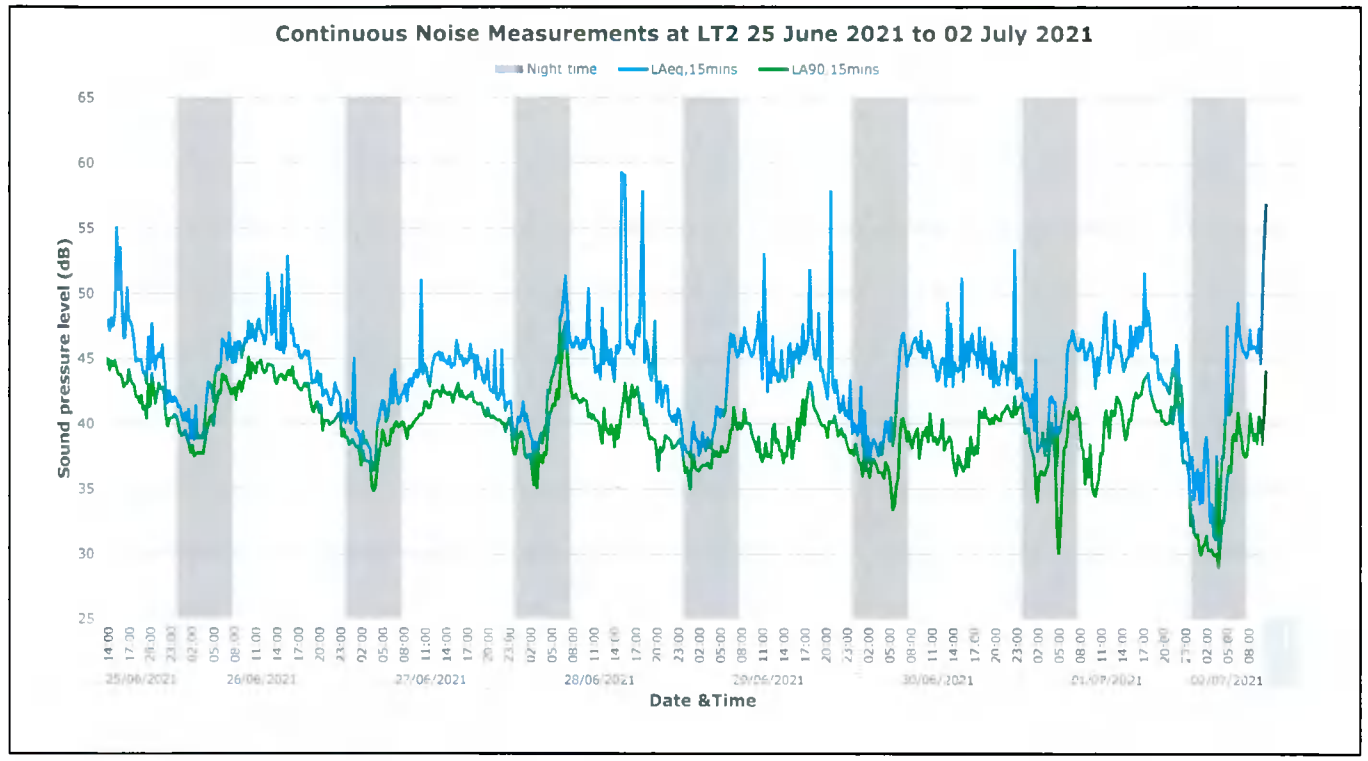


Figure 9.4: Continuous noise measurements at LT2

Table 9.12: Summary of Noise Measurements at Monitoring Position ST1

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
23/06/2021	23:17	54	40
24/06/2021	00:28	48	39
	01:33	45	37
02/07/2021	11:14	67	46
	13:31	69	49
	16:58	69	51

9.70 The noise climate at STI was dominated by road traffic noise during the daytime, with occasional planes and helicopters also contributary. Other sources included cyclists in the cycle lane along New Nagor Road and birdsong. During the night time, road traffic noise was reduced with only one car approximately every 30mins. Humming from nearby industrial units was more clearly audible during the night time measurements.

Table 9.13: Summary of Noise Measurements at Monitoring Position ST2

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
23/06/2021	23:39	38	33
24/06/2021	00:48	38	34
	01:54	36	34
02/07/2021	11:35	45	39
	13:52	49	43
	17:19	44	40

9.71 During the daytime the noise climate at ST2 was dominated by distant road traffic noise and the nearby car garage workshop (hammering, banging, and cars idling). During the night time, the noise climate was dominated by distant road traffic noise.

Table 9.14: Summary of Noise Measurements at Monitoring Position ST3

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
24/06/2021	00:05	39	35
	01:13	40	37
	02:11	39	36
02/07/2021	13:11	46	44
	15:41	44	41
	16:38	45	40

9.72 During the daytime the noise climate at ST3 was dominated by distant road traffic noise and the occasional aircraft noise as noted for ST1 above. Some nearby construction noise was also noted. During the night time, humming from other data centers was more audible, along with faunal clicks in nearby trees.

Table 9.15: Summary of Noise Measurements at Monitoring Position ST4

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
24/06/2021	00:52	41	39
	23:43	41	38
	01:53	41	39
02/07/2021	12:52	46	43
	15:22	44	42
	16:20	50	42

9.73 During the daytime the noise climate at ST4 was dominated by road traffic noise and overheard aircraft movements. Other distant sources included a lorry reversing, a car alarm and fan exhaust noise from the Google Data Center. During the night time, road traffic noise was more distant with the 'hum' from Google's plant more audible.

Table 9.16: Summary of Noise Measurements at Monitoring Position ST5

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
23/06/2021	23:22	49	39
24/06/2021	00:31	39	37
	01:35	39	36
02/07/2021	12:32	41	39
	15:01	41	37
	16:01	46	41

9.74 The noise climate at ST5 was similar to that at ST4, with the loudest industrial noise contributions coming buildings located to the north of New Nangor Road. During the night time, it was noted that contributions from Digital Realty's Data Center were more audible.

Table 9.17: Summary of Noise Measurements at Monitoring Position ST6

Date of measurement	Time	$L_{Aeq,15mins}$ dB	$L_{A90,15mins}$ dB
24/06/2021	00:06	34	33
	01:13	50	32
	02:15	36	33
02/07/2021	11:59	64	43
	14:38	64	39
	17:44	65	39

9.75 The noise climate at ST6 in the daytime was dominated by road traffic noise, vehicles accessing the 'Junior Genius' creche, and children playing in the nearby gardens. During the night time, no local vehicle movements were noted except for the measurement at 01:13 when an articulated lorry passed the measurement position. Otherwise, plant noise from the Google Data Center dominated the noise climate during the night time.

9.76 A summary of the weather conditions during the survey period is provided below (as measured at monitoring position LT2):

Table 9.18: Summary of Weather Conditions During Monitoring Period

Average Wind Direction	Average Wind Speed (m/s)	Average Ambient Temperature (°C)	Average Pressure (bar)	Average Precipitation (mm)
South-East (SE)	1.3	14.1	1009.6	0.0

Future Baseline

9.77 The future baseline of the site and study area will be the continued construction of phases of the business parks across the area defined by the South Dublin County Council Development Plan 2016-22 under use zoning Objective EE.

9.78 If any new development of a data center (or other) were proposed, an assessment of the potential noise and vibration effects on the surrounding receptors would need to be considered.

9.79 The Existing Baseline has been used to form the basis of the noise and vibration assessment as this provides a reasonable worst-case.

Assessment of Effects

9.80 The assessment of effects has taken account of the following embedded mitigation.

Embedded Mitigation

Demolition and Construction

9.81 Standard best practice controls and measures, as detailed below, will be adopted onsite to ensure that noise management forms an integral part of the contractor's scope of works.

Construction Environmental Management Plan

9.82 A Construction Environmental Management Plan (CEMP) will be prepared that defines construction mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors. This will be updated as the project progresses to incorporate specific measures for all phases of the construction works where noise and vibration may give rise to disturbance.

9.83 The CEMP will include the following Best Available Techniques (BAT):

- Demolition operations will be organised with regard to positioning of plant and movement of vehicles so as to minimise noise adjacent to properties.
- Use of plant conforming with relevant Irish standards, directives or recommendations on noise or vibration.
- Works will only be carried out within agreed working hours. Restricted working hours (including Monday-Friday: 07:00-19:00, Saturday: 08:00-13:00, and no working on Sundays or Bank Holidays). Planning of working hours to take account of the effects of noise and vibration upon persons in areas surrounding site operations and upon persons working onsite.
- Construction plant will be maintained in good condition with regards to minimising noise output and workers exposed to harmful noise and vibration.
- All drivers to site, including deliveries, will drive vehicles in a considerate manner in accordance with the specified speed limits with any failure to comply addressed as per infringements of the contractor's Project Health and Safety Plan.
- Construction plant will be operated and maintained appropriately, having regard to the manufacturer's written recommendations and maintenance programmes.
- Starting-up plant and vehicles sequentially rather than all together. Plant, equipment and site vehicles will be switched off when not in use.
- Construction traffic will only use the designated routes as per the construction traffic management plan as outlined in Chapter 5: Construction Description.
- The transport of construction materials, spoil and personnel will be programmed and routed to reduce the risk of increased noise and vibration impacts.
- Adoption of quiet working methods, using plant with lower noise emissions, where reasonably practicable.
- Use of silenced and well-maintained plant conforming with the relevant Irish directives relating to noise and vibration. Vehicle and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers and/or mufflers, maintained in good working order and operated in such a manner as to minimise noise emissions.
- Construction plant and activities will be positioned to minimise noise at sensitive locations.
- Equipment that breaks concrete by munching or similar, rather than by percussion, will be used as far as is practicable.
- Mufflers will be used on pneumatic tools.
- Avoiding breaking out hard surfaces using percussive techniques, where reasonably practicable. Where practicable, rotary drills actuated by hydraulic or electrical power will be used for excavating hard materials.
- Controlled Demolition Techniques: In order to reduce the noise and vibration impacts associated with the demolition activities across the site, the works will be undertaken using controlled demolition techniques. This approach requires the demolition methodology to be planned meticulously in advance of works commencing to ensure potential environmental disturbances to surrounding receptors are minimised wherever possible i.e. noise, vibration, dust.
- Adoption of working methods that minimise vibration generation, where reasonably practicable;
- Locating plant away from noise and vibration sensitive receptors, where feasible;
- Use of site hoarding, assumed 2.4m high, and acoustic screening for static items of plant and work areas, where feasible;
- Avoiding unnecessary revving of engines and switch off equipment, when not required;
- Keeping internal haul routes well maintained and avoid steep gradients;
- Use of rubber linings for chutes and dumpers to reduce impact noise;
- Minimisation of drop height of materials;
- Carrying out regular inspections of noise mitigation measures to ensure integrity is maintained at all times;
- Providing briefings for all site-based personnel so that noise and vibration issues are understood, and mitigation measures are adhered to;
- Management of plant movement to take account of surrounding noise sensitive receptors, as far as is reasonably practicable; and
- Carrying out compliance monitoring of onsite noise and vibration levels to ensure that the agreed limits are being adhered to.

9.84 An appropriate community awareness campaign will be undertaken to provide information to people residing in properties in the vicinity of the construction works, to reduce the likelihood of negative impacts on the public which could result in complaints. The level of engagement will vary depending upon the expected effects experienced by individual receptors due to the construction works.

9.85 It is envisaged that the public awareness campaign will provide local residents with the following items of information:

- The nature of the works being undertaken;
- The expected duration of the works;
- The contractor's working hours;
- Mitigation measures that have been adopted to minimise noise and vibration, as detailed in the CEMP; and
- Contact details in the event of a noise disturbance.

9.86 If work is required to extend into periods beyond the agreed hours, separate authorisation will be secured with SDCC via the CEMP or other agreement process.

9.87 Best Available Techniques (BAT) as defined in Section 7 of the Protection of the Environment Act will be implemented as part of the working methodology as detailed in the CEMP. This will serve to minimise the noise and vibration effects at receptors in the vicinity of the construction works. The reduction in noise levels provided through the implementation of BAT varies depending on the nature of the works; however, values in excess of 5 dB can be expected through a combination of appropriate measures and the use of site hoardings for noise screening.

Operational

9.88 For operational phase processes and locations, reference should be made to the phasing plan details and drawings included in EIAR Chapter 4 and the phasing/modelling scenarios set out earlier in this chapter.

Proposed Generator Buildings (Multifuel Generation Plant)

Exhaust Stacks

9.89 5no. Wartsilla 20V34SG engines are proposed in each of the two generator halls. The sound power per engine exhaust is shown below:

Table 9.20: Wartsilla 20V34SG engine noise

Total (dBA)	Sound Power Level L_{wA} (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
119.8	88.0	103.0	110.0	113.0	114.0	111.0	114.0	-

9.90 Each exhaust stack will include silencers to reduce the engine noise by 45dB.

Internal reverberant noise level

9.91 The following internal reverberant noise level from within the engine halls has been used. This is based on 5no. Wartsilla 20V34SG engines running in each generator hall.

Table 9.21: Internal reverberant noise level in generator halls used in the assessment

Total (dBA)	Internal reverberant noise level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
105.8	74.1	89.1	96.1	99.1	100.1	97.1	100.1	-

Building Envelope Construction

9.92 The current building design allows for the following building envelope construction:

- 0.7mm standing seam steel outer
- 160mm Rockwool 100kg/m^3 (1 x 60mm + 1 x 100mm)
- 5mm Tecsound (10kg/m^2)
- 1.2mm profiled steel liner

9.93 The estimated performance of this construction is as follows:

Table 9.22: Generator building envelope construction octave band transmission loss used in the assessment

Transmission loss of building envelope (dB)	Approx R_w (dB)	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
	50	20	28	37	49	55	58	64	-

Noise from Air Inlets/Exhausts

9.94 The noise level from each air inlet/exhaust will be limited to 65 dBA at 1m from the external louvre/duct. This has been calibrated within the model using the spectrum for the internal reverberant noise level, corrected to 65 dBA at 1 m.

Remote radiators

9.95 The air-cooled radiators associated with the MFGP will be selected to be 'ultra-ultra-low noise'. The A-weighted sound power level $L_{w,A}$ for one 3-fan cooling radiator is shown below. We have assumed this data is applied evenly over the radiator per fan for the model.

Table 9.23: Remote radiator fan noise used in the assessment

Total (dBA)	A-weighted Sound Power Level $L_{w,A}$ (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
88	92.2	93.1	88.6	85.2	83.0	77.8	73.0	65.1

Barriers/Screens

Substation compound

9.96 The proposed substation compound will include a min. 3m high brick blast wall to its full perimeter.

External Plant Installations

Rooftop Chillers per data hall

9.97 There are 12no. Airedale TurboChill V chillers proposed per roof of each data hall. The sound power per chiller is as follows:

Table 9.24: Sound power L_w (dB) as a function of frequency (Hz) per chiller

Total (dBA)	Sound power L_w (dB) at Octave Band Centre Frequency (Hz) per chiller							
	63	125	250	500	1k	2k	4k	8k
99.2	72.0	87.7	98.6	96.5	93.2	90.7	89.4	86.6

9.98 Each chiller will include an acoustic package with attenuated inlet and discharge, providing the following minimum insertion losses:

Table 9.25: Chiller acoustic package octave band insertion loss used in the assessment

Insertion loss (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
4.0	8.0	13.0	22.0	24.0	21.0	18.0	14.0

Step-up Substation

9.99 3no. transformers will be located in the external substation compound. A sound power of 106 dB L_w has been assumed per transformer in the model.

Emergency generators

9.100 36 no. KD3300-F emergency generators will be included (11no. per hall). These will be housed in containers and include silencers to attenuate noise levels to 85dBA at 1m. The following sound levels have been used in the model:

DATA:

Generator set: KD3300-F
Engine: KD83V16-5BFS @ 1500RPM
Radiator Cooling airflow: 46m³/s @ 300Pa.
Absorbed fan Power: 70kW
Combustion airflow: 3.262m³/s
Overall Noise : 85dB(A)@1m

NOISE DATA FOR PROPOSED GENERATOR SET, CANOPY
designed to achieve 85dB(A)@1m around the perimeter under standard test conditions Free Field .

FREQUENCY (Hz)	Octave band Centres (dB). 63	125	250	500	1000	2000	4000	8000	OVERALL dB(A)
UNSILENCED ENGINE NOISE L_W	119.4	126.3	125.6	118.7	117.7	116.9	114.6	114.7	..
UNSILENCED Radiator fan L_W (Calculated)	119	123	124	125	125	125	123	121	130
CANOPY PREDICTED L_P @1m	64.1	74.3	78.2	75.9	69.9	56.9	56.9	52.8	81.6
INLET ATTN PREDICTED L_P @1m	99.3	96.3	80.7	67.3	58.2	55.2	60.2	74	82.2
DISCHARGE PREDICTED L_P @1m	102.6	97.1	80.8	62.8	56.7	56.1	54.0	72.8	83.1
UNSILENCED EXHAUST NOISE Lw SDMO Data	129.9	142.9	135.2	129.3	125.4	123.8	125.6	124.2	..
PREDICTED EXHAUST L_P @1m	99.0	95.0	87.0	69.0	60.0	54.0	56.0	59.0	83.0

NOTES: Grey areas above denote source data stated in L_W Sound Power levels.
White areas above denote calculated data, stated in L_P Sound Pressure levels at 1m from the unit.

Calculations for noise within the unit is carried out using both the engine and radiator fan as noise sources to ensure "Beaming" from fan Pure Tones is prevented in the discharge attenuator.

Figure 9.5: Emergency Generator Sound Levels

Demolition and Construction Effects

Demolition and Construction Noise

9.101 Reference should be made to Appendix 9.2 for details of the demolition and construction noise calculation that has been used to inform this summary.

9.102 Table 9.26 presents the mitigated noise levels (dBA) at various distances from the construction activities taking place at the site. A +3 dB building façade correction factor has been applied in accordance with BS5528:2009+A1 2014.

Table 9.26: Demolition and construction noise assessment results, dB L_{Aeq} (façade levels)

Activity	NSR1 (New Nangor Road)	NSR2 (Baldonnel Rd)	NSR3 (Baldonnel Rd)	NSR4 (Baldonnel Rd)
Min. separating distance	38 or 75m[1]	500m	445m	480m
Enabling Works	65	43	44	44
Demolition	62	46	47	46
Substructure	62	45	46	45
Superstructure	54	38	39	38
Internal Fit-out	52	34	35	35
External Works	64	42	43	42

[1]38 m from Enabling/External Works, 75 m from other activity at the proposed development.

9.103 The noise levels at the identified noise sensitive receptors are not predicted to exceed the threshold criteria as demonstrated by the above table.

9.104 On the basis of the predicted mitigated noise levels and distances to receptors, the demolition and construction works are predicted to give rise to noise levels that will constitute a direct temporary short term **Slight, Negative** and **Not Significant** effect in terms of EIA.

Demolition and Construction Traffic Noise

9.105 The assessment has calculated a maximum number of trips per hour to not exceed the construction noise limit (65 dB L_{Aeq}).

9.106 Based on a (80 dBA at 10m) 44t lorry travelling at 34 kph, the peak permissible number of HGV vehicle movements passing a receptor at 5m has been assessed as 8 per hour, or 4 return journeys per hour. On this basis the predicted construction traffic noise level would be calculated as 64.7 dB L_{Aeq}. This would constitute a direct temporary short term **Slight, Negative** and **Not Significant** effect in terms of EIA.

9.107 Notwithstanding this, the management of construction vehicle movements will form an integral part of the CEMP.

Construction Vibration

9.108 With reference to Table 9.5 and the distances to surrounding NSRs throughout the various phases of the work, there is potential that construction induced vibration may be perceptible. The activities that are most likely to give rise to just perceptible levels of vibration are certain earthworks activities. This would constitute a medium level of impact, prior to application of the embedded mitigation. With application of BAT within the CEMP, it is expected that the magnitude of impact would be low.

9.109 This constitutes a direct temporary short term **Slight, Negative** and **Not Significant** effect in terms of EIA.

Operation Effects

Building Services Plant

Noise Emission Limits

9.110 The specifications for fixed plant installations serving the proposed development have been based on the following noise limits, which have been set in accordance with BS4142:2014+A 2019 and local requirements.

9.111 Limits are set at 1m from the window of the nearest NSRs and include a façade reflection.

Table 9.27: Noise Emissions Limits for New Building Services Plant

NSR reference	Time Period	Representative Background Noise Level $L_{A90,15min}$ (dB)	Rating Noise Limit $L_{Ar,Tr}$ (dB)	Emergency Noise Limit $L_{Aeq,1hr}$ (dB)

Table 9.27: Noise Emissions Limits for New Building Services Plant				
1	Daytime (07:00-19:00)	46	≤56	55
	Evening (19:00-23:00)	44	≤44	55
	Night-time (23:00-07:00)	42	≤42	55
2-4	Daytime (07:00-19:00)	42	≤52	55
	Evening (19:00-23:00)	40	≤40	55
	Night-time (23:00-07:00)	38	≤38	55

9.112 The proposed development is expected to run 24 hours a day, 7 days a week, therefore the assessment has taken into account the noise emission limits during night time only (for normal operation).

Modelled Sound Levels – Normal Operations

9.113 In order to quantify the levels of environmental noise affecting the surrounding NSRs, noise levels have been predicted using the computer noise propagation model, the proposed building constructions, proposed screens and barriers and proposed fixed plant installations, inclusive of any embedded mitigation measures as outlined in this assessment.

9.114 Extracts of the noise model are shown in Figure 9.6, Figure 9.7, and Figure 9.8.

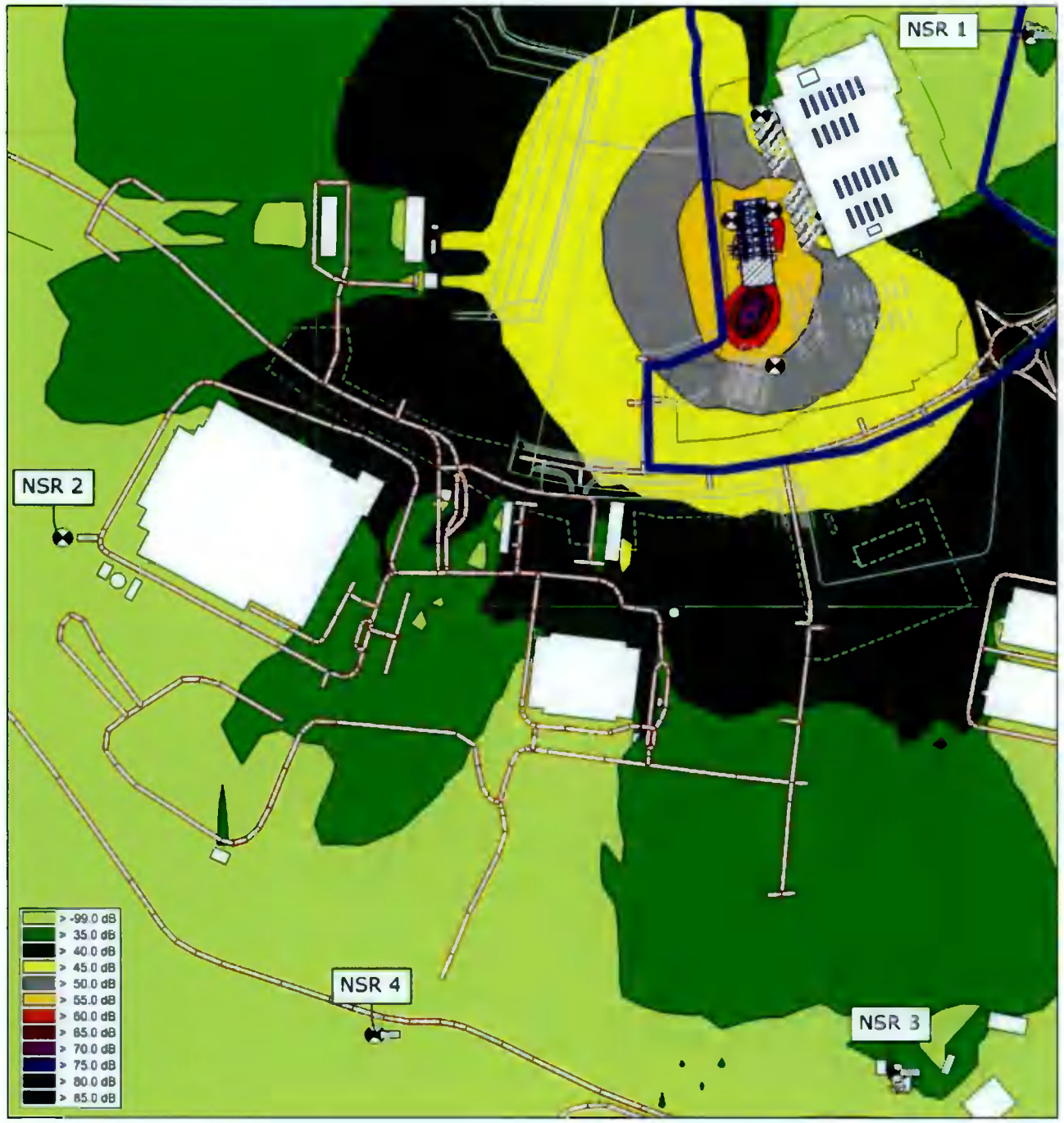


Figure 9.6: Overview of modelled noise emissions (Scenario 1) Grid set at 4.0 AGL

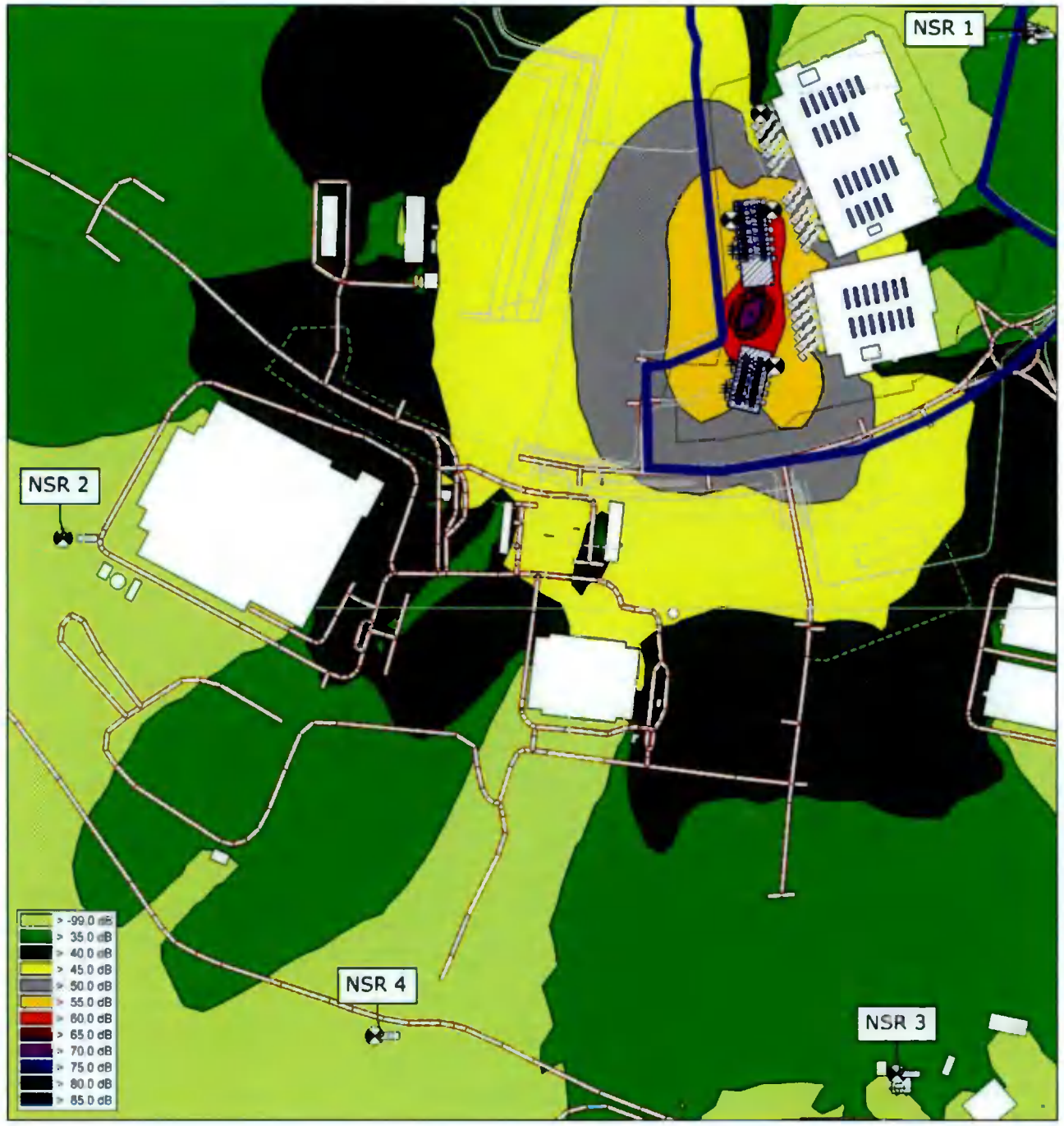


Figure 9.7: Overview of modelled noise emissions (Scenario 2) Grid set at 4.0 AGL

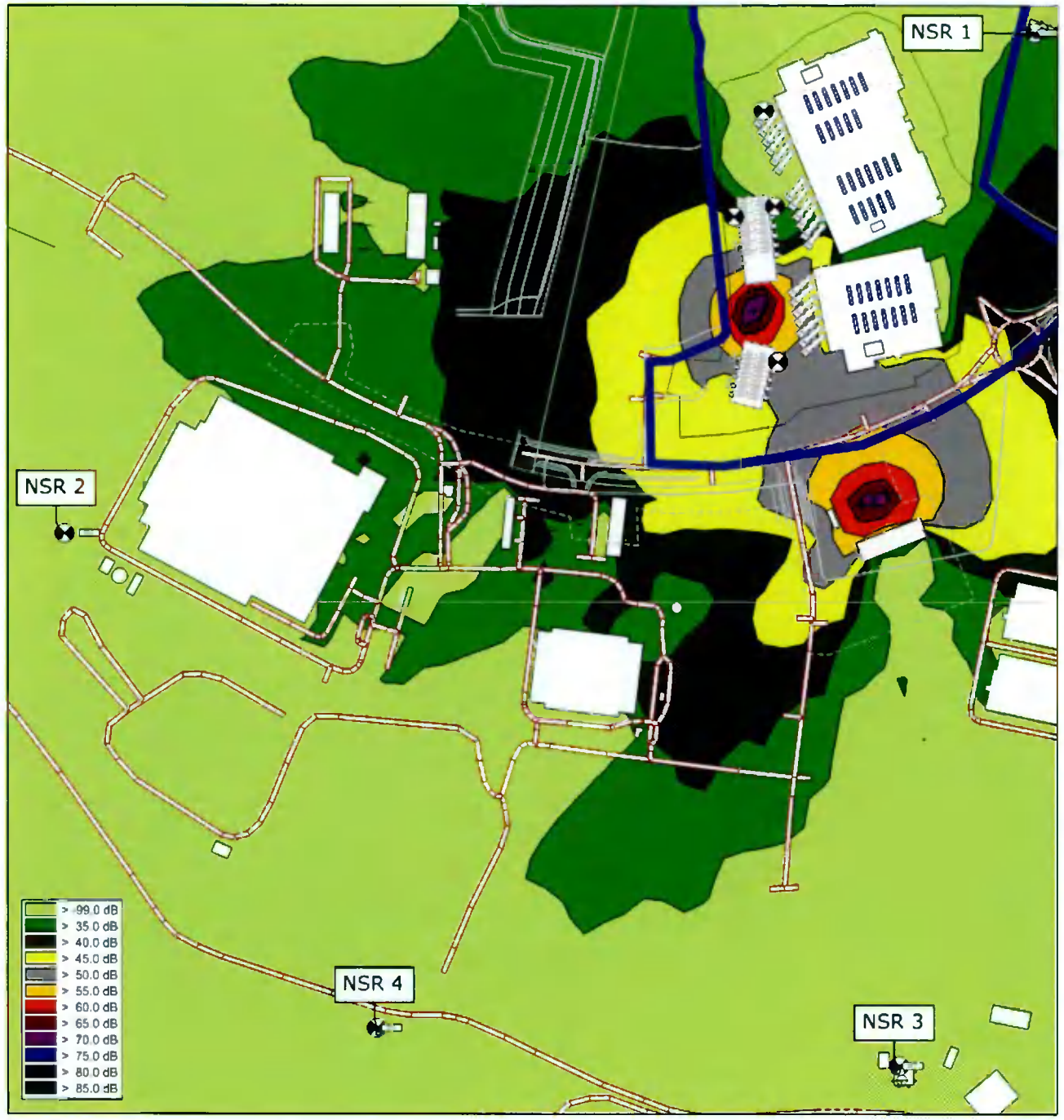


Figure 9.8: Overview of modelled noise emissions (Scenario 3) Grid set at 4.0 AGL

9.116 The predicted noise levels at each NSR location for the three scenarios are presented below in Table 9.28.

Table 9.28: Predicted normal operational building services noise at NSR at 1m from the façade with façade reflection

NSR reference	Rating Noise Limit $L_{Ar,Tr}$ (dB)	Predicted Rating Noise Level $L_{Ar,Tr}$ (dB)		
		Scenario 1	Scenario 2	Scenario 3
1	42	38	39	38
2	38	30	32	26
3	38	37	38	28
4	38	29	32	32

9.117 The above table shows that for Scenario 1, the predicted noise rating levels at NSRs meet the required limits. This constitutes a direct temporary to short-term **Slight, Negative** and **Not Significant** effect in terms of EIA.

9.118 The above table shows that for the worst-case scenario (i.e. Scenario 2 with all non-emergency kit running), the predicted noise rating levels at NSRs meet the required limits. This constitutes a direct permanent long-term **Slight, Negative** and **Not Significant** effect in terms of EIA.

9.119 The above table shows that for the best-case scenario (i.e. Scenario 3 with all non-emergency kit running), the predicted noise rating levels at NSRs meet the required limits. This constitutes a direct permanent long-term **Slight, Negative** and **Not Significant** effect in terms of EIA.

Modelled Sound Levels – Emergency Condition

9.120 Extracts of the noise model showing the calculated noise levels during the emergency condition for Scenarios 1-3 are shown in Figure 9.8, Figure 9.9 and Figure 9.10.

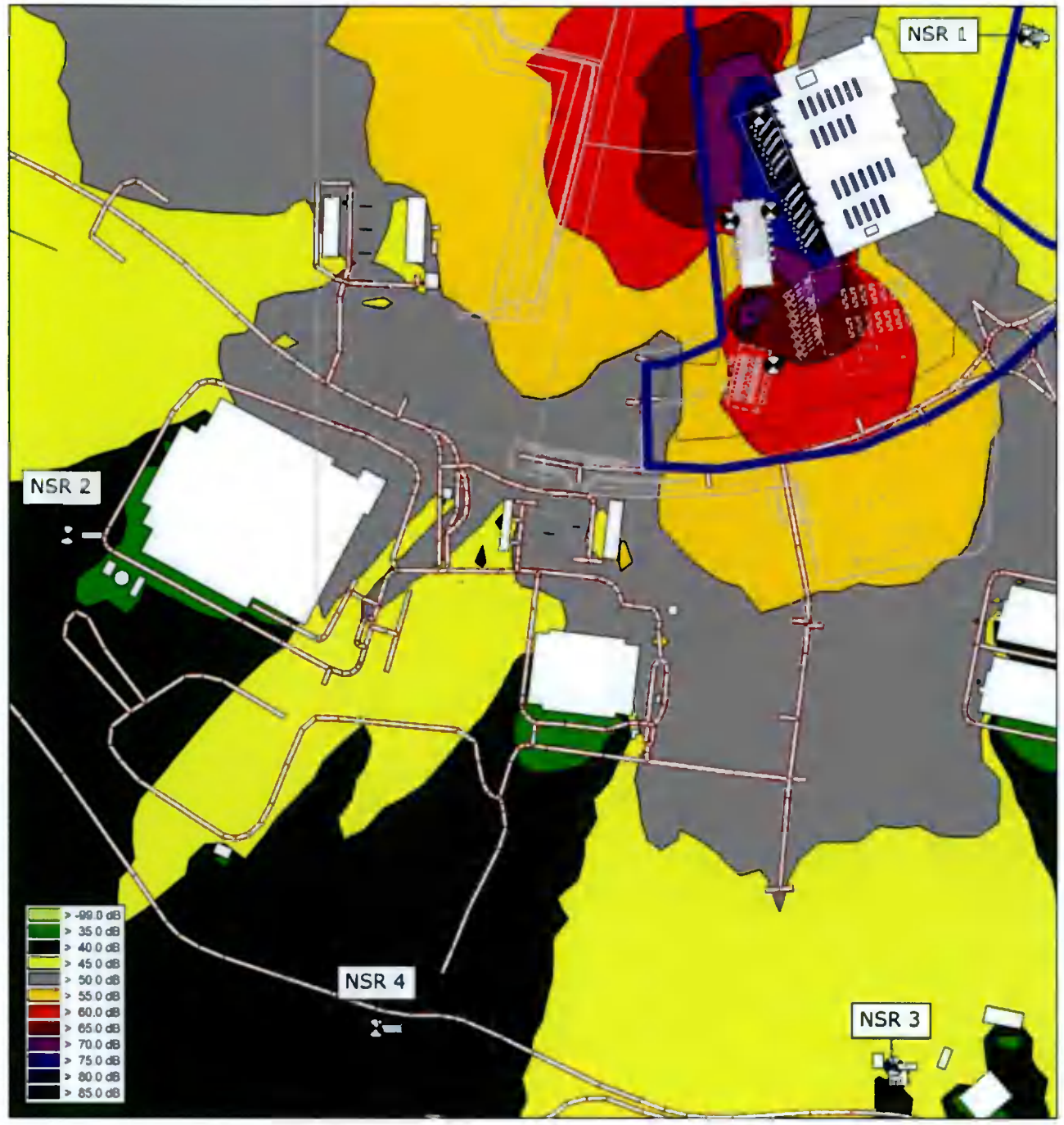


Figure 9.8: Overview of modelled emergency noise emissions (Scenario 1) Grid set at 4.0 AGL

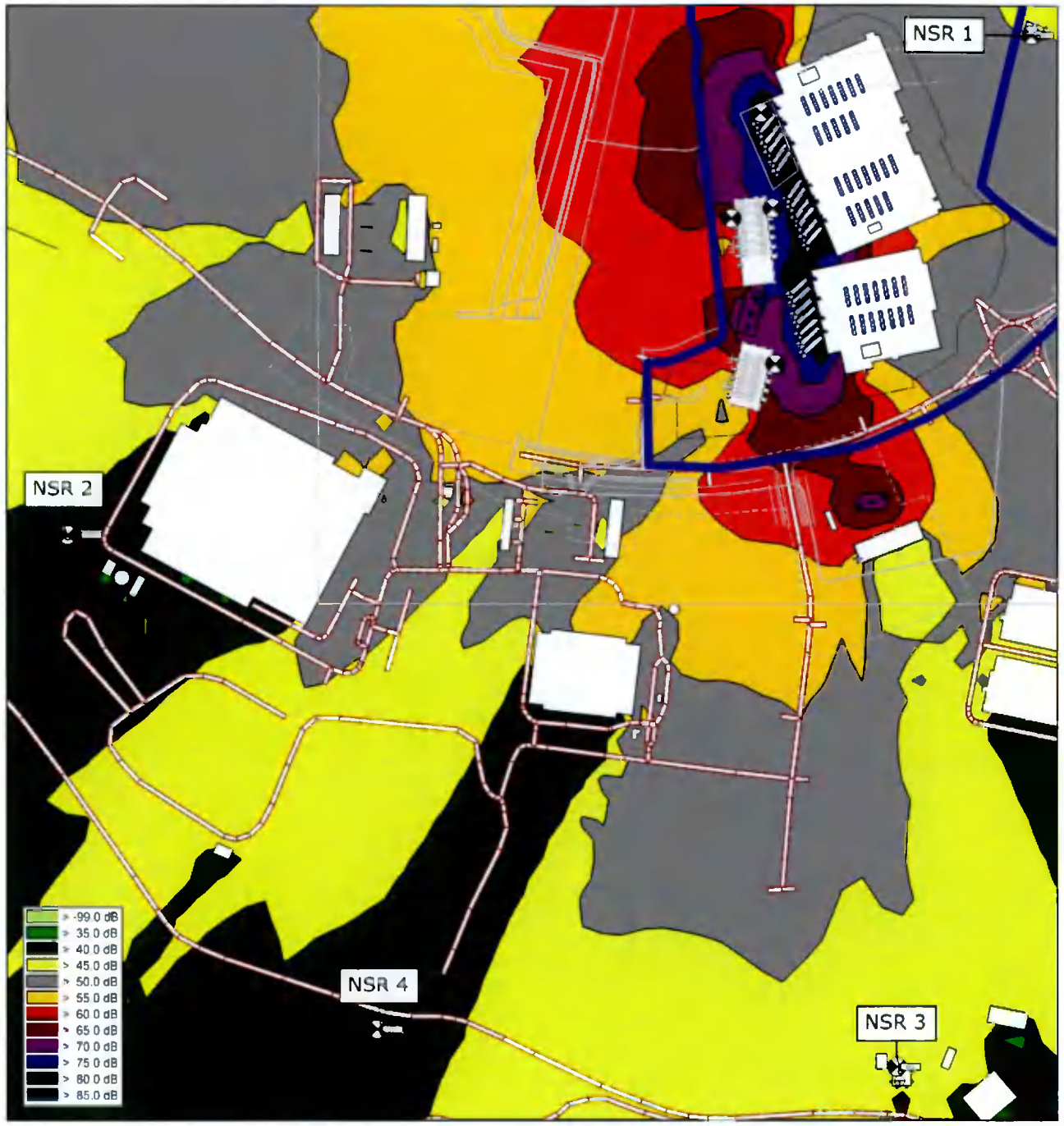


Figure 9.9: Overview of modelled emergency noise emissions (Scenario 2) Grid set at 4.0 AGL

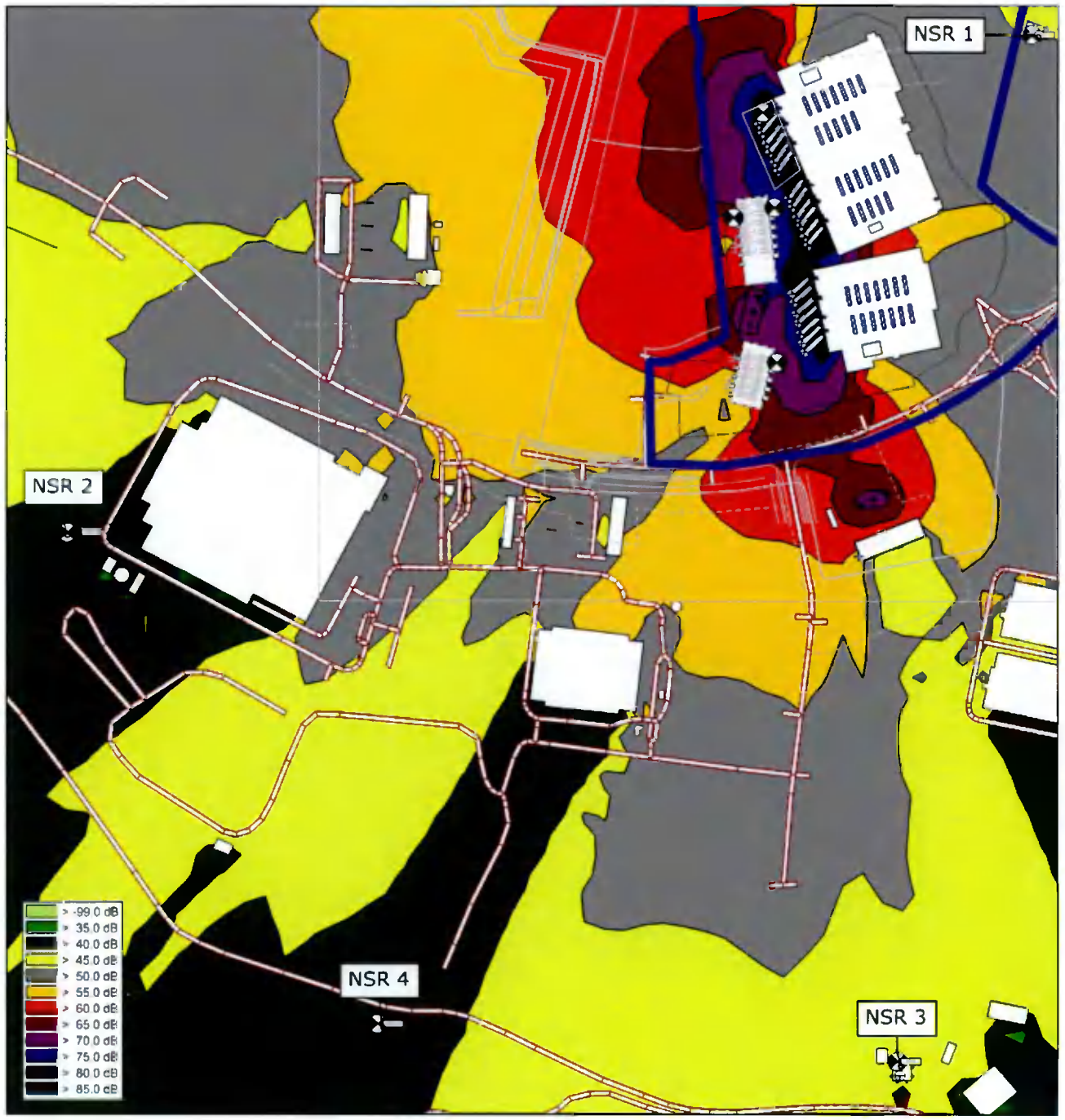


Figure 9.10: Overview of modelled emergency noise emissions (Scenario 3) Grid set at 4.0 AGL

9.122 The worst-case predicted noise levels at each NSR location for the emergency scenarios are presented below in Table 9.29.

Table 9.29: Predicted emergency operational building services noise at NSR at 1m from the façade with façade reflection

NSR reference	Emergency Noise Guideline Limit $L_{Aeq,1hr}$ (dB)	Predicted Emergency Noise Level $L_{Aeq,1hr}$ (dB)		
		Scenario 1	Scenario 2	Scenario 3
1	55	51	52	53
2	55	42	44	44
3	55	49	50	50
4	55	41	44	43

9.123 The above table shows that for the emergency scenarios, the predicted noise rating levels constitute a direct temporary brief **Slight, Negative** and **Not Significant** effect in terms of EIA.

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

9.124 No significant effects are identified therefore no additional mitigation is proposed.

9.125 The CEMP will include provision for monitoring to see that construction phase noise levels do not exceed thresholds above which significant effects may occur. Any complaints will be recorded and addressed with additional mitigation considered as appropriate.

Operation Stage

9.126 No significant effects are identified therefore no additional mitigation is proposed.

9.127 It is expected that compliance with the adopted criteria for plant noise emissions can be achieved through use of a suitably worded planning condition.

9.128 Noise and vibration monitoring has not been proposed during the operational phase of the proposed development.

Enhancement Measures

9.129 No enhancement measures are proposed in respect of noise and vibration.

Demolition and Construction Residual Effects

9.130 As no additional mitigation would be required, the residual demolition and construction effects remain as reported in the assessment of effects section:

- Direct temporary short term **Slight, Negative** and **Not Significant** in terms of EIA for demolition and construction noise;
- Direct temporary short term **Slight, Negative** and **Not Significant** in terms of EIA for demolition and construction traffic noise; and
- Direct temporary short term **Slight, Negative** and **Not Significant** in terms of EIA for construction vibration.

Operation Residual Effects

9.131 As no additional mitigation would be required, the residual operation effects remain as reported in the assessment of effects section:

- Direct temporary short term **Slight, Negative** and **Not Significant** in terms of EIA for Scenario 1 (Phase 1 worst-case) without emergency kit running;
- Direct permanent long term **Slight, Negative** and **Not Significant** in terms of EIA for Scenario 2 (Phase 2 worst-case) without emergency kit running;
- Direct permanent long term **Slight, Negative** and **Not Significant** in terms of EIA for Scenario 2 (Phase 2 best-case) without emergency kit running; and
- Direct brief to temporary **Slight, Negative** and **Not Significant** in terms of EIA for all scenarios (Phase 1 and Phase 2) with emergency kit running.

Summary of Residual Effects

9.132 Table 9.30 provides a tabulated summary of the outcomes of the noise and vibration assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 9.30: Summary of Residual Noise and Vibration Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
Local Residents	Demolition and Construction Noise	None required	Slight	-	L	D	IR	T to St
Local Residents	Demolition and Construction Traffic Noise	None required	Slight	-	L	D	IR	T to St
Local Residents	Construction Vibration	None required	Slight	-	L	D	IR	T to St
Operation								
Local Residents	Plant noise emissions Phase 1	None required	Slight	-	L	D	IR	T to St
Local Residents	Plant noise emissions Phase 2 (worst-case)	None required	Slight	-	L	D	IR	Lt
Local Residents	Plant Noise emissions Phase 2 (best-case)	None required	Slight	-	L	D	IR	Lt
Local Residents	Plant noise emissions during Phase 1 and Phase 2 + emergency kit	None required	Slight	-	L	D	IR	B to T

Notes:
* - = Negative/ + = Positive/ +/- Neutral; D = Direct/ I = Indirect; P = Permanent/ T = Temporary; R=Reversible/ IR= Irreversible; M = Momentary/ B =Brief/ T = Temporary/ St- Short term/ Mt –Medium term/ Lt –Long term/ P = Permanent
**Imperceptible/Not Significant/Slight/Moderate/Significant/Very Significant/Profound

Cumulative Effects

Intra-Project Effects

9.133 As explained in Chapter 2: EIAR Process and Methodology, intra-project cumulative effects are discussed in Chapter 16.

Inter-Project Effects

9.134 Table 9.31 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 9.31: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
Microsoft - Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 [SD20A/0283]	No	Demolition and construction phases do not overlap and therefore no effects considered likely	No	Application site emissions calculated to be up to 39 dB $L_{Ar,Tr}$ at nearest receptors and Microsoft site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
UBC Properties - Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0121]	No	As construction periods overlap, there is potential for cumulative effects to occur. However, given the distance of the UBC site from the identified receptors it is considered that construction noise levels would be sufficiently attenuated below the construction noise levels associated with the Application Site, and therefore are not considered significant.	Mo	Application site emissions calculated to be up to 39 dB $L_{Ar,Tr}$ at nearest receptors and UBC Properties site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
UBC Properties - Grange Castle South Business Park, Dublin 22 [An Bord Pleanála Reference – 308585]	No		No	Application site emissions calculated to be up to 39 dB $L_{Ar,Tr}$ at nearest receptors and UBC Properties site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
Digital Reality Trust - Profile Park, Baldonnell, Dublin 22, D22 TY06 [SD17A/0377]	No	Already constructed	No	Operational noise included within the baseline characterisation for the application site.
Equinix (Ireland) Ltd, Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 [SD21A/0186]	No	As construction periods overlap, there is potential for cumulative effects to occur. However, given the distance of the Application site from the identified receptors it is considered that construction noise levels would be sufficiently attenuated below	No	Application site emissions calculated to be up to 39dB $L_{Ar,Tr}$ at nearest receptors and Equinix site has been designed to 45dB $L_{Ar,Tr}$ emissions limit. Worst-case 1dB cumulative level expected which is not significant.

Table 9.31: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
		the construction noise levels associated with the Equinix Site, and therefore are not considered significant		
Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 [SD18A/0134]	No	Already constructed	No	Operational noise included within the baseline characterisation for the application site.
Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 [SD20A/0295]	No	Already constructed	No	Operational noise included within the baseline characterisation for the application site.
Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 [An Bord Pleanála Ref - 309146]	No	Demolition and construction phases do not overlap and therefore no effects considered likely	No	Application site emissions calculated to be up to 39 dB $L_{Ar,Tr}$ at nearest receptors and Cyrus site has been designed to 45 dB $L_{Ar,Tr}$ emissions limit. Worst-case 1 dB cumulative level expected which is not significant.
Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 [SD21A/0167]	No	As construction periods overlap, there is potential for cumulative effects to occur. However, given the distance of the Centrica site from the identified receptors it is considered that construction noise levels would be sufficiently attenuated below the construction noise levels associated with the	No	Application site emissions calculated to be up to 39 dBA at nearest receptors and Centrica site has been designed to 45 dBA emissions limit. Worst-case 1 dB cumulative level expected which is not significant.

Table 9.31: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
		Application Site, and therefore are not considered significant		

9.135 On the basis of the above table, the background noise levels are likely to increase as a result of the committed developments shown. The baseline characterisation undertaken for the application site will have therefore been undertaken when background levels were lower and, as such, the noise emissions limits set out in this assessment are likely to be significantly below future baseline noise levels.

9.136 In addition to the above, as part of the cumulative assessment, consideration has also been given to the proposed permanent electrical connection for the site that would be located <50 m to the south-east of the site. This will comprise a 110 kV GIS substation and two underground circuit transmission lines and would be subject to a strategic infrastructure development (SID) application to An Bord Pleanála (ABP) in due course. This has been considered in combination with the application site noise emissions and its contribution is included within the reported levels (Scenario 3).

9.137 In the event of a power failure from the national grid, cumulative impacts would be expected from emergency plant from each development. However, these would be expected to be temporary/brief in nature and therefore **not considered significant.**

Summary of Assessment

Background

9.138 This chapter has detailed the potential noise and vibration effects due to the demolition and construction and operation stages of the proposed development. The assessment of has taken into account the relevant national and local guidance and regulations.

9.139 Attended and unattended noise monitoring surveys were undertaken to establish the existing noise climate across the application site. The existing baseline noise climate is generally dominated by road traffic noise and noise from fixed plant installations associated with other industrial activity in the nearby vicinity (data centers). The results of the noise surveys have been used to assess demolition and construction, and operation effects attributable to the application site.

Demolition and Construction Effects

9.140 The assessment of noise and vibration during the demolition and construction phase was undertaken in accordance with BS5228:2009+A1:2014, using representative data for the various phases of the works. The assessment has considered the following phases of construction:

- Demolition;
- Enabling Works and Stream Enhancements;
- Substructure;
- Superstructure;
- Internal Fit-out; and
- External works.

9.141 An assessment of construction traffic noise has also been undertaken to calculate the number of HGV movements permissible per hour, along with consideration of the distance at which perceptible levels of vibration may occur from construction activities.

9.142 With the adoption of a CEMP and BAT implemented as part of the demolition and construction stage embedded mitigation, it is considered that the noise and vibration impacts can be controlled sufficiently to achieve acceptable levels at the surrounding sensitive receptors.

9.143 Overall, it is considered that the demolition of the existing site and construction of the proposed development would result in direct temporary to short term Slight, Negative effects for the identified receptors, and as such **would not give rise to significant effects in terms of EIA**.

Operation Effects

9.144 The proposed development will be designed to achieve the noise emission limits as stipulated by SDCC, which requires that the rating noise level does not exceed the representative background noise level, set in accordance with the principles of BS4142:2014+A1 2019. The effects of noise emissions from proposed fixed items of plant have been considered for Phase 1A and Phase 2B of the proposed development, along with consideration of emergency conditions in the event of the proposed development losing grid power. On the basis of the proposed design, noise emissions are predicted to meet the prescribed limits at the nearest noise sensitive receptors.

9.145 Overall, it is considered that the operation stage would result in a direct permanent long-term Slight, Negative effect, and as such **would not give rise to significant effects** on noise and vibration in terms of EIA. During emergency conditions, there would be direct brief temporary Slight, Negative effect that would **not give rise to significant effects in terms of EIA**.

Cumulative Effects

9.146 The proposed development has the potential to result in cumulative effects when considered in combination with other committed developments. However, the proposed development has been designed to lower noise emissions levels than other committed developments. As such it is expected that the future baseline noise levels would be higher, irrespective of whether this development went ahead. As such, cumulative effects are **not considered significant** in terms of EIA.

10 WATER RESOURCES AND FLOOD RISK

Introduction

10.1 This chapter of the EIAR reports on the likely significant water resources and flood risk effects to arise from the demolition and construction stage and the operation stage of the proposed development.

10.2 The chapter describes the water resources and flood risk policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely water resources and flood risk effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

10.3 The chapter is supported by the following technical appendices in ES Volume 3:

- Technical Appendix 10.1: Pinnacle Consulting Engineers, Engineering Planning Strategy, P210501 (containing details of the proposed site drainage and water supply); and
- Technical Appendix 10.2: Kilgallen & Partners Consulting Engineers, Report on Site-Specific Flood Risk Assessment, 21054-R-SSFRA (Issue PL2).

Methodology

10.4 The assessment has been informed by the following legislation, policies and published guidance:

- International Legislation:
  - Water Framework Directive (WFD) (2000/60/EC)[1];
  - Environmental Quality Standards (EQS) Directive (2008/105/EC)[2] (as amended)[3];
  - Priority Substances Directive (2008/105/EC)[4];
  - Directive 2014/52/EU. The assessment of the effects of certain public and private projects on the environment[5]
- National Legislation and Policy:
  - Planning and Development Act, 2000, Updated to 16 July 2021[6];
  - The Planning System and Flood Risk Management, Guidelines for Planning Authorities[7]
  - Department of Housing, Local Government and Heritage's Guidelines for Planning Authorities and An Board Pleanála on carrying out Environmental Impact Assessment (2018)[8].
  - Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Roads Authority (NRA), 2009)[9];
  - Government of Ireland Climate Action Plan (2021)[10];
- Regional Policy:
  - South Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council[11];
  - Greater Dublin Regional Code of Practice for Drainage Works: Version Draft 6.0 [12];
- National Guidance and Industry Standards:
  - Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites (Eastern Regional Fisheries Board (ERFB)[13];
  - Inland Fisheries Ireland, 2016, Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters[14]
  - Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors[15];
  - Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements[16]

Assessment Scope

10.5 Chapter 2: EIA Process and Methodology explains the assessment methodology used throughout this EIAR. The assessment in this chapter is a qualitative one, and the evaluation of significance and effects is ultimately a matter of professional judgement.

10.6 This assessment has taken account of applicable legislation, guidance and policy.

Technical Scope

10.7 The assessment of the potential impacts and likely effects of the proposed development on water resources and flood risk has considered the following:

- Contamination of controlled waters (surface water or groundwater) arising from demolition and construction works and associated drainage;
- Tidal or fluvial flood risk, both in terms of impacts to the proposed development and changes to flood risk in the study areas or to downstream receptors as a result of the proposed development;
- Changes to the surface water runoff regime and associated downstream flood risks;
- Regular discharge of surface water, during operational use, and the associated effects on the water quality of the downstream receiving waterbodies;
- Changes to local hydrogeology; and
- Demand of the local potable water network and on foul drainage infrastructure.

[1] European Union, 2000. 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. Document 32000L0060.
[2] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[3] European Union, 2013. Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy Text with EEA relevance. Document 32013L0039.
[4] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[5] European Union, 2014. Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
[6] Government of Ireland, 2000. Planning and Development Act, Updated to 16 July 2021
[7] Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW), 2009. The Planning System and Flood Risk Management, Guidelines for Planning Authorities.
[8] Government of Ireland, 2019. Guidelines for Planning Authorities and An Bord Pleanala om carrying out Environmental Impact Assessment 2018 (last updated 19 December 2019)
[9] National Roads Authority (NRA), 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. NRA.
[10] Government of Ireland. Climate Action Plan (2021). Available at https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/ [Accessed 24/11/2021].
[11] Drainage Dublin, 2005. Greater Dublin Strategic Drainage Study Final Strategy Report
[12] Wicklow County Council, South Dublin County Council, Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire- Rathdown County Council & Dublin City Council. Greater Dublin Regional Code of Practice V6.0
[13] Eastern Regional Fisheries Board, Fisheries Protection Guidelines. Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites
[14] Inland Fisheries Ireland, 2016, Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters
[15] CIRIA, 2001. Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA 532, 2001
[16] Institute of Geologists of Ireland, Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements

Spatial Scope

10.8 In the absence of published guidance, the study area has been defined based on professional judgment as that within a 1 km radius of the site boundary as it is considered unlikely that effects would extend beyond such a geographic area. However, surface water and groundwater quality is often assessed at a river catchment level. Therefore, the potential for impacts on downstream water quality has been considered at a river catchment level.

Temporal Scope

10.9 The assessment has considered impacts arising during the demolition and construction stage, which would be expected to be temporary and short term (1-7 years) in nature, and from the operation stage which would be expected to be permanent and long-term in nature (i.e. more than 20 years).

Baseline Characterisation Method

Desk Study

10.10 In order to establish baseline water resources and flood risk conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- Pinnacle Consulting Engineers, Engineering Planning Strategy, P210501 December 2021 (Technical Appendix 10.1);
- Kilgallen & Partners Consulting Engineers, Report on Site-Specific Flood Risk Assessment, 21054-R-SSFRA Issue PL2 (Technical Appendix 10.2);
- Environmental Protection Agency (EPA) Online Environmental Mapping and Spatial Data[17] ;
- Office of Public Works (OPW) flood mapping data[18] (www.floodmaps.ie);
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports; and
- Strategic Flood Risk Assessment (SFRA) for South Dublin County Council[19] .

Field Study

10.11 Field study/data collection was not required at the site as the data provided by other sources, in particular the FRA (Technical Appendix 10.2) was deemed to be adequate and representative of the site conditions.

Assessment Method

Methodology

Demolition and Construction Stage

10.12 The identification of likely significant effects during the demolition and construction stage was based on a review of the presence of potential receptors, a qualitative assessment of the sensitivity of the receptors, the identification of potential impact pathways and an assessment of the magnitude of the potential impacts.

10.13 The assessment of potential impacts and likely effects has, therefore, comprised the following approach:

- Identification and establishment of the sensitivity of water resource receptors on the basis of their use, proximity to the site, existing quality or resource value;
- Consideration of potential source-pathway-receptor' linkages;
- Evaluation of the magnitude of potential impacts to water quality and hydrology as a result of the introduction of the proposed development;
- Consideration of embedded mitigation measures integral to the proposed development;
- Classification of the significance of likely effects;
- Identification of additional mitigation measures to eliminate or reduce adverse effects, where considered necessary; and
- Re-assessment to conclude the significance of residual effects.

Operation Stage

10.14 The demolition and construction stage methodology has been applied to the identification of potential significant effects during the operation stage. The assessment has also been informed by the Engineering Planning Strategy and the Flood Risk Assessment (see Technical Appendices 10.1 and 10.2), which have been undertaken in order to assess in more detail the flood risk and to inform the design of the proposed development, and associated mitigation strategies, in order to minimise any increase in flood risk to both on-site and off-site receptors and to the proposed development itself.

Cumulative Stage

10.15 The potential for cumulative impacts to arise from the combined effects of a number of existing or proposed developments in combination with the proposed development, on water resources and flood risk have been considered.

Assessment Criteria

10.16 The criteria used to assess if an effect is significant or not, are set out in subsequent sub-sections. This was determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration was given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

10.17 The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in Table 10.1.

Table 10.1: Receptor Sensitivity Criteria

Sensitivity	Criteria
Low	Feature of low quality and rarity, with potential for substitution or tolerant of some change: • Surface water quality classified by EPA as A3 waters or seriously polluted • Heavily engineered or artificially modified watercourses • No surface water abstractions for public or private water supplies • GSI groundwater vulnerability "Low" to "Medium" classification and "Poor" aquifer importance.
Medium	Feature of medium quality and rarity, with some potential for replacement and reasonably tolerant of some change: • Surface water quality classified by EPA as A2. • Salmonid species may be present in the watercourse which may be locally important for fisheries. • Abstractions for private water supplies. • GSI groundwater vulnerability "High" classification and "Locally" important aquifer.

[17] The EPA Geoportal website (available at https://gis.epa.ie)

[18] OPWs national flood information portal, providing location specific access to flood risk and flood management information (available at https://www.floodinfo.ie/)

[19] RPS, 2016. Strategic Flood Risk Assessment for South Dublin County Council Development Plan 2016-2022

Table 10.1: Receptor Sensitivity Criteria	
High	Feature of high quality and rarity, or with limited potential for replacement and highly sensitive to some change, e.g. • Receptor is of high environmental importance or of national or international value i.e. NHA or SAC. • Surface water quality classified by EPA as A1 and salmonid spawning grounds present. • Abstractions for public drinking water supply. • GSI groundwater vulnerability "Extreme" classification and "Regionally" important aquifer

Impact Magnitude Criteria

10.18 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 10.2.

Table 10.2: Impact Magnitude Criteria	
Magnitude of Impact	**Criteria**
Negligible	No perceptible alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.
Low	Small alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.
Medium	Medium alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.
High	Large alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters and associated flood risk.

Scale of Effect Criteria

10.19 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 10.3.

Table 10.3: Scale of Effect Criteria			
Magnitude	**Sensitivity of Receptors**		
	Low	**Medium**	**High**
Negligible	Imperceptible	Imperceptible	Not Significant / Slight
Low	Imperceptible	Not Significant / Slight	Moderate
Medium	Not Significant	Moderate	Significant
High	Slight	Significant	Very Significant / Profound

10.20 The criteria used to assess whether an effect is significant or not, are given in the EPA Guidelines 2017, and are set out in Table 2.1 in Chapter 2: EIA Process and Methodology. 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.

10.21 Based on professional judgement, an effect is considered Slight if it could alter the character of the environment but in a manner that is consistent with existing and emerging baseline trends. A Moderate, Significant or Very Significant effect would, by its character, magnitude, duration or intensity alter a sensitive aspect of the environment or, in the case of Very Significant, most of a sensitive aspect of the environment. The Moderate, Significant or Very Significant effect are considered significant in terms of EIA.

10.22 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. Further details are set out in Table 2.1 in Chapter 2: EIA Process and Methodology.

Assumptions and Limitations

10.23 The assessment has relied on data included within the Engineering Planning Strategy and Flood Risk Assessment (Technical Appendices 10.1 and 10.2) as well as publicly available data reported via the EPA online Environmental Mapping and Spatial Data Service and the OPW online Flood Mapping. It has been assumed that these data sets have been reported correctly.

Baseline Conditions

Existing Baseline

Existing Site

10.24 The subject site is greenfield and appears to have historically been exclusively in agricultural use. There is no evidence of engineered pluvial drainage entering the site although there is a potential for overland sheet flow of fluvial flood waters onto the site from the Profile Park Road during an extreme event (as suggested in SFRA and CFRAM mapping presented in the FRA). Whilst the vegetation is suggestive of poorly draining upper soils, the FRA states that there is no evidence of standing groundwater.

Existing Surface Water Features

10.25 The Baldonnel Stream flows through the site, entering the site in the southeast before meandering to the north and then leaving the site via a twin-pipe culvert to the west. The FRA reports that a visual assessment of the channel of the stream and the culverts suggests that the culverts will have a significantly lower hydraulic capacity than the channel within the site.

10.26 The head waters of the Baldonnel Stream are within the Casement Aerodrome to the south of the site. The airfield is largely greenfield in nature with areas of impermeable limited to landing strips, the main aerodrome buildings and adjacent hardstanding. The stream flows in a northerly direction from the aerodrome towards the site although the route of the stream has been realigned as part of recent development. The stream flows through the northern part of the application site in an east to west direction, close to the northern boundary of the site. It is understood that the stream has been culverted in some sections through the site to allow for crossings. The Baldonnel Stream ultimately discharges to the River Griffeen and then to the River Liffey.

Surface Water Quality

10.27 The site is located within the Liffey and Dublin Bay WFD Catchment, and the Liffy Sub-Catchment. Currently, the EPA classifies the Liffy sub-catchment as having a 'good' ecological status or potential and a 'Good' chemical surface water status.

10.28 The nearest EPA monitoring stations are at Baldonnel Stream (RS09B090400) located 200 m west of the site, downstream of Bolands Garage and at Griffeen (RS09G010200), located approximately 1 km west of the site. The latest EPA biological assessment of surface water from the latter location indicated a

score of Q3 (poor) in 1991. The EPA classifies the main pressure preventing the achievement of 'Good Status' for the River Liffey WMU (Water Management Unit) being diffuse agricultural pollution. As part of the River Basin Management Plan 2009-2015, the water quality of the Griffeen Lower was assessed. The overall water quality status obtained for the Griffeen Lower was 'Bad' primarily due to its fish status and overall chemical status which each obtained a 'Bad' classification.

Existing Surface Water Drainage

10.29 There is not considered to be any existing engineered surface water drainage within the site

OPW Flood Mapping

10.30 The OPW online Flood Mapping service[20] does not indicate there to be any records of historic flooding at the site; the closests incident of flooding being over 1km west and not in directly hydrological connectivity to the site.

10.31 Areas of the site in close proximity to the Baldonnel Stream are shown in the OPW mapping to be in an area of Low fluvial flooding probability. There is also a potential residual overland flow path indicated for flood waters during event from the Profile Park Road, taking the form of sheet flow between the carriageway kerblines. This Low fluvial flooding probability designation represents the "*modelled extent of land that might be flooded by rivers in a very extreme flood event*". Low Probability flood events are indicated by the OPW to have a 1 in a 1000 Annual Exceedance Probability (AEP); i.e. they have a 0.1% chance of being exceeded in any year.

10.32 The site is shown to be entirely outside of the area of Medium fluvial flood probability (indicated by the OPW to have a 1 in a 100 AEP; i.e. land that could have a 1% chance of being flooded in any year).

10.33 The OPW mapping shows the 'Present Day' scenario (referred to as the Current Scenario in the Maps and Plans) which "*were generated using methodologies based on historic flood data, without taking account of potential changes due to climate change*". No flood level data is provided by the OPW for the site.

CFRAM Flood mapping

10.34 Mapping prepared as part of the CFRAM programme also indicates the Site is affected by the 0.1% AEP flood event but not the 1.0% AEP event. The predicted flood patterns are the same as presented in the OPW mapping.

SFRA Flood Mapping

10.35 Alternative mapping prepared as part of the SFRA for South Dublin County Council indicates the site could be affected by the 0.1% AEP and 1.0% AEP flood events.

Hydraulic Modelling

10.36 A hydrological model was prepared as part of the FRA (Technical Appendix 10.2) to simulate flow patterns during the 1% and 0.1% (1 in 100 and 1 in 1,000) annual exceedance probability (AEP) rainfall events. Peak flood flows were estimated using statistical methods for ungauged small catchments and the responses of the catchment to these flows was modelled using the River and Flood Analysis module of the industry standard package Infrastructure Ultimate Design Suite produced by Autodesk. The hydrological modelling within this module is itself based on the HEC-RAS modelling software produced by the US Army Corps of Engineers peak flood flows were estimated using statistical methods for ungauged small catchments. Parts of the site were found to be affected by both the 1% and 0.1% AEP fluvial flood events. The peak waters levels for the pre-development scenario are 72.07m OD for the 1% AEP event and 72.53m OD for the 0.1% AEP event.

Flood Defences and Structures

10.37 The Baldonnel Stream flows through two parallel 600 mm internal diameter culverts immediately downstream of the western boundary of the site, passing for approximately 60 m below the yard of the adjoining commercial land use. There are further culverted sections downstream of this between the site and the River Griffeen.

Groundwater

10.38 As set out in Chapter 12: Ground Conditions, there are three main bedrock aquifer classifications in Ireland (regionally important, locally important and poor aquifers) and the bedrock aquifers underlying the site (Dinantian Limestones) are classified as Locally Important; i.e. an aquifer which is moderately productive only in local zones. It is also reported in Chapter 12: Ground Conditions that, during a 2021 ground investigation, groundwater strikes or seepages were encountered in trial pits at depths mainly between 1.2-1.9 m, and in cable percussive boreholes groundwater was intercepted at depths of 1.6-2.4 m in some boreholes. Groundwater was intercepted at depths of 2.50, 2.60 and 3.00 m during rotary drilling while the standpipes show groundwater levels of 0.97-1.89 m in late June 2021. Groundwater is likely to be in continuity with the Baldonnel stream which runs through the centre of the site and given this the groundwater flow direction is likely to be towards the north.

10.39 With reference to the WFD, the Groundwater Body underlying the site is the Dublin GWB (EU GWB Code: IE_EA_G_008), which under WFD is of 'good status' and has a GWB risk score of 'not at risk' (2010-2015 WFD status). The GSI currently classifies the aquifer vulnerability underlying the site to be high (H) with the subsoils being of low permeability.

10.40 The site is not situated with a Groundwater Drinking Water Protection Area or Groundwater SPA and there are no wells or springs within 1km of the site with the closest being approximately 3km southeast and east of the site. There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or immediately adjacent to the site.

Future Baseline

10.41 The only change to the future baseline with regard to water resources and flood risk are associated with climate change. The surface water drainage strategy (within the Engineering Planning Strategy) and the FRA provided in Technical Appendices 10.1 and 10.2 take account of potential for increased fluvial flood risk, as well as increased rainfall rates.

Sensitive Receptors

10.42 The receptors identified as sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised in Table 10.6.

Table 10.6: Summary of Sensitive Receptors

Receptor	Sensitivity
Surface Water Features (Baldonnel Stream)	Medium (the stream is heavily artificially altered immediately downstream and whilst the stream is classified as being of moderate status, it is also given a biological assessment score of 'poor' downstream of the site)
Flood Risk (on-site or downstream terrestrial receptors within the catchment)	High The flood risk status of a site or receptor is considered to be of high sensitivity due to the potential implications of a flood event.

[20] https://www.floodinfo.ie/map/floodmaps

Table 10.6: Summary of Sensitive Receptors	
Groundwater	Medium (whilst the Groundwater Body underlying the site is of 'good status' and has a GWB risk score of 'not at risk', the site is not situated with a Groundwater Drinking Water Protection Area or Groundwater SPA)

10.43 Direct impacts on groundwater quality have been scoped out of the subsequent assessment. The proposed development would involve groundworks and installation of foundations which would inevitably have an interaction with the on-site soils and water environment. However, such potential impacts are considered separately within Chapter 12: Ground Conditions and is noted that demolition and construction works will be undertaken in compliance with a CEMP which would be established and maintained by the contractors during the demolition and construction stage which will cover all potentially polluting activities and emergency response procedures. Chapter 12: Ground Conditions does not specifically consider the potential for the proposed development to result in a reduction of local recharge to the underlying aquifer. However, as the overall area of aquifer is large relative to the site area, the potential reduction in local recharge is considered in to have no potential for significant change in the natural hydrogeological regime so is not considered further. The potential for localised disruption of groundwater is considered.

Assessment of Effects

Demolition and Construction Effects

10.44 The following potential impacts on water resources could arise during the demolition and construction stage of the proposed development:

- Contamination of Surface Water as a result of silt-laden runoff across the demolition and construction site and from stockpiles, polluting substances (e.g. fuels and chemicals) from accidental spillages and other wastes during general demolition and construction activity;
- Change in Surface Water Quality and Hydrodynamic Status (as a result of the proposed works/enhancements in the Baldonnel Stream floodplain);
- Disruption of Groundwater during construction excavations;
- Changes to Fluvial Flood Risk; and
- Water Supply and Foul Drainage During Construction.

Contamination of Surface Water

10.45 There are a range of embedded mitigation measures that are incorporated within the Proposed Development in order to reduce the potential for effects on the surface water environment. A project-specific Construction and Environmental Management Plan (CEMP) would be established and maintained by the contractors during the demolition and construction stage which would cover all potentially polluting activities and emergency response procedures. All personnel working on the site would be trained in the implementation of the procedures. The measures identified in this section and in Chapter 12, and those provided in Chapter 5: Demolition and Construction, would be included in the CEMP.

10.46 Subsoil would be excavated to facilitate the proposed development. Such works would be carefully planned to ensure as much material is left in situ as possible. Reuse of on-site excavated soil 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 the site. It is envisaged that any soil excavated will be retained on-site and reused as fill material or landscaping. Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil.

10.47 Stockpiles have the potential to cause negative impacts on and water quality through increased potential for sediment release to watercourses. The effects of soil stripping and stockpiling would be mitigated against through the implementation of an appropriate earthworks handling protocol during construction within the CEMP. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body.

10.48 The following procedures will be included in the CEMP in order to prevent any spillages of fuels to the Baldonnel Stream, or groundwater, and to prevent any resulting water quality impacts:

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures would be taken:
- Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
- Pumps or valves would be fitted with a lock and would be secured when not in use;
- All bowsers to carry a spill kit;
- Operatives must have spill response training; and
- Drip trays used on any required mobile fuel units.
- In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:
- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they would be secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

10.49 The aforementioned list of measures is non-exhaustive and would be included in the CEMP.

10.50 Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthworks operations will be carried out with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management, as set out in the CEMP, will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation.

10.51 Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any off-site impacts. All run-off will be prevented from directly entering into any water courses or drainage ditches.

10.52 Should any discharge of demolition or construction related water be required, discharge would be to foul sewer. Pre-treatment and silt reduction measures on-site would include a combination of silt fencing, settlement measures (e.g. silt traps, 20m buffer zone between machinery and watercourses, off-site refuelling of machinery) and use of hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.

10.53 Considering the embedded mitigation that would be specified within the CEMP, which in turn would be secured by means of an appropriately worded planning condition the effects would be of a low magnitude. Although the Baldonnel Stream passes through the site, and is considered to be of Medium sensitivity, the likely effect would be only temporary **Not Significant, Negative** (**Not Significant** in terms of EIA) and no further mitigation beyond that to be set out in the CEMP is necessary.

Change in Surface Water Quality and Hydrodynamic Status as a Result of Proposed Works/Enhancements in the Baldonnel Stream Floodplain

10.54 In order to reduce the potential effects of the proposed construction works in the floodplain on surface water quality and hydrodynamic status, mitigation is embedded within the design and within construction

methodologies. It is proposed that the works would be carried out in line with the Irish Fisheries Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters, with appropriate protection measures to channel during construction works.

10.55 Therefore, over the short term, improvements to the landscaping in the floodplain would be expected to result in a beneficial impact of low magnitude on the Baldonnel Stream (medium sensitivity) which equates to a **Slight, Positive** effect that would **not be significant** in terms of EIA.

Disruption of Groundwater during Construction Excavations

10.56 As set out previously, strikes or seepages of groundwater were encountered during the site investigation at depths mainly between 1.2 and 3.00 m during a range of investigations. Groundwater is likely to be in continuity with the Baldonnel stream which runs through the centre of the site and given this the groundwater flow direction is likely to be towards the north. The proposed piling methods could result in short-term changes to groundwater patterns. However, this is unlikely to lead to a significant change to hydrogeological conditions outside of the site boundary.

10.57 The proposed development would involve groundworks, which would inevitably have an interaction with the on-site soils and water environment. As set out in Chapter 4, to facilitate the proposed development a Multifuel Generation Plant (MFGP) would be constructed to the west of the data centers. The associated HVO fuel storage facility would be located below the footprint of the two blocks of the MFGP facility within buried double-skinned steel tanks and would be fully compliant with all environmental protection agency standards and regulations. The tanks would be fully bunded with monitors and alarms for fuel level and fuel spill with a breach of primary containment. The fuel storage basement would be protected by manual and automatic fire protection. Correct management of the excavations for the tanks would be set out in the CEMP and would seek to minimise inflow of shallow/perched groundwater into any excavation. It is anticipated that water arising from excavations from piling would be disposed of to the local sewer network if uncontaminated and following the removal of silt via settlement ponds or alternative measures.

10.58 Whilst the excavations and associated dewatering could result in a localised draw down of groundwater levels, given the scale of works relative to the total contributing catchment to the Baldonnel Stream, it is unlikely that the works would have a significant effect on groundwater contribution to the watercourse.

10.59 Therefore, the potential impact of the proposed development on groundwater flows (medium sensitivity) would be of negligible magnitude and the effect temporary to short-term **Not Significant, Negative, Not Significant** in terms of EIA.

Changes to Fluvial Flood Risk

10.60 As set out in the FRA, ground raising as part of the proposed development would displace floodplain storage associated with fluvial flood risk, with FFLs to be raised above the peak modelled flood levels for the 1 in 1,000 annual probability event. This could potentially lead to an increase in flood risk elsewhere during construction. However, the proposed development includes compensatory storage to replace the displaced storage. The volume of compensatory storage exceeds the volume of existing floodplain storage that is being lost and so the proposed development will lead to a slight reduction in flood risk elsewhere.

10.61 In order to prevent such a short-term loss of floodplain volume during construction, it is proposed that the landscape construction works necessary to maintain capacity would be carried out early within the construction programme. Therefore, the floodplain capacity would be maintained, or improved, at all stages during construction such that the proposed works would result in negligible changes to the watercourse's floodplain capacity such that there would be a beneficial impact of negligible magnitude on the flood risk status (High sensitivity) which equates to a short-term **Slight, Positive** effect i.e. **Not Significant** in terms of EIA.

Water Supply and Foul Drainage Capacity During Construction

10.62 As set out in Chapter 15: Material Assets, welfare facilities would be required for the construction compound and workers with portable toilets will be provided for construction workers. A temporary connection to the foul water drainage network within Profile Park 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 short term demolition and construction stage.

10.63 Accordingly, foul drainage effects on the public sewerage network during the demolition and construction stage are considered to be temporary to short term, imperceptible and neutral i.e. not significant.

10.64 A temporary connection to the mains water supply will be established for the construction phase. The water demand during the construction phase will not be significant enough to affect existing pressures and from discussions with the South Dublin County Council, it is understood that there is adequate capacity within the existing watermain network to supply the proposed development. Effects associated with water supply during the demolition and construction stage are considered to be temporary to short term, **Imperceptible** and **Neutra**l i.e. **Not Significant** in terms of EIA.

Operation Effects

10.65 The following potential impacts on water resources and flood risk could arise during the operation stage of the proposed development:

- Increased flood risk from the Baldonnel Stream;
- Surface Water Flood Risk: Increased surface water runoff volumes leading to flood risks off-site;
- Disruption of Groundwater: Potential to alter local groundwater flow paths and levels;
- Water Demand: Increase in water demand from the site to supply the new occupants of the proposed development; and
- Foul Sewer Capacity: Increase in discharge volumes of effluent to foul sewer.

. Increased Flood Risk from the Baldonnel Stream

10.66 As set out previously, in order to reduce the flood risk to the proposed development, it is proposed that finished floor levels (FFLs) be raised above the peak modelled flood levels to between 74.0 and 74.25m OD. In the absence of mitigation this could create the potential for the proposed development to displace floodplain storage and thereby increase flood risk elsewhere. To prevent this, it is necessary to provide compensatory storage within the site and the FRA sets out that the proposed development includes compensatory storage (provided by reducing the ground level in the landscape area adjoining the northern boundary) to replace the displaced storage. The volume of compensatory storage exceeds the volume of existing floodplain storage that is being lost and so the proposed development will lead to a slight reduction in flood risk elsewhere.

10.67 A hydraulic model was also prepared (using the same methodology as for the pre-development scenario) to simulate flow patterns during the 1% and 0.1% AEP rainfall events in the post-development scenario (taking account of the proposed finished levels for the proposed development). The peak waters levels for the post-development scenario are 72.02m OD for the 1% AEP event and 72.51m OD for the 0.1% AEP event (a slight decrease from pre-development peak flood levels and approximately 1.5m to 2.0m below the proposed FFLs). The modelling includes a 20% increase in all estimated peak flow rates to account for potential climate change.

10.68 Therefore, the proposed reconfiguration of the floodplain would result in long-term improvements to the floodplain capacity such that there would be a beneficial impact of low magnitude on the flood risk status (High sensitivity) which equates to a long-term **Moderate, Positive** effect that is **Significant** in terms of EIA.

Surface Water Flood Risk

10.69 As set out in Technical Appendix 10.1, storm water from the proposed development has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and ensures that Best Management Practice has been incorporated into the design. As a result, it is not expected that the proposed development would negatively impact on flood risk for downstream receptor and neighbouring properties. The subject site currently comprises a greenfield site and the proposed surface water measures are aimed at improving the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge to an acceptable rate. 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. The storm water drainage within the entire development has been designed to accommodate a 1 in 2 annual probability storm frequency. The SuDS measures have been designed to accommodate a 1 in 100 annual probability storm event plus a 20% climate change allowance (a 20% increase in peak rainfall depths). The outflow from the proposed development would be to the Baldonnel Stream and would be restricted by way of a Hydrobrake which would limit the total discharge to 4.4 l/s (the calculated QBAR greenfield run-off rate). The FRA (Technical Appendix 10.2) has identified that the Baldonnel Stream has capacity to accommodate the proposed surface water discharge from the site. Therefore, the proposed surface water management, which would include an allowance for climate change, would result in a positive impact of low magnitude on the flood risk status (High sensitivity) which equates to a long-term **Moderate, Positive** effect that is **Significant** in terms of EIA.

10.70 In order to achieve this, based on the contributing catchment area for the proposed development, the total attenuation volume required to achieve the proposed reduction in discharge has been calculated by Pinnacle Consulting Engineers (Technical Appendix 10.1) as being approximately 2,391 m^3, which would be provided for within a storage pond, swales and permeable paving. Storm water from the rear roof areas of the proposed building units, would be directed via rainwater pipes into an on-site reticulation system. The outflow from this system will be connected into the surface water drainage network collecting run-off from the road areas and will be ultimately discharged into stormwater storage ponds or swales. The front roof areas of the buildings are proposed to drain into a permeable paving sub-base, prior to the ultimate discharge into the Baldonnel Stream. Storm water from all car park areas, access roads and delivery areas would be drained via a series of on-site gullies and channels draining into a separate system of below ground gravity storm water sewers and permeable paving prior to discharge to the proposed ponds. Oil inceptors will be installed on all drainages systems that collects surface water from roads, loading docks and parking areas before discharge into storage ponds for attenuation.

Disruption of Groundwater: Potential to Alter Local Groundwater Flow Paths and Levels

10.71 As set out previously, a fuel storage facility would be located below the footprint of the two blocks of the MFGP facility. The below ground tanks would be within buried double-skinned steel tanks. There is a potential for the tanks to result in localised alterations in groundwater level. However, the tanks would be embedded within a granular fill which would allow for continuation of groundwater flows and the magnitude effects are expected to be low as a result. The proposed structures would require foundations to structural engineer specifications. However, the foundations for the precast concrete or structural steel frames would require moderate scale excavations and the method of foundations would take account of the ground conditions and environmental considerations such that any long-term effects on groundwater flows (medium sensitivity) are therefore likely to be of low magnitude and the effect long-term, **Not Significant, Negative** i.e. **Not Significant** in terms of EIA.

Water Demand and Foul Sewer Capacity

10.72 It is intended to serve the potable demand of the proposed development via connection off a 150mm diameter network in Falcon Avenue. water mains, as required. A Pre-Connection Enquiry application has been submitted to Irish Water in respect of the water supply. The Applicant received a confirmation from Irish Water for potable and foul water. As such, effects on water supply during the operation stage are considered to be permanent, imperceptible and neutral i.e. not significant.

10.73 It is proposed to discharge foul water from the proposed development, via a 225mm diameter gravity foul sewer outfall discharging into an existing 225mm diameter spur connection laid across Falcon Avenue, which is connected to the existing foul sewer network laid along the western edge of Falcon Avenue. All on-site foul sewers have been designed with gradients designed to achieve self-cleansing velocities.

10.74 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 operation stage are considered to be long term, **Imperceptible** and **Neutra**l i.e. **Not Significant** in terms of EIA.

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

10.75 No additional mitigation measures are proposed.

Operation Stage

10.76 As set out in the FRA (Technical Appendix 10.2), all developments would include some element of residual flood risk. In the case of the proposed development, the Baldonnel Stream is culverted as it leaves the site. There are currently blockages that greatly reduce the capacity of the culvert and it is assumed within the FRA that the culvert would be cleared of all obstructions and maintained free of debris and silt deposition throughout the operational life of the proposed development. However, the condition and size of the culvert downstream of the blockages is unknown and there may be a potential in the event of culvert collapse that the stream could surcharge within the site to a level exceeding that predicted by the hydraulic modelling study.

10.77 To mitigate this risk, the FRA recommends that consideration be given to the construction of an overflow which would allow such excess flows to bypass the culvert. Any permanent diversion would require works outside of the demise of the proposed development and may not be proportionate to the level of risk, given that FFLs offer approximately a 1.5m or 2.0m freeboard above the peak modelled waters levels for the post-development scenario during the 1% and 0.1% AEP events respectively, including an allowance for climate change.

10.78 Therefore, to address this residual risk, it is recommended that a Site-Specific Flood Risk Mitigation Plan be prepared and implemented throughout the operational life of the proposed development. This plan should include a maintenance regime for all drainage features within the site and for regular inspection of drainage features immediately upstream and downstream of the site. Procedures should also be put in place for temporary measures to divert waters from the stream around the downstream culverts in the event that inspections identify defects in the culvert or if waters are observed to be surcharging upstream of the culvert. Such that flood risk could be managed until remedial works to repair the culvert could be implemented

10.79 The Site-Specific Flood Risk Mitigation Plan and associated maintenance regime would ensure that the long-term residual operation effects would remain as reported in the assessment of effects section.

Enhancement Measures

10.80 No additional enhancement measures are proposed

Demolition and Construction Residual Effects

10.81 As no additional mitigation or enhancement measures would be required, the residual demolition and construction effects remain as reported in the assessment of effects section:

- The likely effect of contamination of surface water is likely to be only temporary and **Not Significant, Negative** and no further mitigation beyond that to be set out in the CEMP is necessary;
- Over the short term, improvements to the watercourse and associated landscaping would be expected to result in a beneficial impact of low magnitude on the Baldonnel Stream (medium sensitivity) which equates to a **Slight, Positive** effect (**Not Significant** in terms of EIA) on surface water quality and hydrodynamic status of the Baldonnel. Stream.
- The potential impact of the proposed development on groundwater flows (medium sensitivity) would be of negligible magnitude and the effect temporary to short-term, **Not Significant, Negative** i.e. **Not Significant** in terms of EIA.
- The floodplain capacity would be maintained, or improved, at all stages during construction such that the proposed works in the floodplain would result in a positive impact of negligible magnitude on the flood risk status (High sensitivity) which equates to a short-term **Slight, Positive** effect i.e. **Not Significant** in terms of EIA; and
- Effects on the public sewerage and potable water supply networks during the demolition and construction stage are considered to be temporary to short term, **Imperceptible** and **Neutral** i.e. **Not Significant** in terms of EIA.

Operation Residual Effects

10.82 The Site-Specific Flood Risk Mitigation Plan and associated maintenance regime would ensure that the residual operation effects would remain as reported in the assessment of effects section:

- The proposed reconfiguration of the floodplain of the Baldonnel Stream would result in long-term improvements to the floodplain capacity such that there would be a beneficial impact of low magnitude on the flood risk status (High sensitivity) which equates to a long-term **Moderate, Positive** effect which would be **Significant** in terms of EIA.
- The proposed surface water management, which would include an allowance for climate change, would result in a positive impact of low magnitude on the flood risk status (High sensitivity) which equates to a long-term **Moderate, Positive** effect which would be **Significant** in terms of EIA.
- Any long-term effects on groundwater flows (medium sensitivity) would be likely to be of negligible magnitude and the effect long-term, **Not Significant, Negative** i.e. **Not Significant** in terms of EIA; and
- It is understood that there is adequate capacity within the existing foul drainage and water main network to supply the proposed development. As such, effects during the operation stage are considered to be permanent, **Imperceptible** and **Neutral** i.e. **Not Significant** in terms of EIA.

Summary of Residual Effects

10.83 Table 10.7 provides a tabulated summary of the outcomes of the water resources and flood risk assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 10.7: Summary of Residual Water Resources and Flood Risk Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
Surface Water Receptors	Potential contamination as a result of silt-laden runoff across the demolition and construction site and potential for contaminants to be introduced to surface water by construction activities through leakages/spillages	None Required	Not Significant	-	L	D	R	T
Surface Water Receptors	Direct impacts on surface water quality and hydrodynamic status as a result of construction works	None Required	Slight	+	L	D	R	St
Groundwater Supply	Disruption of Groundwater during Construction Excavations	None Required	Slight	-	L	D	R	T to St
Fluvial Flood Risk	Loss of floodplain volume during construction	None Required	Slight	+	L	D	R	St
Water Supply and Foul Drainage Network	Water Supply and Foul Drainage Capacity During Construction	None Required	Imperceptible	+ /-	U	D	R	St
Operation								
Fluvial Flood Risk	Reduced flood risk from the Baldonnel Stream	Site-Specific Flood Risk Mitigation Plan and associated maintenance regime	**Moderate**	**+**	**L**	**D**	**IR**	**LT**
Surface Water Flood Risk	Changes to flood risk as a result of changes to the surface water runoff regime of the site	None Required	**Moderate**	**+**	**L**	**D**	**IR**	**LT**
Groundwater	Potential to alter local groundwater	None Required	Not Significant	-	L	D	IR	LT

Table 10.7: Summary of Residual Water Resources and Flood Risk Effects								
	flow paths and levels							
Water Supply and Foul Drainage Network	Water Supply and Foul Drainage Capacity During Operation	None Required	Imperceptible	+ /-	L	D	IR	LT

Notes:

* - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, ID = Indirect;

L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = Medium-term, Lt = Long-term, P = Permanent.

** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound.

Cumulative Effects

Intra-Project Effects

10.84 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in Chapter 16: Cumulative Effects.

Inter-Project Effects

10.85 Consent would not be granted for any development which would increase off-site flood risks. Consent would also not be granted to any surface water discharge from a proposed development were it to increase downstream flood risk. Any discharge to sewer or to a fluvial watercourse would need to be restricted so as to provide betterment in terms of downstream capacity, taking account of predicted climate change. As the proposed development would discharge at a greenfield rate, there would be no detrimental impact on downstream flood risk. It would be reasonable to assume that any other development would similarly need to decrease flood risk and reduce pressures on downstream sewer or watercourse capacity such that any cumulative impact during the operation stage would be beneficial.

10.86 In accordance with national and local policy, it is reasonable to assume that other schemes would similarly be required to demonstrate suitable surface water runoff management measures during construction and that discharges of surface water would be subject to suitable treatment such that there would be no cumulative significant effect on downstream water quality during demolition and construction works, or for the operation. Furthermore, each cumulative would be expected to deliver improvements in respect of contamination, groundwater disruption, water demand and sewer capacity.

10.87 Accordingly, the overall scale of water resources and flood risk cumulative effects would be no greater than that of the proposed development in isolation. Therefore, it is unlikely that there would be any significant negative cumulative effects on flood risk or surface water quality.

Summary of Assessment

Background

10.88 This chapter has detailed the potential water resources and flood risk effects due to the construction and operation stages of the proposed development. The assessment of construction and operation stages has been undertaken taking into account the relevant national and local guidance and regulations.

10.89 The bedrock aquifers underlying the site (Dinantian Limestones) are classified as Locally Important; i.e. an aquifer which is moderately productive only in local zones. The site is not situated with a Groundwater Drinking Water Protection Area or Groundwater SPA and there are no wells or springs within 1km of the site with the closest being approximately 3km southeast and east of the site. There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or immediately adjacent to the site.

10.90 The subject site is greenfield and appears to have historically been exclusively in agricultural use. There is no evidence of pluvial drainage entering the site and, whilst the vegetation is suggestive of poorly draining upper soils, the FRA states that there is no evidence of standing groundwater. The Baldonnel Stream flows through the site, entering the site in the southeast before meandering to the north and then leaving the site via a twin-pipe culvert to the west. The FRA reports that a visual assessment of the channel of the stream and the culverts suggests that the culverts will have a significantly lower hydraulic capacity than the channel within the site.

10.91 Areas of the site in close proximity to the Baldonnel Stream are shown in the OPW mapping to be in an area of Low fluvial flooding probability. This designated shows the "*modelled extent of land that might be flooded by rivers in a very extreme flood event*". Low Probability flood events are indicated by the OPW to have a 1 in a 1000 Annual Exceedance Probability (AEP); i.e. they have a 0.1% chance of being exceeded in any year. The site is shown to be entirely outside of the area of Medium fluvial flood probability (indicated by the OPW to have a 1 in a 100 AEP; i.e. they have a 1% chance of being exceeded in any year).

10.92 A hydrological model was prepared as part of the FRA (Technical Appendix 10.2) to simulate flow patterns during the 1% and 0.1% (1 in 100 and 1 in 1,000) annual exceedance probability (AEP) rainfall events.

10.93 . . . In order to reduce the flood risk to the proposed development, it is proposed that finished floor levels (FFLs) be raised above the peak modelled flood levels. In the absence of mitigation, this could create the potential for the proposed development to displace floodplain storage and thereby increase flood risk elsewhere. To prevent this, it is necessary to provide compensatory storage within the site and the FRA sets out that the proposed development includes embedded mitigation in the form of compensatory storage (provided by reducing the ground level in the landscape area adjoining the northern boundary) to replace the displaced storage. The volume of compensatory storage exceeds the volume of existing floodplain storage that is being lost and so the proposed development will lead to a slight reduction in flood risk elsewhere.

Demolition and Construction Effects

10.94 During demolition and construction works, there is the potential for the following impacts on water resources and flood risk:

- Contamination of Surface Water as a result of silt-laden runoff across the demolition and construction site and from stockpiles, polluting substances (e.g. fuels and chemicals) from accidental spillages and other wastes during general demolition and construction activity;
- Change in Surface Water Quality and Hydrodynamic Status (as a result of the proposed works in the Baldonnel Stream floodplain)
- Disruption of Groundwater during construction excavations;
- Changes to Fluvial Flood Risk; and
- Water Supply and Foul Drainage During Construction

10.95 Overall, and considering the embedded mitigation (primarily through the CEMP), it is considered that the demolition and construction of the proposed development **would not give rise to significant effects** on water resources and flood risk.

Operation Effects

10.96 The following potential impacts on water resources and flood risk could arise during the operation stage of the proposed development:

- Increased flood risk from the Baldonnel Stream;
- Surface Water Flood Risk: Increased surface water runoff volumes leading to flood risks off-site;

- Disruption of Groundwater: Potential to alter local groundwater flow paths and levels;
- Water Demand: Increase in water demand from the site to supply the new occupants of the proposed development; and
- Foul Sewer Capacity: Increase in discharge volumes of effluent to foul sewer.

10.97 The proposed development includes measures to improve the landscaping and habitat setting of the Baldonnel Stream, and to provide a proposed increase in floodplain capacity. This would result in improvements in terms of flood risk, and such improvements would be supplemented by the proposed management of surface water runoff (reduction to a greenfield rate taking account of climate change) and raising of FFLs, such that it is considered that the operation stage of development would result in a Moderate Positive effect on flood risk at the site and for downstream receptors, and as such **would be expected to give rise to Significant Positive effects**.

10.98 The improved landscaping and habitat setting of the Baldonnel Stream floodplain would also be expected to result in long term slight positive changes in terms of surface water quality and hydrodynamic status such that no significant effects are expected. Long-term changes to groundwater flow paths, as well as to water supply and foul water assets are expected to be not significant or imperceptible.

Cumulative Effects

10.99 Consent would not be granted for any development which would increase off-site flood risks. Consent would also not be granted to any surface water discharge from a proposed development were it to increase downstream flood risk. Accordingly, the overall scale of water resources and flood risk cumulative effects would be no greater than that of the proposed development in isolation. Therefore, it is **unlikely that there would be any significant negative cumulative effects** on flood risk or surface water quality.

11 ECOLOGY

Introduction

11.1 This chapter of the EIAR reports on the likely significant ecological effects to arise from the demolition and construction stage and the operation stage of the proposed development.

11.2 The chapter describes the ecological policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely ecological effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

11.3 The chapter is supported by the following technical appendices in ES Volume 3:

- Appendix 11.1: Ecological Impact Assessment;
- Appendix 11.2: Appropriate Assessment Screening;
- Appendix 11.3: Biodiversity Management Plan.

Methodology

11.4 The assessment has been informed by the following legislation, policies and published guidance:

International Legislation:

- EU Habitats Directive 92/43/EEC[1];
- The Birds Directive 2009/147/EC[2];
- Environmental Liability Directive 2004/35/EC[3]; and
- Bern Convention[4].

National Legislation and Policy:

- The Wildlife Act 1976 (as amended)[5];
- EC (Birds and Natural Habitats) Regulations 2011 (amended 2015)[6];
- Flora Protection Order 2015[7]; and
- The EC (Water Policy) Regulations 2003[8].

Local Policy:

- South Dublin Development Plan 2016–2022[9].

National guidance and industry standards:

- BS 42020:2013 Biodiversity[10]
- CIEEM Guidelines:
  - Ecological Impact Assessment[11]
  - Ecological Report Writing[12].

11.5 Further details are provided in EIAR Volume 3: Technical Appendix 11.1.

Consultation

11.6 Table 11.1 summarises the consultation that has been undertaken with respect to the ecology assessment.

Table 11.1: Summary of Consultation

Consultee and Form/Date of Consultation	Summary of Comments	Where in this Chapter Comments are addressed
SDCC Consultation Meetings 23 June and 19 July 2021	During pre-apps the stream diversion was discussed whereby SDCC requested more detailed landscape and water management proposals. Of particular relevance to this chapter, SDCC requested that a biodiversity management plan accompanies the planning application to demonstrate how the proposed development will bring about and commit to biodiversity improvements at the site.	The biodiversity considerations associated with Baldonnel Stream and the proposed ecological enhancements are contained herein and the EcIA in Volume 3, Technical Appendix 11.1. A Biodiversity Management plan is contained in Volume 3, Technical Appendix 11.3.
SDCC Additional Information Request ref SD21A/0241 dated 26 October 2021	SDCC outlined that the stream is an established feature, with existing trees and vegetation along its banks, particularly along the eastern boundary. As part of the AI request SDCC requested the Application reconsider the realignment of the stream.	

Assessment Scope

11.7 The assessment has been conducted by ecologists registered with the Chartered Institute of Ecology and Environmental Management (CIEEM). All work has been carried out in line with the relevant professional guidance; CIEEM's Guidelines for Preliminary Ecological Appraisal[13], Guidelines for the Ecological Impact

[1] Council Directive 92/43/EEC of 21 May 1992 on The Conservation of Natural Habitats and of Wild Fauna and Flora.
[2] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the Conservation of Wild Birds.
[3] Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on Environmental Liability with Regard to The Prevention and Remedying of Environmental Damage.
[4] The Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats, 1979. Bern.
[5] Government of Ireland. The Wildlife Act 1976 (as amended). Available from: http://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/html#zza39y1976
[6] Government of Ireland. S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).
[7] Government of Ireland. S.I. No. 356/2015 - Flora (Protection) Order, 2015.
[8] Government of Ireland. S.I. No. 722/2003 - European Communities (Water Policy) Regulations 2003.
[9] South Dublin County Council. South Dublin Development Plan 2016–2022. Dublin. South Dublin County Council
[10] British Standards Institution, 2013. BS 42020:2013 Biodiversity. Code of practice for planning and development. London. BSI
[11] Chartered Institute of Ecology and Environmental Management, 2019. Guidelines for the Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Winchester. CIEEM
[12] Chartered Institute of Ecology and Environmental Management, 2017. Guidelines on Ecological Report Writing. Winchester. CIEEM
[13] Chartered Institute of Ecology and Environmental Management, 2017. Guidelines for Preliminary Ecological Appraisal. Second Edition. Winchester. CIEEM

Assessment in the UK and Ireland[14] and the Environment, Heritage and Local Government's Guidance on Appropriate Assessments[15].

11.8 Daniel Flenley BSc (Hons) MPhil MCIEEM is a full member of CIEEM. He has over 14 years of ecology experience including undertaking surveys and writing associated reports. Daniel is experienced at undertaking and managing a range of surveys and assessments, including Ecological Impact Assessment (EcIA), extended phase 1 habitat surveys, and ornithological and protected species surveys, for over 450 projects. These include a variety of development types such as residential, energy, commercial, industrial and transport infrastructure. Daniel holds a great crested newt class licence and has worked as an accredited agent under bat and amphibian mitigation and reptile survey licences.

11.9 Ashleen Blom BSc (Hons) MSc is a senior ecologist with 5 years' professional experience in ecological consultancy. She has worked as part of multidisciplinary and dedicated ecology teams contributing towards projects in education, commercial, defence, energy, residential, and infrastructure sectors in Northern Ireland. She has contributed towards large multidisciplinary and small-scale private developments. Ashleen has experience in completing Phase 1 habitat surveys across a variety of habitats. She also has experience in protected species surveys including bat, otter, smooth newt and badger. She has experience classifying Potential Roosting Features for bats in trees and structures and classifying habitats for their potential to support foraging and commuting bats. Ashleen has experience in completing invasive species surveys including invasive aquatic species.

11.10 Dara Dunlop BSc (Hons) is a Qualifying Member of CIEEM with circa 3 years' experience in the ecology sector, including working for an ecological consultancy, undertaking a range of protected species surveys and extended phase 1 habitat surveys for industrial schemes, and land management of designated sites. Dara has co-authored a number of reports including Ecological Impact Assessments and Protected Species Reports for various developments.

Technical Scope

11.11 The technical scope of the assessment has considered the following:

- Disturbance/injury/death of a protected species, both during the Demolition and Construction stage and the Operation stage (including lighting impacts and effects on bats);
- Disturbance of breeding birds;
- Direct loss of habitats;
- Reduction in local biodiversity;
- Damage to local ecology through pollution;
- Chemical or physical pollution of aquatic habitats and consequent effects on designated sites;
- Accidental trapping of mammals in excavations;
- Habitat fragmentation and loss of ecological connectivity / commuting pathways for wild and protected species;
- Loss or damage of habitats as a result of dust and other air- or water-borne pollution; and
- Potentially consequent population-level effects of these impacts on wild species and groups including bats, badger, otter, birds, herptiles, invertebrates and flora.

11.12 The following have been considered in terms of embedded mitigation:

- Standard practice pollution prevention measures (see Chapter 5: Demolition and Construction Environmental Management);
- Preparation and implementation of a Site Waste Management Plan (SWMP);
- Environmental monitoring during the Demolition and Construction stage, to be specified in a Construction Environmental Management Plan (CEMP) as outlined in Chapter 5 Demolition and Construction Environmental Management;
- Cowling of lighting, plus reduction of light levels to 1lux where possible (see Burns McDonnell lighting plan[16] which accompanies the application);
- Setting of noise and vibration limits, with associated monitoring during the Demolition and Construction stage (see Chapter 5: Demolition and Construction Environmental Management).

Spatial Scope

11.13 The study area for international/European statutory designations has been determined by means of reference to published guidance (Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities[17]), and covers an area of 15km from the site boundary. The study area for national statutory designations follows standard professional practice as accepted in a number of similar planning applications. This covers an area of 5km from the site boundary. The study area for protected and priority species has been derived by reference to CIEEM Guidelines for Preliminary Ecological Appraisal[18] and consideration of their ecological characteristics, and covers an area of 2km from the site boundary. The study area for the Fossitt habitat survey has been determined with reference to CIEEM Guidelines for Preliminary Ecological Appraisal[19]. All of the above also consider the scale and nature of the proposed development.

11.14 Sensitive receptors in the study area include Rye Water Valley/Carton Special Area of Conservation (SAC; 5.71km northwest of the site), Glenasmole Valley SAC (7.91km southeast of the site), Wicklow Mountains SAC (9.62km southeast), Red Bog, Kildare SAC (14.04km southwest), Wicklow Mountains Special Protection Area (SPA; 12.74km southeast), South Dublin Bay and River Tolka SPA (14.90km northeast), Poulaphouca Reservoir SPA (14.98km southwest), Grand Canal proposed Natural Heritage Area (pNHA; 1.34km north) and Liffey Valley pNHA (4.22km northwest).

Temporal Scope

11.15 The assessment has considered impacts arising during the demolition and construction stage, which would be expected to be temporary to short term (1-7 years) in nature, and from the operation stage which would be expected to be long-term to permanent in nature (i.e. more than 20 years).

11.16 The following scenarios have been considered:

- Baseline;
- Baseline + Proposed Development; and
- Baseline + Proposed Development + Cumulative Development.

Baseline Characterisation Method

Desk Study

11.17 In order to establish baseline ecology conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- National Biodiversity Data Centre (NBDC);
- National Parks and Wildlife Service (NPWS);

[14] Chartered Institute of Ecology and Environmental Management, 2019. Guidelines for the Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Winchester. CIEEM

[15] Environment, Heritage and Local Government, 2009. Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities. Dublin. Department of the Environment, Heritage and Local Government

[16] Burns McDonnel, 2021. DUB11 Campus Development Design Statement ref DUB11-DC-XX-G021-V0-PL-BMD

[17] Environment, Heritage and Local Government, 2009. Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities. Dublin. Department of the Environment, Heritage and Local Government

[18] Chartered Institute of Ecology and Environmental Management, 2017. Guidelines for Preliminary Ecological Appraisal. Second Edition. Winchester. CIEEM

[19] Chartered Institute of Ecology and Environmental Management, 2017. Guidelines for Preliminary Ecological Appraisal. Second Edition. Winchester. CIEEM

- Scott Cawley Report (2020) on the same site.

11.18 Further details are provided in EIAR Volume 3: Technical Appendix 11.1.

Field Study

11.19 A Fossitt habitat survey was undertaken on 17 June 2021 by Ashleen Blom. This encompassed all lands within the red line boundary and up to 50m outside, where access allowed.

11.20 A stream macroinvertebrate assessment of the Baldonnel stream within the site was completed on 22 June 2021 by Ashleen Blom and Dara Dunlop. Two-minute kick sampling and sweep methods were employed to collect samples of macroinvertebrates for analysis. Samples were then assessed visually. Where macroinvertebrates were removed, these were identified using stereoscopic microscopes and appropriate keys.

11.21 Bat activity surveys were completed on 23 June 2021 and 15 July 2021 by Ashleen Blom and Dara Dunlop. A static (Wildlife Acoustics Song Meter SM4 BAT FS) bat detector was also deployed on site over a minimum of five consecutive nights per month during June and July 2021. Two dusk emergence surveys of the derelict cottage and outbuilding were undertaken by Dara Dunlop on the 22 June 2021 and 15 July 2021. All bat surveys were designed based on Bat Conservation Trust guidance[20]. Two emergence surveys were, however, used in preference to one emergence and one re-entry. This was due to the greater accuracy of emergence surveys for British and Irish bat species[21].

11.22 Bat activity, breeding bird and Fossitt habitat surveys were competed in June 2020 by Scott Cawley. These surveys went on the inform the 2020 Ecological Impact Assessment report for a previous planning application on this site.

11.23 Further details are provided in EIAR Volume 3: Technical Appendix 11.1.

Assessment Method

Methodology

Demolition and Construction Stage

11.24 The evaluation of ecological receptors is based upon CIEEM guidelines[22], which suggests that the value or potential value of an ecological resource or feature (for example a habitat type, species or ecosystems) should be determined within a geographical context (e.g. rare at a local level).

11.25 At the Demolition and Construction stage, the impact assessment process involves:

- Identifying and characterising impacts and their effects;
- Incorporating measures to avoid and mitigate negative impacts and effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

11.26 Potential impacts and effects have been assessed in accord with the following proposals for the Demolition and Construction stage:

11.27 One treeline would be removed to facilitate the development. Treelines and hedgerows at the boundaries of the site would be retained, and enhanced where possible. Additional planting of trees and shrubs would occur within the riparian strip alongside the stream channel, with native shrubs adding shelter and food sources for a variety of different species. Trees and shrubs planted will be managed in line with the Biodiversity Management Plan (see Volume 3, Technical Appendix 11.3) and the Landscape Proposals by Kevin Fitzpatrick Landscape Architecture.

11.28 Planting on the banks of the Baldonnel stream will include aquatic species such as yellow iris and watercress.

11.29 Areas of wet wildflower meadow would be created to the north and northwest of the site. This area would also act as a retention pond, in periods of heavier flow. Species in this area have been selected in order to thrive in a wetter area and create habitat for wetland species, particularly invertebrates.

11.30 Additional wildflower areas would also be created particularly in the south; this would provide food and shelter for invertebrates, birds and small mammals.

11.31 All habitats on site would be managed sensitively, to promote biodiversity.

Operation Stage

11.32 Assessment methods used for the Operation stage follow this same process with only slight variation. Impact assessment during the Operation stage emphasises the potential for disturbance of wild and protected species, including through lighting impacts on bats, rather than the wider range of potential impacts during the Demolition and Construction stage.

Cumulative Stage

11.33 The potential for cumulative impacts to arise from the combined effects of a number of existing or proposed developments in combination with the proposed development on ecology has been considered as set out in Chapter 2: EIA Process and Methodology.

Assessment Criteria

11.34 The criteria used to assess if an effect is significant or not is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

11.35 The sensitivity of receptors has been classified as international, national, regional, local or negligible, in accordance with the criteria set out in Table 11.2.

Table 11.2: Receptor Sensitivity Criteria

Sensitivity	Criteria
International	An internationally designated site (e.g. SAC, SPA, Ramsar site); Site meeting criteria for international designations or qualifying species of a SAC where there is connectivity Species present in internationally important numbers (>1% of biogeographic populations)
National	A nationally designated site (NHA, pNHA), or sites meeting the criteria for national designation or qualifying species where there is connectivity Species present in nationally important numbers (>1% Irish population)
Regional	Species present in regionally important numbers (>1% of regional population) Areas of valuable habitat falling below criteria for selection as an NHA (e.g. areas of ancient woodland larger than 0.25ha)

[20] Collins, J. (ed.), 2016. Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd edition. London. The Bat Conservation Trust

[21] Andrews, H. and Pearson, L. (2017) A Review of Empirical Data in Respect Of Emergence And Return Times Reported For The UK's 17 Native Bat Species. Fourth Edition. Bridgwater. Andrews Ecology

[22] Chartered Institute of Ecology and Environmental Management, 2019. Guidelines for the Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Winchester. CIEEM

Table 11.2: Receptor Sensitivity Criteria	
Local	Areas of ancient woodland smaller than 0.25ha Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or hedgerows Baldonnel Stream
Negligible	Usually widespread and common habitats and species. Features falling below local value are not normally considered in detail in the assessment process

Impact Magnitude Criteria

11.36 The magnitude of impact has been classified as negligible, low, medium, high or very high, in accordance with the criteria set out in Table 11.3.

Table 11.3: Impact Magnitude Criteria	
Magnitude of Impact	**Criteria**
Negligible	Minimal impact on a very small scale; effects not dissimilar to those expected within a 'do nothing' scenario.
Low	Would lead to a not significant effect upon the feature or its viability. For example, less than 10% habitat loss, damage or gain.
Medium	Would lead to a slight to moderate effect on the feature or its viability. For example, between 10 - 20% habitat loss, damage or gain.
High	Would lead to a significant effect on the feature or its viability. For example, more than 20% habitat loss, damage or gain.
Very High	Would cause the loss of the majority of a feature (>80%) or would be sufficient to damage a feature enough to affect its viability immediately. For positive effects, would e.g. create over 80% habitat gain.

Scale of Effect Criteria

11.37 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 11.4.

Table 11.4: Scale of Effect Criteria					
Magnitude	**Sensitivity of Receptors**				
	Negligible	**Local**	**Regional**	**National**	**International**
Negligible	Imperceptible	Imperceptible	Imperceptible / Not Significant	Imperceptible / Not Significant	Imperceptible / Not Significant
Low	Imperceptible	Imperceptible	Not Significant / Slight	Moderate	Moderate
Medium	Imperceptible	Not Significant	Moderate	Significant	Significant
High	Imperceptible	Slight	Significant	Significant	Very Significant / Profound
Very High	Imperceptible	Slight	Significant	Very Significant / Profound	Very Significant / Profound

11.38 In line with CIEEM guidance[23], the duration of effects should be defined in relation to the lifespan of each organism in question. The criteria used to determine duration of effects under this approach is provided in Table 11.5.

Table 11.5: Effect Duration Criteria	
Magnitude	**Criteria**
Momentary	Effects lasting from seconds to minutes.
Short-term	Up to (but not including) 5 years; for short-lived species, a single season or part of a season.
Medium-term	From 5 years up to (but not including) 15 years; for short-lived species, a single generation.
Long-term	From 15 years up to (and including) 30 years; for short-lived species such as invertebrates, multiple generations.
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken here as 30+ years), except where there is likely to be substantial improvement after this period in which case the category Long-term may be more appropriate.
Reversible	Effects that can be undone, for example through remediation or restoration.

11.39 The criteria used to assess whether an effect is significant or not, are given in the EPA Guidelines 2017, and are set out in Table 2.1 in Chapter 2: EIA Process and Methodology. 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

11.40 Based on professional judgement, moderate, significant, very significant and profound effects are considered significant in terms of EIA.

Assumptions and Limitations

11.41 The assessment has relied on data provided by NBDC, NPWS and Scott Cawley. It has been assumed that these data sets have been reported correctly.

11.42 At the time of the Fossitt survey, access was only permitted within the landownership boundary. The areas of land which formed the Ecological Study Area (ESA) which were not within the landownership boundary were viewed from field boundaries, with the use of binoculars, where needed. It is considered that the limited access to areas of land directly adjacent to the Proposed Development boundary has not unduly impacted upon the findings of the habitat or species scoping surveys.

11.43 Results of the survey undertaken are representative of the time that surveying was undertaken.

11.44 The absence of specific species records returned during the data search does not necessarily indicate absence of a species or habitat from an area, but rather that these have not been recorded or are perhaps under-recorded within the search area.

[23] Chartered Institute of Ecology and Environmental Management, 2019. Guidelines for the Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Winchester. CIEEM

11.45 A Fossitt habitat survey does not aim to produce a full botanical or faunal species list or provide a full protected species survey, but enables competent ecologists to ascertain an understanding of the ecology of the site in order to:

- Identify broadly the nature conservation value of a site and preliminary assess the significance of any potential impacts on habitat/species recorded; and/or
- Confirm the need and extent of any additional specific ecological surveys that are required to identify the true nature conservation value of a site.

Baseline Conditions

Existing Baseline

Desk Study

11.46 The data search conducted via the NBDC identified the presence of 5 bat species/groups, West European hedgehog, two invasive mammals, 17 bird species and three invasive plant species within 2km of the site. Four SACs, three SPAs and two pNHAs were identified within the relevant national and international search areas. Further details are presented in EIAR Volume 3: Technical Appendix 11.1.

Fossitt Habitat Survey

11.47 A Fossitt habitat survey was undertaken on 17 June 2021 by Ashleen Blom. This encompassed all lands within the red line boundary and up to 50m outside, where access allowed.

11.48 Survey work was carried out in accordance with Fossitt habitat survey guidance[24]. Habitats were mapped electronically in the field in order to produce a habitat map.

11.49 The following habitat types were identified within the site:

- Improved agricultural grassland (GA1);
- Amenity grassland (improved) (GA2);
- Dry meadows and grassy verges (GS2);
- Hedgerows (WL1);
- Treelines (WL2);
- Depositing/lowland rivers (FW2);
- Recolonising bare ground (ED3); and
- Buildings and artificial surfaces (BL3).

Species Scoping Survey

11.50 A species scoping survey was carried out to identify the presence of protected species, or the potential of the Application Site to support protected species. The aim of the survey was to provide an overview of the Application Site and to determine whether any further survey work was required.

11.51 No additional protected species surveys were undertaken at this time.

11.52 Table 11.6 below outlines the relevant habitat and field signs that indicate the potential presence of protected or notable species within the ESA.

Table 11.6: Indicative Habitats and Field Signs of Protected Species

Taxon	Indicative Habitat(s)	Field Signs (In Addition to Sightings)
Bats	Roosts – trees, buildings, bridges, caves, etc.	In or on potential roost sites: droppings stuck to walls, urine
	Foraging areas – e.g. parkland, water bodies, streams, wetlands, woodland edges and hedgerow. Commuting routes – linear features (e.g.) hedgerows, water courses, tree lines). See Appendix C of EIAR Volume 3: Technical Appendix 11.1 for preferred foraging and commuting habitat of individual species.	spotting in roof spaces, oil from fur staining round roost entrances, feeding remains (e.g. moth wings under a feeding perch).
Badger *Meles meles*	Found in most rural and many urban habitats.	Excavations and tracks: sett entrances, latrines, hairs, well-worn paths, prints, scratch marks on trees.
Otter *Lutra lutra*	Watercourses.	Holts (or dens), prints, spraints (droppings), slide marks into watercourses, feeding signs (e.g. fish bones).
Birds	Trees, scrub, hedgerow, field margins, grassland, buildings.	Nests, droppings below nest sites (especially in buildings of trees), tree holes.
Common lizard *Zootoca vivipara*	Rough grassland, log and rubble piles.	Sloughed skins.

Weather Conditions

11.53 Table 11.7 describes the weather conditions at the time of survey giving air temperature (°C), wind speed (Beaufort force), cloud cover (percentage) and precipitation.

Table 11.6: Indicative Habitats and Field Signs of Protected Species

Survey Date	Temperature (°C)	Wind	Cloud Cover (%)	Precipitation
17/06/2021	16	2	100	None
22/06/2021	15	1 Westerly	100	Light rain approximately 1 hour after sunset.
15/07/2021	20	1 Westerly	0	None

Additional Surveys

11.54 Two walked bat activity transect surveys were performed. No bats were recorded during the 23 June 2021 transect survey, while 29 bat passes (from soprano pipistrelle, Leisler's bat and common pipistrelle, in order of abundance) were recorded during the 15 July transect. Static detector monitoring undertaken between 14 and 23 June 2021 recorded no bat activity.

11.55 Two emergence surveys were carried out on the dwelling proposed to be demolished. The emergence surveys did not reveal any bats emerging from or entering the cottage or the outbuilding. A total of 80 common pipistrelle passes, 28 soprano pipistrelle passes and 3 Leisler's bat passes were recorded during the June emergence survey. The July emergence only recorded seven passes by common

[24] Fossitt, J.A., 2000. A Guide to Habitats in Ireland.

pipistrelle/Leisler's bat. The overall picture suggested is one of low levels of commuting/foraging bat use of the site.

11.56 An assessment of benthic macroinvertebrates was completed on the section of the Baldonnel stream within the site. No notable species were identified during this stream assessment. The dominant species were freshwater shrimp (*Gammarus* sp.) and stone clingers (*Baetidae* sp.). Macroinvertebrate biodiversity was considered to be low.

11.57 Bat activity, breeding bird and Fossitt habitat surveys were competed in June 2020 by Scott Cawley. These surveys went on the inform the 2020 Ecological Impact Assessment report.

11.58 Breeding bird surveys were undertaken on the 18 June and 1 July 2020. A range of common bird species were noted using the site for foraging and breeding during these surveys. No nests were observed in vegetation or structures during the breeding bird surveys. Meadow pipit was the only Irish red-listed bird of conservation concern[25] recorded using the site to forage and potentially attempt breeding.

11.59 A ground level bat roost potential assessment of structures and trees was undertaken on 1 July 2020. No potential bat roost features were identified on trees within the Application Site. The residential building on site was considered to have low to moderate potential for roosting bats. The other structure on site, a shed, was considered to have no bat roost potential. An internal inspection of the residential building was carried out on the 2 July 2020 and no evidence of roosting bats was observed.

11.60 Two bat emergence and activity surveys were undertaken on the 8 June and 22 July 2020. No bats were observed emerging from the two buildings on site. Common pipistrelle, soprano pipistrelle and Leisler's bat were recorded foraging and commuting within the site during the bat activity surveys.

11.61 It is also understood from the arborist that Sycamore, an invasive non-native tree is present in the mixed hedge in the southwest of the site.

11.62 Receptors identified are as follows:

- Seven internationally designated sites (SACs and SPAs) – International sensitivity;
- Two pNHAs – National sensitivity;
- Baldonnel stream – Local sensitivity;
- Other habitats – Negligible to Local sensitivity;
- Bats – Negligible to Local sensitivity;
- Badger – Negligible sensitivity;
- Otter (population not connected to European sites) – Negligible sensitivity;
- Hedgehog – Negligible sensitivity;
- Other mammals – Negligible sensitivity;
- Birds – Negligible to Local to sensitivity;
- Herptiles (amphibians and reptiles) – Negligible sensitivity;
- Terrestrial and aquatic invertebrates – Negligible sensitivity;
- Flora – Negligible sensitivity.

[25] Colhoun, K. and Cummins, S., 2019. Birds of Conservation Concern in Ireland 2014-2019. Greystones. BirdWatch Ireland

Sensitive Receptors

11.63 The receptors identified as sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised in Table 11.8.

Table 11.8: Summary of Sensitive Receptors

Receptor	Sensitivity
South Dublin Bay and River Tolka SPA	International
Baldonnel stream	Local
Other habitats on site	Negligible to Local
Bats	Negligible to Local
Birds	Negligible to Local

11.64 Based on the baseline characterisation, the following issues have been scoped out of the subsequent assessment:

- Rye Water Valley/Carton SAC: this international site has no connectivity with the site;
- Glenasmole Valley SAC: this international site has no connectivity with the site;
- Wicklow Mountains SAC: this international site has no connectivity with the site;
- Red Bog, Kildare SAC: this international site has no connectivity with the site;
- Wicklow Mountains SPA: this international site has no connectivity with the site;
- Poulaphouca Reservoir SPA: this international site has no connectivity with the site (see EIAR Volume 3: Technical Appendix 11.2);
- Grand Canal pNHA: this national site has no connectivity with the site;
- Liffey Valley pNHA: this national site has no connectivity with the site;
- Otter: negligible sensitivity;
- Hedgehog: negligible sensitivity (common and widespread in Ireland);
- Other mammals: negligible sensitivity;
- Herptiles: negligible sensitivity;
- Terrestrial and aquatic invertebrates: negligible sensitivity; and
- Flora: negligible sensitivity.

11.65 Please note that EIAR Volume 3: Technical Appendix 11.1 considers impacts and effects for the species/groups scoped out above. This highlights that there will be long-term positive effects for a number of species and groups. It also ensures legal responsibilities towards protected species are met.

Assessment of Effects

Demolition and Construction Effects

Designated Sites - South Dublin Bay and River Tolka SPA

11.66 The South Dublin Bay and River Tolka SPA is designated due to its assemblages of wetland and waterbirds. As these species are mobile, there is potential for them to occur within the site; however, due to a lack of suitable habitat within the site, it is considered highly unlikely that these species would be present on site. The SPA is connected to the site hydrologically through the Baldonnel stream. However, embedded mitigation (including the following of all relevant pollution prevention guidelines to prevent pollutants including hydrocarbons and silt entering the watercourse) reduces the likelihood of

negative impact. Given this and the distances and dilution factors involved, demolition and construction effects would be short-term **Imperceptible/Not significant** and **Negative** in nature and **Not Significant** in terms of EIA.

Baldonnel Stream

11.67 Potential impacts during the construction phase include indirect loss or damage of habitats as a result of dust and other air- or water-borne pollution. As the Construction stage will adhere to all relevant legislation and best practice construction and pollution prevention methods, this is expected to cause only negligible impact. Effects would be short-term **Imperceptible and Negative** in nature and **Not Significant** in terms of EIA.

Terrestrial Habitats

11.68 The proposed development will also require the removal of a treeline and grassland habitat. These habitats are abundant in the surrounding area, and it is considered that the small amount of habitat loss would not be significant. Effects would be short-term **Imperceptible and Negative** in nature and **Not Significant** in terms of EIA. Effects for the Demolition and Construction stage are not considered permanent for habitats or species owing to enhancements that would be implemented during the Operation stage.

Bats

11.69 Demolition within the current site includes the demolition of one former residential property and one outbuilding. Both these buildings have been surveyed for the presence or likely absence of roosting bats. No bats roosts were identified. The majority of the site is comprised of improved agricultural grassland; this habitat offers sub-optimal foraging habitat for bat species due to the limited number of prey species present. The loss of these habitats under the proposed development footprint will not lead to a significant reduction in foraging habitat for local bats. Hedgerows and treelines provide suitable habitat for foraging and commuting bats. The small amount of treeline removal proposed will not lead to a significant reduction in foraging habitat for local bats, given the abundance of similar habitat in the surrounding landscape, and the poor quality of this habitat on site. This is because the site is currently subjected to high amounts of artificial light from neighbouring similar developments and streetlighting. The increased amount of artificial light has the potential to reduce the suitability of this habitat to commuting and foraging bats. Low levels of bat activity were recorded. Short-term **Imperceptible, Negative** effects on bats are predicted during the Demolition and Construction stage which are **Not Significant** in terms of EIA.

Birds

11.70 Main impacts on bird species from developments include direct loss or deterioration of habitats, and indirect habitat loss as a result of displacement by disturbance. No evidence of breeding birds was noted in the buildings. However, in the absence of mitigation there is potential for loss of breeding attempts in and adjacent to the site if construction works are undertaken between the months of March and August inclusive. This would result in an effect of low spatial and medium-term temporal magnitude. The effect may continue beyond a single bird generation, but is expected to be sufficiently small for the local population to recover relatively soon. This effect would be not significant for the commoner species, but could be significant at the site level for birds of conservation concern. However, due to the Negligible to Local sensitivity of the site's bird assemblage, overall effects during this stage would be short-term **Imperceptible, Negative** and **Not Significant** in terms of EIA.

Operation Effects

Designated Sites - South Dublin Bay and River Tolka SPA

11.71 Possible longer-term effects of the proposed development on the South Dublin Bay and River Tolka SPA could arise. This would be via the indirect loss of habitat due to water-borne pollutants entering the stream on and adjacent to the site. However, with embedded pollution prevention/mitigation measures included in the proposed development design, it is unlikely that any waterbird or wetland bird will be affected by the proposed development. Potential long-term imperceptible/not significant negative effects would be anticipated from pollution. However, these are not considered likely to be permanent owing to the proposed stream enhancements. These would be considered likely to improve the Baldonnel Stream ecologically over time, essentially neutralising any negative effects downstream in the SPA. Permanent, **Neutral** effects would therefore be expected overall which are **Not Significant** in terms of EIA.

Baldonnel Stream

11.72 The landscape masterplan by KFLA Architects includes the planting of a wetland wildflower mix, wildflower meadow mix, berms and woodland on site. Substantial enhancements are proposed for the stream, and will be in place for the entire operation stage. These are expected to be high (over 20%), leading to a permanent **Slight, Positive** ecological effect and **Not Significant** in terms of EIA.

Terrestrial Habitats

11.73 Gains would be forecast to be below 10% in terrestrial habitat terms. This is because the majority of the site will be occupied by the proposed buildings. The operation stage would therefore be expected to lead to a permanent **Imperceptible, Positive** effect on other habitats which are **Not Significant** in terms of EIA.

Bats

11.74 To retain dark zones for commuting bats, lighting will be cowled in order to direct artificial light from retained hedgerows which are currently used by bats to commute and forage. As detailed within the lighting Plan by Burns McDonnell light will be reduced to 1lux where possible; 1lux is considered to be similar to moonlight levels of light. The landscape masterplan and BMP (EIAR Volume 3: Technical Appendix 11.3) also include the planting of native tree, shrub, and wildflower species. These will attract insects and provide foraging opportunities for bats, enhancing the situation over the current agricultural context. Overall effects would be permanent **Imperceptible, Positive** for bats which are **Not Significant** in terms of EIA.

Birds

11.75 The operation stage of the proposed development will result in overall long-term to permanent imperceptible positive effects on birds. Disturbance may be raised slightly, but the creation of invertebrate-rich habitats will provide a suitable food source for many bird species throughout this stage. This is considered likely to result in an **Imperceptible, Positive** impact on this Local to Negligible sensitivity receptor which is **Not Significant** in terms of EIA.

11.76 Further details of all impacts and enhancements predicted during the Operation stage can be found in EIAR Volume 3: Technical Appendices 11.1 and 11.3.

Assessment of Residual Effects

Additional Mitigation

Demolition and Construction Stage

11.77 No significant effects are predicted, and consequently no additional mitigation is required in terms of EIA. Please note that EIAR Volume 3: Technical Appendix 11.1 refers to mitigation to meet legal obligations for Negligible-/ Local to Negligible-sensitivity receptors.

Operation Stage

11.78 No significant effects are predicted. Consequently, no additional mitigation is required in terms of EIA.

Enhancement Measures

11.79 Enhancements to the Baldonnel stream, terrestrial habitats and (as a consequence) protected species are proposed. These have already been described in part above under a consideration of effects during the Operation stage. Full details of enhancements are given in EIAR Volume 3: Technical Appendix 11.3.

Demolition and Construction Residual Effects

11.80 As no additional mitigation would be required, the residual demolition and construction effects remain as reported in the assessment of effects section:

- South Dublin Bay and River Tolka SPA - short-term **Imperceptible/Not Significant, Negative** and **Not Significant** in terms of EIA;
- Baldonnel stream - short-term **Imperceptible, Negative** and **Not Significant** in terms of EIA;
- Terrestrial habitats on site - short-term **Imperceptible, Negative** and **Not Significant** in terms of EIA;
- Bats - short-term **Imperceptible, Negative** and **Not Significant** in terms of EIA; and
- Birds - short-term **Imperceptible, Negative** and **Not Significant** in terms of EIA.

Operation Development Residual Effects

11.81 As no additional mitigation would be required, the residual demolition and construction effects remain as reported in the assessment of effects section:

- South Dublin Bay and River Tolka SPA - permanent **Neutral** and **Not Significant** in terms of EIA;
- Baldonnel stream - permanent **Slight, Positive** and **Not Significant** in terms of EIA;
- Terrestrial habitats on site - permanent **Imperceptible, Positive** and **Not Significant** in terms of EIA;
- Bats - permanent **Imperceptible, Positive** and **Not Significant** in terms of EIA; and
- Birds - permanent **Imperceptible, Positive** and **Not Significant** in terms of EIA.

Summary of Residual Effects

11.82 Table 11.9 provides a tabulated summary of the outcomes of the ecology assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 11.9: Summary of Residual Ecology Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P**
Demolition and Construction								
South Dublin Bay and River Tolka SPA	Pollution	None required	Imperceptible/Not Significant	-	L	I	IR	St
Baldonnel stream	Pollution	None required	Imperceptible	-	L	D	IR	St
Terrestrial habitats	Habitat loss	None required	Imperceptible	-	L	D	R/IR	St
Terrestrial habitats	Pollution	None required	Imperceptible	-	L	I	R	St
Bats	Commuting and foraging habitat loss	None required	Imperceptible	-	L	D	R	St
Birds	Disturbance / destruction of nest (if works are undertaken between March and August)	None required (pre-commencement checks recommended in Volume 3: Technical Appendix 11.3 to avoid an offence.	Imperceptible	-	L	D	IR	St
	Habitat loss as a result of displacement by disturbance	None required	Imperceptible	-	L	I	R	St
Operation								
South Dublin Bay and River Tolka SPA	Pollution Ecological enhancement	None required	Imperceptible	+/-	L	I	IR	Lt
Baldonnel stream	Ecological enhancement	None required	Slight	+	L	D	R	P
Terrestrial habitats	Ecological enhancement	None required	Imperceptible	+	L	D	R	P
Bats	Disturbance through lighting	None required	Imperceptible	+	L	D	R	P
Birds	Foraging habitat enhancement	None required	Imperceptible	+	L	D	R	P

Notes:

* - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, ID = Indirect;

L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = Medium-term, Lt = Long-term, P = Permanent.

** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound.

Cumulative Effects

Intra-Project Effects

11.83 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in Chapter 15: Cumulative Effects.

Inter-Project Effects

11.84 Table 11.10 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 11.10: Inter-Project Cumulative Effects

Cumulative Development	Demolition and Construction		Operation	
	Cumulative Effects Likely?	Reason	Cumulative Effects Likely?	Reason
SD20A/0283 Microsoft, Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 VA06S.308585 SD20A/0121 UBC Properties, townlands within Grange Castle Business Park, Baldonnel, Dublin 22 UBC Properties - Grange Castle South Business Park, Dublin 22 SD17A/0377Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 SD18A/0134 Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 SD20A/0295 (amendment to SD18A/0134) Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 VA06S.309146 Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 (SD21A/0167) Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22 (SD21A/0186) Site proposed electrical connection and substation to EirGrid to the south	No	All effects during Demolition and Construction stage of proposed development are imperceptible or not significant	No	All effects during Operation stage of proposed development are imperceptible, not significant and/or positive – therefore no negative cumulative effects

Demolition and Construction Cumulative Effects

11.85 It has been concluded that, with embedded mitigation measures included in the proposed development, it is likely that there will be no significant cumulative effects on designated sites or any other ecological feature in combination with any other development during these stages.

Operation Cumulative Effects

11.86 It has been concluded that, with embedded mitigation measures included in the proposed development, it is likely that there will be no significant negative cumulative effects on designated sites or any other ecological feature in combination with any other development during the operation stage.

Summary of Assessment

Background

11.87 This chapter has detailed the potential ecology effects due to the construction and operation development stages of the proposed development. The assessment of demolition, construction and operation stages has been undertaken taking into account the relevant national and local guidance and regulations.

11.88 The desk-based assessment identified four Special Areas of Conservation (SACs) and three Special Protection Areas (SPA) within 15km of the site boundary. Within 5km of the site boundary there are two proposed Natural Heritage Areas (pNHAs). The site has a hydrological connection with South Dublin Bay and the River Tolka Estuary SPA via the Baldonnel stream and the River Liffey.

11.89 Eight habitat types were identified within the site during a Fossitt habitat survey undertaken in June 2021. The main habitat types recorded within the site are Improved grassland (GA1), and treeline (WL2). The lands directly under and adjacent to the proposed development are considered to be of low ecological value.

11.90 An assessment of invertebrates was completed on the section of the Baldonnel stream within the site. No notable species were identified during this stream assessment. Invertebrate biodiversity was considered to be low.

11.91 Bat surveys did not reveal any bats emerging from or entering the cottage or the outbuilding. Low levels of commuting/foraging bat use of the site by three common Irish species were recorded overall.

Demolition and Construction Effects

11.92 During demolition and construction works, there may be disturbance of protected species or breeding birds, loss of habitats, habitat damage though air- or water-borne pollutants, accidental trapping of mammals in excavations, and habitat fragmentation and loss of commuting routes for wild mammals. These have the potential to lead to effects on protected species populations and one internationally designated site. However, considering the importance and sensitivity of these designated sites, habitats and species, and embedded mitigation measures designed into the proposed development, these effects are considered to be **Imperceptible** and **Not Significant** in terms of EIA.

11.93 Overall, it is considered that demolition and construction of the proposed development would result in a negative but **Imperceptible** effect on ecology and identified receptors. As such, it would **not give rise to Significant effects** on ecology in terms of EIA.

Operation Effects

11.94 During the operation stage, pollution to aquatic habitats and disturbance of bats through lighting are expected. However, the residual effects would be expected to be imperceptible for the local bat population, and imperceptible and neutral for the only designated site affected (South Dublin Bay and the River Tolka Estuary SPA).

11.95 The proposed landscape masterplan includes a range of landscape enhancements including those to the Baldonnel Stream, the planting of a wetland wildflower mix, wildflower meadow mix, berms, green walls and woodland on site. Substantial enhancements are proposed for the wildlife and the stream, leading to positive effects for habitat interest and for species groups including birds and those associated with the stream.

11.96 Overall, it is considered that the operation stage would result in a **Slight, Positive** effect on ecology and identified receptors. It would therefore **not give rise to Significant effects** on ecology in terms of EIA.

Cumulative Effects

11.97 No significant effects are predicted on ecology as a result of the proposed development alone in either the demolition and construction or the operation stage so there is **no potential for cumulative effects**.

12 GROUND CONDITIONS

Introduction

12.1 This chapter reports on the likely significant ground condition effects likely to arise from the demolition and construction stage and the operational stage of the proposed development.

12.2 It describes the ground condition policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely ground condition effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

12.3 The chapter is supported by the following technical appendices (provided in EIAR Volume 3):

- Appendix 12.1: ISGL Ltd., 2021, Project Apollo: Ground Investigation & Geotechnical Report; and
- Appendix 12.2: Ramboll, 2021, Vantage Data Centers Dublin, Contamination Land Interpretative Report.

Methodology

12.4 The assessment has been informed by the following published guidance (further to those listed in the Planning Context section in Chapter 1: Introduction and paragraph 2.7 of Chapter 2: EIA Process and Methodology of this EIAR Volume):

- International Legislation:
  - Water Framework Directive (WFD) (2000/60/EC)[1];
  - Environmental Quality Standards (EQS) Directive (2008/105/EC)[2] (as amended)[3];
  - Priority Substances Directive (2008/105/EC)[4];
- National legislation, guidance and industry standards:
  - European Communities Environmental Objectives (Groundwater) Regulations 2010[5];
  - Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements' (Institute of Geologists of Ireland (IGI), 2013)[6];
  - Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (National Roads Authority (NRA), 2009)[7];
  - Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (Environmental Protection Agency (EPA), 2013)[8]; and
  - Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007)[9].

12.5 For human health assessments from impacts to soil, there are no statutory thresholds in Ireland for the assessment of soil contamination. For human health, the EPA recommends the use of Generic Assessment Criteria (GAC), based on the UK Environment Agency Contaminated Land Exposure Assessment (CLEA)8 model, either produced by the UKEA itself (known as Soil Guideline Values (SGV)) or values generated using the CLEA model by reputable third-party organisations. Where GAC have not been published or if practitioners do not use human health GAC publications, values should be generated by appropriately qualified and experienced professionals using the CLEA model for consistency with the EPA approach.

12.6 The 'Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites' indicates that values for screening of the impact on groundwater may come from several sources, including the European Communities Environmental Objectives (Groundwater) Regulations 2010, the EPA's Groundwater Threshold Values (GTV), the EPA's Interim Guideline Values (IGV) or relevant Environmental Quality Standards (EQS). The latter guidelines are used when considering a surface water receptor.

12.7 There are no provisions to create a contaminated land database in the Republic of Ireland (RoI) and since contaminated land regulations have not yet been enforced. It is unlikely that there is a dedicated contaminated land officer at South Dublin County Council (SDCC), however, most counties have an Environmental Department responsible for waste management; environmental enforcement; litter control; pollution control; environment education and awareness; and water quality.

Assessment Scope

12.8 There is no statutory definition of 'contaminated land' in the RoI, and in contrast to the UK, there is no framework within which the regulatory agencies are required to undertake an assessment of contaminated sites or create a register of contaminated land. Furthermore, there are currently no Irish standards in relation to the clean up or rehabilitation of contaminated land.

12.9 The 'Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites' (2007) established a risk based approach for soil and groundwater assessment and remediation in line with the UK Environment Agency's document 'Model Procedures for the Management of Land Contamination: Contaminated Land Report No. 11 (CLR 11) – Note CLR 11' (2004)[10], now replaced in the UK by 'Contaminated Land Risk Management' (2020) guidance[11]. In 2013, the EPA published 'Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites' (e.g. large scale industrial activities, large petrol storage facilities, waste sites).

12.10 As there is no published or formalised technical guidance relating to the assessment of ground contamination (including controlled waters) effects, professional judgement, experience and best practice methods have therefore been drawn upon to assess the significance of the potential ground contamination (including controlled waters) effects of the proposed development. The assessment has taken account of all applicable legislation, guidance and policy as previously outlined.

Technical Scope

12.11 The potential pollutant linkages and contamination impacts for both the demolition and construction stage and the operational stage of the proposed development have been assessed.

[1] European Union, 2000. 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. Document 32000L0060.
[2] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[3] European Union, 2013. Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy Text with EEA relevance. Document 32013L0039.
[4] European Union, 2008. Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. Document 32008L0105.
[5] Government of Ireland, 2010. European Communities Environmental Objectives (Groundwater) Regulations 2010. S.I. No. 9 of 2010.
[6] Institute of Geologists of Ireland (IGI), 2013. Guidelines for the preparation of the Soils, Geology and Hydrogeology chapters of an Environmental Impact Assessment Report (EIARs). Published 30 April 2013. IGI.
[7] National Roads Authority (NRA), 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. NRA.
[8] Environmental Protection Agency (EPA), 2013. Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. EPA.
[9] EPA, 2007. Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites. EPA.
[10] Environment Agency, 2004. Model Procedures for the Management of Land Contamination: Contaminated Land Report No. 11 (CLR 11) – Note CLR 11. [Now withdrawn].
[11] Environment Agency, 2020. Guidance: Land contamination risk management (LCRM). October 2020. EA.

12.12 The technical scope of the assessment includes the potential for existing contamination to be present within the soil and shallow groundwater on the site and the risks to human health and the water environment waters associated with the potential presence and mobilisation of existing contamination.

12.13 Accordingly, the following potential pollutant linkages, which have the potential to present an unacceptable risk, have been considered:

- Exposure of construction workers to contaminated soil;
- Generation of dust and potentially contaminated dusts, including asbestos;
- Exposure of construction workers to ground gases;
- Exposure of construction workers to contaminated groundwater (if present);
- Mobilisation of contamination in surface water and groundwater through excavations and foundation works, including those for the underground fuel storage tanks;
- Mobilisation of site materials and pollutants during rainfall events;
- Changes in ground level as a result of earthworks and cut and fill activities may increase vulnerability of the underlying bedrock aquifer;
- Contaminants introduced by construction activities through leakages/spillages; and
- Loss of agricultural land.

12.14 During the operational stage there would be no interaction between the proposed development and deep groundwater beneath the site. As such, deep groundwater has not been assessed for the operational stage.

Spatial Scope

12.15 The study area is defined as that within a radius of up to 2 kilometres (km) from the site boundary. The study area has been used to identify potential historical land uses which may have contributed to contamination issues associated within the site; as well as potentially sensitive land uses in the wider surrounding area that could be impacted if existing contaminants were mobilised as a result of the proposed development.

Temporal Scope

12.16 The assessment has considered impacts arising during the demolition and construction stage which would be of expected to be short-term (1-7 years) or medium-term (7-15 years) in nature; and from the operational stage which would be expected to be permanent (i.e. more than 60 years).

Baseline Characterisation Method

Desk Study

12.17 In order to establish baseline geology and soil conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- Geological Survey of Ireland (GSI) – online Public Viewer mapping[12], which includes Geohazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping,
- Teagasc soil and subsoil database[13];
- Ordnance Survey Ireland – aerial photographs and historical mapping[14];
- EPA website mapping and database information[15]; and
- National Parks and Wildlife Services (NPWS) – Protected Site Register[16].

12.18 Site-specific data was derived from the following sources:

- ISGL 2021 Ground Investigation – (provided in Appendix 12.1 of EIAR Volume 3); and
- Various design site plans and drawings.

Field Study

12.19 A preliminary intrusive ground investigation was undertaken in June 2021 by IGSL to characterise the ground, groundwater and ground gas conditions of the site and the potential contamination risks. The factual results of this investigation are reported within Appendix 12.1 of EIAR Volume 3.

12.20 Interpretation of the IGSL data is provided in Appendix 12.2 of EIAR Volume 3.

Assessment Method

Methodology

Demolition and Construction Stage

12.21 The identification of likely significant effects during the demolition and construction stage was based on a review of the presence of potential receptors, a qualitative assessment of the sensitivity of the receptors, the identification of potential impact pathways and an assessment of the magnitude of the potential impacts.

12.22 The assessment of potential impacts and likely effects has, therefore, comprised the following approach:

- Identification and establishment of the sensitivity of receptors on the basis of their use, proximity to the site, existing quality or resource value;
- Consideration of potential source-pathway-receptor linkages;
- Evaluation of the magnitude of potential impacts from potential contamination as a result of the introduction of the proposed development;
- Consideration of embedded mitigation measures integral to the proposed development;
- Classification of the significance of likely effects;
- Identification of additional mitigation measures to eliminate or reduce residual effects, where considered necessary; and
- Re-assessment to conclude the likely significance of residual effects.

Operation Stage

12.23 The demolition and construction stage methodology has been applied to the identification of likely significant effects during the operational stage.

Cumulative Assessment

12.24 With respect to potential inter-cumulative effects, the assessment reviews the potential effects on geology and soils of the cumulative development (through review of project details for potential effects on geology of their sites and locality) and discusses whether and how any likely effects of the proposed development may interact with them, resulting in a cumulative effect.

Assessment Criteria

12.25 The criteria used to assess if an effect is significant or not in terms of EIA, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

[12] Geological Survey Ireland, 2021. Data and Maps [online]. Available at: https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx (Accessed on 30/06/2021).
[13] Teagasc, 2017. County Soils Maps [online]. Available at: https://www.teagasc.ie/crops/soil--soil-fertility/county-soil-maps/
[14] Ordnance Survey Ireland, 2018. Historical Mapping [online]. Available at: https://www.osi.ie/products/professional-mapping/historical-mapping/
[15] Environment Protection Agency, 2021. Maps [online]. Available at: https://gis.epa.ie/EPAMaps/
[16] National Parks and Wildlife Service, 2020. Information [online]. Available at: https://www.gov.ie/en/organisation-information/09575-national-parks-and-wildlife-service/

12.26 Although there is no framework or Irish standards in relation to the assessment of risks associated with contamination, often the UK framework is adopted. This framework allows for the categorisation of risks and is undertaken in terms of consequence (i.e. severity of risk) and probability (i.e. likelihood of the risk being realised), which are combined to produce an overall classification of the risk of harm occurring. Whilst this classification is not directly translatable into the EIA process, the principles and land use scenarios from the framework have been used to allocate criteria that can be used in EIA.

12.27 The human health criteria, set out in Tables 12.2 and 12.3, have been based on that principle for the assessment of risks associated with contaminated land. Criteria for surface and groundwater have been based on a variety of sources including Water Framework Directive (WFD) Protected Area designations, GSI and EPA aquifer classifications.

Receptor Sensitivity/Value Criteria

12.28 The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in Table 12.2.

Table 12.2: Receptor Sensitivity/Importance Criteria

Sensitivity	Criteria (Examples)
Low	Human health: low sensitivity land use such as commercial or industrial.
	Surface water: • Has no or minimal ecosystem present; • Does not form or supply water to a designated site; • Provides low/no amenity value; • Is not used as a commercial or private water supply; • Is substitutable in short-term; and • Does not form part of a designated fishery.
	Groundwater: • Poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu). • Is classified as having low aquifer vulnerability; • Does not supply baseflow to local rivers; • Resource is such that there is some potential for substitution; • Is classified by the EPA as not being at risk; • Is not located within a groundwater source protection area (SPA); • Is not used as a commercial or private water supply; • Does not supply a groundwater dependent terrestrial ecosystem (GWTE); • No hazardous substances recorded within the aquifer; and • Is not threatened by, or sensitive to, saline intrusion.
Medium	Human health: medium sensitivity land use such as public open space.
	Surface water: • Has an ecosystem that has low sensitivity to water quality or quantity changes; • Provides amenity value on a local basis; • Is used as a water supply for industrial, commercial or agricultural purposes; • May be substitutable in the long-term; and • Is or forms part of a cyprinid fishery.
	Groundwater:

Table 12.2: Receptor Sensitivity/Importance Criteria

Sensitivity	Criteria (Examples)
	• Is a locally important aquifer. These are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). • Is classified as having low or intermediate aquifer vulnerability; • Contributes some baseflow to local rivers; • May be substitutable in the long-term; • Is classified by the GSI as probably not being at risk; • Is located within a groundwater SPA (source catchment area); • Provides water for agricultural or industrial use with limited connection to surface water; • Supplies a GWTE that has species that are not protected or listed. They are abundant/common and not critical for GWDTE functions; • Shows a downward trend in hazardous substances; • Is potentially at risk from or sensitive to saline intrusion; and • Is extracted such that extraction could potentially put water balance at risk.
High	• Human health: high sensitivity land use such as schools or residential without private gardens.
	Surface water: • Has an ecosystem that has moderate sensitivity to water quality or quantity changes; • Supports protected aquatic flora and fauna of national importance; • Is or supplies water to nationally designated sites (e.g. National Park or Nature Reserve); • Is regularly used for recreation (where water immersion sports are practiced regularly) and commercial navigation, important on a local or regional basis; • Is used as a local water supply for potable water supply purposes; • Is not substitutable in the short- or long-term; • Is or forms part of a salmonid fishery; and • Is a designated Shellfish water.
	Groundwater: • Is a regionally important aquifer. These are subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). • Regionally important aquifer with high vulnerability; • Contributes some baseflow to regionally important rivers; • Is not substitutable in the short- or long-term; • Is classified by the GSI as being probably at risk; • Is located within a groundwater SPA (outer catchment); • Provides water for a private water supply or locally important industrial, commercial or agricultural purposes; • Provides locally important resource or supports aquatic ecosystems; • Shows a stable pattern of hazardous substances; • Quality is sensitive to or likely to be threatened by saline intrusion; and • Is extracted such that extraction is putting water at risk.
Very High	Human health: very high sensitivity land use such as allotments or residential with private gardens.
	Surface water:

Table 12.2: Receptor Sensitivity/Importance Criteria

Sensitivity	Criteria (Examples)
	• Has an ecosystem that has high sensitivity to water quality or quantity changes; • Supports nationally or internationally protected species or supplies a site that has these characteristics; • Is or supplies water to internationally designated sites (e.g. Ramsar sites); • Is a major commercially significant navigational or recreational water body (where water immersion sports are practiced regularly); • Is used as a regional water supply for potable water supply purposes; • Is not substitutable in the short- or long-term; and • Is or forms part of a salmonid fishery.
	Groundwater: • Is a regionally important aquifer. These are subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). • Regionally important aquifer with high vulnerability; • Provides significant baseflow to rivers; • Is not substitutable in the short- or long-term; • Is classified by the GSI as being at risk; • Is located within a groundwater SPA (inner catchment); • Provides water for a public water supply or regionally important industrial, commercial or agricultural purposes; • Supports aquatic ecosystems incorporating protected species; • Shows an upward trend in hazardous substances; • Is subject to saline intrusion causing damage to quality of the groundwater; and • Is extracted such that extraction is putting water balance at severe risk.

Impact Magnitude Criteria

12.29 The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in Table 12.3.

Table 12.3: Impact Magnitude Criteria

Magnitude of Impact	Criteria
Low	Human health: • Contaminant concentrations substantially below relevant screening criteria as detailed in Appendix 12.2 of EIAR Volume 3; • Resulting exposure to contamination is unlikely to represent significant harm or significant potential of significant harm (SPOSH) to receptors; and • No requirement for specific control measures to reduce risks to human health and/or make land suitable for intended use.
	Surface water: • Small alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters (refer to Chapter 10: Water Resources and Flood Risk).
	Groundwater: • Water quality/quantity within screening levels and unlikely to affect most sensitive receptors;
	• Localised changes in groundwater levels or quality but no appreciable change in wider groundwater regime; and • Short-term changes that would recover in the short- to medium-term.
	Buildings: • Damage to buildings or property easily repairable as part of normal maintenance routines.
Medium	Human health: • Contaminant concentrations are below relevant screening criteria as detailed in Appendix 12.2 of EIAR Volume 3; • Significant contamination is unlikely with a low risk to human health; and • Best practice measures can be required to minimise risk to human health.
	Surface water: • Medium alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters (refer to Chapter 10: Water Resources and Flood Risk).
	Groundwater: • Non-compliance with water quality/quantity standards on a short-term basis; • Localised changes in groundwater levels or quality with small-scale measurable changes in wider groundwater regime but no significant impact on local private water supplies; and • Change in water body but not enough to change its WFD status.
	Buildings: • Damage to buildings or property requiring investment in excess of normal maintenance routines.
High	Human health: • Contamination levels exceed background levels and relevant screening criteria as detailed in Appendix 12.2 of EIAR Volume 3 with potential for significant harm to human health; and • Control/remediation measures are required to reduce risks to human health and/or make land suitable for intended use.
	Surface water: • Large alteration/change in the quality or quantity of controlled waters and/or to the physical or biological characteristics of surface waters (refer to Chapter 10: Water Resources and Flood Risk).
	Groundwater: • Non-compliance with water quality/quantity standards on a long-term basis; • Measurable changes in groundwater levels or quality in wider groundwater regime with significant impact on local private or public water supplies; and • Changes in quantity or quality that result in a reduction in WFD status.
	Buildings: • Significant or material damage to buildings or property.

Scale of Effect Criteria

12.30 Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 12.4.

Table 12.4: Scale of Effect Criteria			
Magnitude	**Sensitivity of Receptors**		
	Low	**Medium**	**High**
Low	Imperceptible	Imperceptible/Not Significant	Slight/Moderate
Medium	Imperceptible/Not Significant	Moderate	Moderate/Significant
High	Slight/Moderate	Moderate/Significant	Very Significant/Profound

12.31 Based on professional judgement, effects of moderate significance and above are considered significant in terms of EIA. The description off effects used within this Chapter are in accordance with EPA Guidance as set out in Table 2.1 of Chapter 2: EIA Process and Methodology.

Assumptions and Limitations

12.32 The assessment has relied on data provided within public domain environmental databases. It has been assumed that the data sets within these reports have been reported correctly and are most up to date.

12.33 The field data comprising soil and groundwater quality was collected for the site was collected IGSL. It has been assumed that the data sets within the IGSL report have been reported correctly.

Baseline Conditions

Existing Baseline

Current and Historical Use

12.34 An assessment of site history using historical maps (OSI, 2019) indicates that the site has been in agricultural use since the earliest mapping available (1837- 1842).

12.35 The site currently consists of mostly flat agricultural land with the land surrounding the site comprising a mixture of agricultural, residential and industrial uses. There are two residential properties located near the site on the northern site boundary adjacent to the R134 New Nangor Road, one of which is vacant and within the site and one which is occupied to the immediate north-east of the site. Bolands Car Centre (a motor sales business) is present to the immediate west of the site. Several data centre developments are under construction or are operational located near the site.

Geology

12.36 With reference to published GSI and Teagasc records the site is anticipated to be underlain (in sequence) by Quaternary Glacial Till Deposits and the Lucan Formation which comprises dark grey to black limestone and shale (also known as Dinantian (Upper Impure) Limestone or Calp Limestone). It is also anticipated that topsoil and Made Ground will be present within the site.

12.37 The following ground conditions were encountered in the site-specific investigation undertaken by IGSL in May 2021 and comprised 17 cable percussive boreholes, three rotary core drillholes, and 13 trial pits excavated across the site. Figure 12.1 identifies the borehole/trial pit locations.

Figure 12.1 Site Investigation Sample Location Plan (extracted from IGSL 2021 Report)

12.38 The investigations have revealed the ground conditions at the Grangecastle site to comprise:

- TOPSOIL consisting of brown slightly sandy silty CLAY / SILT with occasional rootlets;
- Glacial Till – firm mottled grey and brown sandy gravelly CLAY / SILT with a medium cobble content;
- Glacial Till – stiff to very stiff dark grey very gravelly SILT/CLAY with a medium cobble content;
- Variably weathered rockhead recovered as dark grey clayey silty GRAVEL shy of trial pit termination. Gravel and cobbles range from medium strong limestone to weak mudstone or shale; and
- Bedrock consisting of dark grey and black LIMESTONE with thin horizons of fissile SHALE or MUDSTONE.

12.39 Published GSI mapping indicates faults to be present to the south and west of the site but not within the site boundary.

12.40 The GSI Public Viewer was reviewed to identify sites of geological heritage for the site and surrounding area. There are no recorded geological heritage sites on the site and there is no evidence of any geological heritage site which could be considered suitable for protection from the proposed development. Likewise, there are no identified geological heritage sites in the SDCC Development Plan 2016-2022[17] associated with the site.

[17] SDDC, 2016. South Dublin County Council Development Plan 2016-2022 [online]. Available at: https://www.sdcc.ie/en/services/planning/development-plan/plan-2016-2022/ [Accessed on 28/06/2021].

Hydrogeology

12.41 The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d; cubic meters per day), specific capacity ($m^3/d/m$; cubic meters per day per m depth) and groundwater throughput (mm^3/d; cubic millimeters per day). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division comprises regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

12.42 The bedrock aquifers underlying the site according to the GSI National Draft Bedrock Aquifer Map (see earlier reference to GSI – online Public Viewer mapping) are classified as 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.

12.43 During the 2021 ground investigation, groundwater strikes or seepages were encountered in each of the trial pits excavated and in a number of cable percussive boreholes. In the case of the trial pits, groundwater was reported as seepages at depths mainly between 1.2-1.9 m. In the cable percussive boreholes, groundwater was intercepted at depths of 1.6-2.4 m in boreholes (BH) 1, 7, 8, 10, 12 and 17; while the remainder were noted to be dry. Where groundwater was absent, this may be attributed to potential seepages of the casing's sealing. Groundwater was intercepted at depths of 2.50, 2.60 and 3.00 m during rotary drilling while the standpipes show groundwater levels of 0.97-1.89 m in late June 2021.

12.44 Groundwater is likely to be in continuity with the Baldonnel stream which runs through the centre of the site and given this the groundwater flow direction is likely to be towards the north.

12.45 There is no evidence of springs or karstification in this area according to the GSI Karst database.

Groundwater Quality Status and Groundwater Bodies

12.46 With reference to the WFD, the Groundwater Body (GWB) underlying the site is the Dublin GWB (EU GWB Code: IE_EA_G_008), which under WFD is of 'good status' and has a GWB risk score of 'not at risk' (2010-2015 WFD status).

12.47 The GSI currently classifies the aquifer vulnerability underlying the site to be high (H) with the subsoils being of low permeability.

12.48 The site is not situated with a Groundwater Drinking Water Protection Area or Groundwater SPA and there are no wells or springs within 1km of the site with the closest being approximately 3km southeast and east of the site.

12.49 There are no Special Protection Areas, candidate Special Areas of Conservation or proposed Natural Heritage Areas within or immediately adjacent to the site.

Hydrology

12.50 The site is situated within the sub catchment of the Griffeen River and Baldonnel Stream which are tributaries of the River Liffey. The Baldonnel Stream runs approximately east to west through the centre of the site. Further surface water features are present within the Grange Castle Golf Club situated approximately 400 m to the south east of the site.

Surface Water Quality Status and Surface Water Bodies

12.51 Currently, the EPA classifies the Baldonnel Stream and Griffeen River as being under review. A review of WFD waterbody status (2013-2018) indicates that the Baldonnel Stream is classified as having 'moderate status'. The nearest EPA monitoring stations are at Baldonnel Stream (RS09B090400) located 200 m west of the site, downstream of Bolands Garage and at Griffeen (RS09G010200), located approximately 1 km west of the site. The latest EPA biological assessment of surface water from the latter location indicated a score of Q3 (poor) in 1991.

Ground Gases (including Radon)

12.52 According to the EPA (now incorporating the Radiological Protection Institute of Ireland) the site is in a Low Radon Area where is it estimated that between 5-10 % of dwellings will exceed the Reference Level of 200 Bq/m^3 (becquerel per cubic meter). This is the third lowest of the five radon categories which are assessed by the EPA.

Mining and Quarrying

12.53 According to the GSI there are no active quarries located in the immediate vicinity of the site with the nearest quarry being located approximately 4 km south east at Belgard Quarry. EPA mapping indicates there are no mines on or near the site.

Geomorphology and Designated Sites

12.54 No designated geological or geomorphological areas or sites are present on-site or adjacent to the site. As such, the proposed development is not considered to adversely impact on such receptors. The closest geological heritage site is the Belgard Quarry, located 3 km to the south-east of the site.

Current Regulated Activities and Industrial Uses including Landfills

12.55 According to the EPA, there are a number of licensed Integrated Pollution Prevention and Control (IPPC) and waste facilities; however, these are located approximately 3 km from the site.

12.56 Information gained from surrounding planning applications indicates that there no known illegal or historic landfills within 500 m of the site, however it is understood that uncontrolled waste operations are undertaken at the adjacent car centre.

Sources of Contamination

12.57 Due to the lack of development at the site and the historical agricultural use, the risk of contaminated soils being present on-site is low. There is a potential risk, albeit low, associated with migration of contaminants from the adjacent Bolands Garage; although it is noted that this land use is hydraulically down/cross gradient from the site.

12.58 No particular types of potential contaminants were identified from the current and historical use of the site; therefore, the 2021 ground investigation included a typical contaminated land chemical testing suite comprising of heavy metals, petroleum hydrocarbons, asbestos, organic contaminants (such as polycyclic aromatic hydrocarbons (PAHs)) and ground gases.

12.59 The findings of the initial contaminated land assessment (i.e. comparison of soil and water contaminant levels against GAC) as detailed in Appendix 12.2 of EIAR Volume 3 is as follows:

- There are no potentially significant contaminative activities on-site;
- No significant visual or olfactory field evidence of contamination within soils or groundwater was found on-site;
- Very low levels of soil contamination were recorded on-site, typical of a greenfield site at concentrations that do not present a significant risk to potential receptors;

- Low levels of contamination in groundwater typical of a greenfield site and representative of general background groundwater quality in the site's urban industrial setting were found on-site. Contamination detected does not present a significant risk to potential receptors;
- No asbestos was detected on-site; and
- No significant potential off-site contamination sources were identified.

12.60 Below is a summary of the site sensitivity in relation to geology, hydrogeology, hydrology and contamination:

- The site has been predominantly greenfield and agricultural use historically. There is no evidence of any historical waste disposal or source of contamination.
- The site is underlain by a LI aquifer.
- The site is underlain by the Lucan formation comprising dark grey to black limestone and shale from the Carboniferous Age.
- Very low levels of soil contamination were recorded typical of a greenfield site at concentrations that do not present a significant risk to potential receptors. Low levels of contamination in groundwater typical of a greenfield site and representative of general background groundwater quality in the site's industrial and agricultural and greenfield setting.

Future Baseline

12.61 The existing baseline conditions have been used for this assessment as the proposed future activities on site (use as a data centre) will not introduce any significant sources of contamination which could significantly impact soil or the water environment.

Sensitive Receptors

12.62 The receptors identified as sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised in Table 12.6.

Table 12.6: Summary of Sensitive Receptors

Receptor	Sensitivity
Construction workers	Low
Adjacent site users	Low
Future site users	Low
Water environment (Baldonnel Stream)	Medium
Groundwater beneath the site (aquifers)	Medium

Assessment of Effects

Demolition and Construction Effects

Embedded Mitigation

12.63 This section identifies a range of embedded mitigation measures that are incorporated within the Proposed Development.

Construction Environment Management Plan

12.64 A project-specific Construction and Environmental Management Plan (CEMP) will be established and maintained by the contractors during the demolition and construction stage which will cover all potentially polluting activities and emergency response procedures. All personnel working on the site would be trained in the implementation of the procedures.

12.65 The measures identified in this section (including those in relation to control of soil excavation, material export, fill materials, fuel and chemical handling, transport and storage and control of water), and those provided in Chapter 5: Demolition and Construction, would be included in the CEMP.

Control of soil excavation

12.66 Subsoil will be excavated to facilitate the construction of a series of underground fuel storage tanks, foundations, access roads, car parking areas, expansion of drainage connections and other ancillary works (SUDs / wetland features to the north of the stream). The proposed development will incorporate the reduction, reuse and recycle approach in terms of on-site soil excavations. The proposed works will be carefully planned to ensure only material required to be excavated will be, with as much material left *in situ* as possible. Reuse of on-site excavated soil 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 the site. It is envisaged that any soil excavated will be retained on-site and reused as fill material orlandscaping.

12.67 Excavation works will be carefully monitored by a suitably qualified person to ensure any potentially contaminated soil is identified and segregated from clean/inert soil.In the unlikely event that any potentially contaminated soils are encountered, the soil should be tested and classified as hazardous or non-hazardous in accordance with the EPA's Waste Classification –List of Waste & Determining if Waste is Hazardous or Non-Hazardous'[18] publication, HazWasteOnline tool[19] or similar approved method. The material will then need to be classified as inert, non-hazardous, stable non-reactive hazardous or hazardous in accordance with EC Decision 2003/33/EC[20]. It should then be removed from site by a suitably permitted waste contractor to an authorised waste facility.

12.68 Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of an appropriate earthworks handling protocol during construction within the CEMP. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body.

12.69 Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads.

Export of material from site

12.70 It is currently envisioned that all soil/stones arising on the site will be re-used on site. In the event that any excavated material requires removal off-site, it may be removed as either a waste or, where appropriate, as a by-product. Where the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*[21]. EPA agreement will be obtained before re-using the spoil as a by- product. However, it is not currently anticipated that any excavated material will be removed offsite orimported onto the site for reuse as a by-product. Where material cannot be reused off site it will be sent for recovery or disposal at an appropriately authorised facility.

[18] EPA, 2018. Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous. July 2018 EPA
[19] HazWasteOnline, 2012. Waste Assessment Tool [online]. Available at: https://www.hazwasteonline.com/ [Accessed on 28/07/2021].
[20] European Union, 2003. 2003/33/EC: Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC. Document 32003D0033.
[21] Article 27 of the European Communities (Waste Directive) Regulations 2011,

12.71 If any waste soil requires removal from site, it will be classified by an experienced and qualified environmental professional to ensure that the waste soil is correctly classified for transportation and recovery/disposal offsite. Refer to Chapter 14: Waste Management for further information.

Sources of fill and aggregates

12.72 All fill and aggregate for the proposed development will be sourced from reputable suppliers. All suppliers would be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of material specified for the proposed development;
- Environmental Management status; and
- Regulatory and Legal Compliance status of the Company.

Fuel and chemical handling

12.73 The following procedures will be included in the CEMP in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of a bunded refuelling areas on the site;
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures would be taken:
  - Any flexible pipe, tap or valve would be fitted with a lock and would be secured when not in use;
  - The pump or valve would be fitted with a lock and would be secured when not in use;
  - All bowsers to carry a spill kit;
  - Operatives must have spill response training; and
  - Drip trays used on any required mobile fuel units.

12.74 In the case of drummed fuel or other potentially polluting substances which may be used during the demolition and construction stage the following procedures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they would be secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

12.75 The aforementioned list of measures is non-exhaustive and would be included in the CEMP.

Control of water during construction

12.76 Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Earthwork operations will be carried out with adequate drainage, falls and profile to control run-off and prevent ponding and flowing. Correct management, as set out in the CEMP, will ensure that there will be minimal inflow of shallow/perched groundwater into any excavation.

12.77 Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any off-site impacts. All run-off will be prevented from directly entering into any water courses or drainage ditches.

12.78 Should any discharge of demolition or construction related water be required, discharge would be to foul sewer. Pre-treatment and silt reduction measures on-site would include a combination of silt fencing, settlement measures (e.g. silt traps, 20m buffer zone between machinery and watercourses, off-site refuelling of machinery) and use of hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits.

Groundworks

12.79 The proposed development would involve groundworks, which would inevitably have an interaction with the on-site soils and water environment. As outlined above, demolition and construction works will be undertaken in compliance with a CEMP.

12.80 Proposed activities that are likely to be occurring at the site during the demolition and construction stage which could involve or which could affect the ground, are as follows:

- Excavation and construction of a series of underground fuel storage tanks;
- Formation of landscape bunds and SUDs / wetland features to the north of the stream;
- Re-use of excavated material within construction works where possible in order to minimise off-site material movements, including excavated soils, roads and demolition materials;
- Foundations;
- Soil stripping, excavation and/or exposure of underlying materials;
- Topsoil and subsoils would be segregated during the works;
- Excavations for foundations, drainage works or services (standard open trenching techniques would be used for excavations);
- Dewatering of excavations (if required);
- Site-won material would be re-used on-site wherever possible, subject to relevant geotechnical testing. Imported materials would also be required to provide engineered fill as part of the construction of structures and embankments;
- Where waste material is to be disposed of off-site this would be to a licensed waste facility in accordance with a Materials Management Plan (MMP) or equivalent;
- Establishment of a temporary construction compound(s), storage and use of fuels or chemicals – the establishment stage sits prior to the installation of appropriate bunds and other pollution control measures and as such represents the highest risk. All storage areas for fuels and oils would be appropriately bunded in line with best practice guidance;
- Movement of plant and machinery within the proposed development and to/from the compound;
- Wheel washing facilities would be provided during the demolition and construction stage for plant and vehicles; and
- Vehicles moving across soils within the site.

12.81 As outlined above the activities required for the demolition and construction stage of the proposed development represents the greatest risk of potential impact on the geological environment. These activities primarily pertain to the site preparation, excavation, levelling and infilling activities required to facilitate construction of proposed development and ancillary services.

12.82 Taking the above into account, the likely effects associated with contamination during the demolition and construction stage are as follows:

- A proportion of the development area would be covered in hardstand (approximately 8.43 ha). This provides protection to the underlying aquifer but also reduces local recharge in this area of the aquifer. As the area of aquifer is large this reduction in local recharge would have no significant change in the natural hydrogeological regime.
- Excavated and stripped soil can be disturbed and eroded by site vehicles during the works. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where soil is stockpiled. This can lead to run-off with high suspended solid content which can impact on water bodies. The potential risk from this indirect impact to water bodies and/or habitats from contaminated water would depend on the magnitude and duration of any water quality impact.

- Due to the lack of development at the site and the historical agricultural use the risk of contaminated soils being present on-site is low. Nonetheless material, which is exported from site, if not correctly managed or handled, could impact negatively on human beings (on-site and off-site) as well as water and soil environments. However, it is currently anticipated that all soil would be reused on-site.
- As with all construction projects, there is potential for water (e.g. surface water, groundwater) to become contaminated with pollutants associated with the demolition and construction works. Contaminated water which arises from construction sites can pose a risk to groundwater quality for the duration of the construction if contaminated water is allowed to percolate to the underlying aquifer. 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.

12.83 With consideration of the embedded mitigation measures outlined above predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the demolition and construction stage. Effects would be temporary to short-term, **Imperceptible** to **Imperceptible/Not Significant Negative** i.e. **not significant** in EIA terms.

Accidental spills and leaks

12.84 During the construction of the proposed 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.

12.85 Accidental spillages may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoils and impact underlying groundwater. Groundwater vulnerability at the site is currently classified as extreme and high. Any soil stripping will also further reduce the thickness of subsoil and the natural protectionthey provide to the underlying aquifer. However, capping of site with impermeable paving and building and associated drainage infrastructure will provide additional protection following construction.

12.86 With consideration of the embedded mitigation measures outlined predicted impacts on the hydrogeological environment from accidental spills and leaks would be unlikely to occur during the demolition and construction stage. Effects would be temporary to short-term, **Imperceptible/Not Significant Negative** i.e. **not significant** in EIA terms.

Loss of agricultural land

12.87 There would be local loss of 8.7 Ha of agricultural soil within the site as a result of the proposed development; however, the area of development is small in the context of the overall agricultural land available in the region. Furthermore, the site has been zoned under Objective EE of the SDCC Development Plan 2016-2022 to provide for enterprise and employment uses.

12.88 There would be no impact to mineral resources (such as sands and gravels / or quarried stone) in the area as a result of the proposed development.

12.89 As such effects would be permanent and **Imperceptible Negative i.e., Not Significant** in EIA terms.

Operation Effects

Embedded Mitigation

Environmental procedures & Fuel Storage

12.90 As detailed in Chapter 4: Description of Development, the Applicant would implement an Environmental Safety and Health Management System for the proposed development. Prior to operation of the proposed development, a comprehensive set of operational procedures would be established which will include site-specific mitigation measures and emergency response measures.

12.91 The primary potential impact relates to a failure or accidental spill of diesel fuel which is stored and used on-site for back-up power generation.

12.92 In order to minimise any impact on the underlying subsurface strata from material spillages, the fuel storage tanks are located above ground in designated fuel storage bunds with an impervious base. Three 40,000 litre bunded tanks will be provided next to each data centre. They will be bunded to volume of 110 % of the capacity of the tank within the bund (plus an allowance of 30 mm for infiltration). Drainage from the bunds is be diverted for collection and safe disposal. Fuel delivery to the bulk storage tanks would take place within designated bunded unloading areas. Diesel would be piped from the bulk storage tanks to belly tanks at each of the back-up generator units. The belly tanks would be double skinned. Delivery of fuel will be undertaken following a documented procedure which minimises risk of spills and spill containment or clean-up kit shall be readily available on-site. It is anticipated, based on the Applicant's experience, that the back-up generators would rarely be used.

Operational Activities

12.93 Reasonably foreseeable activities or factors during the operational stage which could affect or be affected by the ground are as follows:

- Periodic maintenance which could involve small scale excavations;
- Areas of soft landscaping and planting; and
- Drainage and storm water attenuation.

12.94 These potential impacts are not anticipated to occur following the implementation of mitigation measures outlined below.

12.95 With consideration of the embedded mitigation measures outlined above predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the operation stage. Effects would be permanent, **Imperceptible** to **Imperceptible / Not Significant Negative**, and **Not Significant** in EIA terms.

Accidental spills and leaks

12.96 During the operational stage there is a potential for leaks and spillages from the fuel storage (bulk storage and local storage at the back-up generators) to occur on-site. In addition, there is a potential for leaks and spillages from vehicles along access roads, loading bays and in parking areas. Any accidental spillages and leaks of oil, petrol or diesel could cause soil/groundwater contamination if the spillages and leaks are unmitigated.

12.97 In the event of an on-site fire, firewater would also need to be contained or it may contaminate soils and/or groundwater.

12.98 With consideration of the embedded mitigation measures outlined above predicted impacts on the hydrogeological environment would be unlikely to occur during the operation stage. Effects would be permanent, **Imperceptible / Not Significant Negative**, and **Not Significant** in EIA terms.

Assessment of Residual Effects

Additional Mitigation

12.99 No additional mitigation measures are proposed.

Enhancement Measures

12.100 No enhancement measures are proposed.

Demolition and Construction Residual Effects

12.101 The residual demolition and construction effects remain as reported in the assessment of effects section:

- Temporary to short-term **Imperceptible** to **Imperceptible/Not Significant** effect from groundworks.
- Temporary to short-term **Imperceptible/Not Significant** effect from accidental spills/leaks.
- Permanent **Imperceptible** effects from loss of agricultural land.

Operation Residual Effects

12.102 The residual operation stage effects remain as reported in the assessment of effects section:

- Permanent, **Imperceptible** to **Imperceptible/Not Significant** effects associated with general operation activities such as periodic maintenance including with areas of soft landscaping and planting and use of the site's drainage network.
- Permanent, **Imperceptible/Not Significant** effects associated with accidental spills and leaks.

Summary of Residual Effects

Table 12.7 provides a tabulated summary of the outcomes of the ground conditions assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 12.7: Summary of Residual Ground Conditions Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect **	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P
Demolition and Construction								
Construction workers	Impact to human health from exposure to contaminated soils / dust / ground gases / water during enabling and construction works.	None required	Imperceptible	-	U	D	IR	T to St
Adjacent site users	Impact to human health from exposure to contaminated dust during enabling and construction works.	None required	Imperceptible	-	U	I	IR	T to St
Water environment (Baldonnel Stream)	Increased potential for leaching of contaminants from soils and mobilisation of contamination in surface water and groundwater during earthworks and foundation works. Also, contaminants introduced to surface water by construction activities through leakages/spillages.	None required	Imperceptible/not significant	-	U	D	IR	T to St
Groundwater beneath the site (aquifers)		None required	Imperceptible/not significant	-	U	D	IR	T to St
Agricultural Land	Loss of agricultural land	None required	Imperceptible	-	U	D	IR	P
Operation								
Adjacent site users	Impact to human health from exposure to residual contaminated soils / dust / ground gases / water.	None required	Imperceptible	-	U	I	IR	P
Future site users		None required	Imperceptible	-	U	D	IR	P
Water environment (Baldonnel Stream)	Contaminants released by operation activities through leakages/spillages.	None required	Imperceptible/not significant	-	U	D	IR	P
Groundwater beneath the site (aquifers)		None required	Imperceptible/not significant	-	U	D	IR	P

Notes:

* - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, ID = Indirect;

L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = Medium-term, Lt = Long-term, P = Permanent.

** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound.

Cumulative Effects

Intra-Project Effects

12.103 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in Chapter 16: Intra-Cumulative Effects.

Inter-Project Effects

12.104 Table 12.8 provides a summary of the likely cumulative effects resulting from the proposed development and the cumulative developments.

Table 2.4: Inter-Project Cumulative Effects

Cumulative Schemes	Demolition and Construction & Operation	
	Cumulative Effects Likely?	Reason
SD20A/0283 Microsoft, Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22 VA06S.308585 SD20A/0121 UBC Properties, townlands within Grange Castle Business Park, Baldonnel, Dublin 22 UBC Properties - Grange Castle South Business Park, Dublin 22 SD17A/0377Digital Reality Trust - Profile Park, Baldonnel, Dublin 22, D22 TY06 SD18A/0134 Cyrus One - Grange Castle Business Park, Clondalkin, Dublin 22 SD20A/0295 (amendment to SD18A/0134) Cyrus One Townlands within Grange Castle South Business Park, Baldonnel, Dublin 22 VA06S.309146Cyrus One - Grange Castle South Business Park, Baldonnel, Dublin 22 SD21A/0167 Centrica Business Solutions – Profile Park, Baldonnel, Dublin 22 SD21A/0186 Equinix (Ireland) Ltd – Plot 100, Profile Park, Nangor Road, Clondalkin, Dublin 22	No	Cumulative effects are unlikely as each site would be mitigated through an appropriate staged approach to contaminated land assessment and ground investigation as required under EPA (2013) guidance, *Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites*. Cumulative effects are unlikely from other operational sites nearby as each site would have spill response procedures and will have been subject to contaminated land assessment and ground investigation as required under EPA (2013) guidance. Similarly, each development site would have embedded mitigation through their site specific contaminated land management procedures documented in the site environmental management systems.

Table 2.4: Inter-Project Cumulative Effects

Cumulative Schemes	Demolition and Construction & Operation	
	Cumulative Effects Likely?	Reason
Site proposed electrical connection and substation to EirGrid to the south	No	

Demolition and Construction Cumulative Effects

12.105 Cumulative effects from other developments nearby are unlikely as each development site would be mitigated through an appropriate staged approach to contaminated land assessment and ground investigation as required under EPA (2013) guidance, Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Similarly, each development site would have embedded mitigation through their site-specific contaminated land management procedures documented in the site CEMP.

Operation Cumulative Effects

12.106 Cumulative effects from other operational sites nearby are unlikely as each site would have spill response procedures to manage storage and use of potential polluting fuels and chemicals and will have been subject to contaminated land assessment and ground investigation as required under EPA (2013) guidance, Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Similarly, each development site would have embedded mitigation through their site-specific contaminated land management procedures documented in the site environmental management systems.

Summary of Assessment

Background

12.107 This chapter has detailed the potential ground condition effects due to the demolition and construction and operational stages of the Proposed Development. The assessment of effects has been undertaken using the relevant national and local guidance and regulations.

12.108 Baseline assessment has been made using publicly available information supplemented by a ground investigation assessing soil and water quality. The assessment of the baseline information and ground investigation results indicate that:

- The site has been predominantly greenfield and agricultural use historically. There is no evidence of any historical waste disposal or source of contamination within the site itself.
- The site is underlain by the Lucan formation comprising dark grey to black limestone and shale from the Carboniferous Age.
- The site is underlain by a locally important aquifer with the Baldonnel Stream running through the site.
- Very low levels of soil contamination were recorded typical of a greenfield site at concentrations that do not present a significant risk to potential receptors. Low levels of contamination in groundwater

typical of a greenfield site and representative of general background groundwater quality in the site's industrial and agricultural and greenfield setting.

12.109 Overall, the results of the baseline assessment identified no significant sources of ground contamination in either the soil or the water environment.

Demolition and Construction Effects

12.110 The proposed development would involve groundworks, which would have an interaction with the on-site soils and water environment.

12.111 The activities that could affect the ground, are:

- Excavation and construction of a series of underground fuel storage tanks;
- Formation of landscape bunds and SUDs / wetland features to the north of the stream;
- Re-use of excavated material within construction works where possible in order to minimise off-site material movements, including excavated soils, roads and demolition materials;
- Excavations for foundations, drainage works or services (standard open trenching techniques would be used for excavations) and any dewatering of excavations (if required);
- Movement of plant and machinery within the proposed development and to/from the compound;
- Wheel washing facilities would be provided during the demolition and construction stage for plant and vehicles; and
- Vehicles moving across soils within the site.

12.112 With consideration of the embedded mitigation measures outlined above predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the demolition and construction stage. Effects would be temporary to short-term, Imperceptible to Imperceptible/Not Significant i.e. not significant in EIA terms.

12.113 Also, during the construction, 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.

12.114 Again, with consideration of the embedded mitigation measures outlined predicted impacts on the hydrogeological environment from accidental spills and leaks would be unlikely to occur during the demolition and construction stage. Effects would be Imperceptible/Not Significant Negative i.e. not significant in EIA terms.

12.115 Overall, it is considered that the demolition of the existing site and construction of the proposed development would result in a temporary to short-term and Imperceptible/Not Significant effect on the ground conditions and identified receptors, and as such **would not give rise to significant effects**.

Operational Effects

12.116 During the operational stage there is a potential for leaks and spillages from the fuel storage (bulk storage and local storage at the back-up generators) to occur on-site. In addition, there is a potential for leaks and spillages from vehicles along access roads, loading bays and in parking areas. Any accidental spillages and leaks of oil, petrol or diesel could cause soil/groundwater contamination if the spillages and leaks are unmitigated.

12.117 With consideration of the embedded mitigation measures predicted impacts on the hydrogeological environment would be unlikely to occur during the operation stage. Effects would be permanent, Imperceptible to Imperceptible/Not Significant i.e. not significant in EIA terms.

12.118 Reasonably foreseeable activities or factors during the operational stage which could affect or be affected by the ground are as follows:

- Periodic maintenance which could involve small scale excavations;
- Areas of soft landscaping and planting; and
- Drainage and storm water attenuation.

12.119 With consideration of the embedded mitigation measures predicted impacts on human health and the geological and hydrogeological environment would be unlikely to occur during the operation stage. Effects would be permanent, Imperceptible/Not Significant i.e. not significant in EIA terms.

12.120 Overall, it is considered that the operation of the proposed development would result in an imperceptible/Not Significant effect on the ground conditions and identified receptors, and as such **would not give rise to significant effects**.

Cumulative Effects

12.121 **No significant effects** are predicted on the ground conditions as a result of the proposed development alone in either the demolition and construction or the operation stage so there is no potential for cumulative effects.

13 CLIMATE CHANGE

Introduction

13.1 This chapter of the Environmental Impact Assessment (EIA) reports on the likely significant climate change effects to arise from the demolition and construction stage and the completed development stage of the proposed development.

13.2 The chapter describes the climate change policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely climate change effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

13.3 There are no technical appendices associated with this chapter.

Methodology

13.4 The assessment has been informed by the following legislation, policies, and published guidance:

- International Legislation:
  - The Paris Agreement, which builds upon the United National Framework Convention on Climate Change (UNFCCC)[1];
  - Kyoto Protocol of the UNFCCC[2];
  - European Union (EU) Nationally Determined Contribution (INDCs)[3] under the UNFCCC;
  - European Union Emission Trading Scheme (2015)[4];
- National Legislation and Policy:
  - The Climate Action and Low Carbon Development Act 2015 (Amendment Bill 2021)[5];
  - Government of Ireland National Mitigation Plan (2017)[6];
  - Government of Ireland Climate Action Plan (2021)[7];
  - Climate Action and Low Carbon Development (Amendment) Act 2021[8]
- Regional Policy:
  - South Dublin County Council (SDCC) Climate Change Action Plan 2019-2024[9];
  - SDCC 2020 - 2024 Corporate Plan, Theme 4 Environment, water and climate change, Objective 1: Create a sustainable low carbon and climate-resilient county[10];
- Local Policy:
  - Dublin City Council Climate Change Action Plan (2019-2024)[11];
  - Dublin City Development Plan (2016-2022)[12].
- National guidance and industry standards:
  - Institute of Environmental Management and Assessment's (IEMA) Environmental Impact Assessment Guide to assessing Greenhouse Gas (GHG) emissions and evaluating their significance (2017)[13];
  - IEMA's Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2020)[14];
  - Environmental Protection Agency research, National Risk Assessment of Impacts of Climate Change: Bridging the Gap to Adaptation Action (2016)[15];
  - EPA's Draft Guidelines on the information to be contained in Environment Impact Assessment Reports (2017)[16]; and
  - PAS 2080:2016 Carbon management in infrastructure[17].

Assessment Scope

13.5 There is currently no specific climate change assessment guidance in Ireland and therefore this chapter provides a preliminary assessment of the potential climate impacts and effects from the demolition and construction and operation of the proposed development, following the methodology set out in IEMA's aforementioned guidance[13,14]. However, terminology regarding the scale of impacts has been altered to reflect the terminology as set out in the Environmental Protection Agency's (EPA) Draft Guidelines on the information to be contained in Environment Impact Assessment Reports[16].

13.6 In line with the requirements of IEMA, this chapter describes the likely significant effects of the proposed development on the environment resulting from the:

- Climate Change Resilience (CCR) assessment;
- In-combination climate impacts (ICCI) assessment; and
- GHG assessment.

13.7 The chapter presents the proposed development's demolition and construction and operational stages' sources of GHG emissions. GHG emissions have been measured in carbon dioxide equivalent emissions (CO_2e), which is a measure used to compare the emissions from various GHGs based upon their global warming potential.

13.8 Table 13-1 presents the GHG emissions assessment boundaries.

[1] UNFCCC, 2015, Paris Agreement. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement [Accessed 12/04/2021].
[2] UNFCCC, 1998, Kyoto Agreement. Available at https://unfccc.int/kyoto_protocol. [Accessed 13/07/2021].
[3] UNFCCC, 2016. NDC User Guide. Available at: https://unfccc.int/files/focus/indc_portal/application/pdf/ndc_parties_userguide_version_1__may_2016_(2).pdf [Accessed 13/07/2021].
[4] EU Emissions Trading System (EU ETS). Available at: https://ec.europa.eu/clima/policies/ets_en [Accessed 12/04/2021].
[5] Climate Action and Low Carbon Development (Amendment) Bill 2021. Available at: https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/ [Accessed 13/07/2021].
[6] Department of Communications, Climate Action & Environment. National Mitigation Plan (2017). Available at: https://www.climatecaseireland.ie/wp-content/uploads/2018/04/National-Mitigation-Plan-2017.pdf [Accessed 13/07/2021].
[7] Government of Ireland. Climate Action Plan (2021). Available at https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/ [Accessed 24/11/2021].
[8] Climate Action and Low Carbon Development (Amendment) Act 2021. Available at: Climate Action and Low Carbon Development (Amendment) Act 2021 (irishstatutebook.ie) [Accessed 24/11/21].
[9] SDCC, 2019. South Dublin Climate Change Action Plan (CCAP) 2019-2024 [online]. Available at: SDCC's Climate Change Action Plan - SDCC [Accessed 13/07/2021].
[10] SDCC, 2020. Corporate Plan (2020) [online]. Available at: https://www.sdcc.ie/en/services/our-council/policies-and-plans/corporate-plan/ [Accessed 13/07/2021].
[11] Dublin City Council Climate Change Action Plan 2019 - 2024. (2019). Available at: https://www.dublincity.ie/sites/default/files/2020-07/2019-dcc-climate-change-action-plan.pdf [Accessed 12/04/2021].
[12] Dublin City Development Plan 2016-2022. (2016). Available at: https://www.dublincity.ie/dublin-city-development-plan-2016-2022 [Accessed 13/07/2021]
[13] IEMA Environmental Impact Assessment (IEMA) Guide to assessing GHG emissions and evaluating their significance, 2015. Available at: assessing-greenhouse-gas-emissions-and-evaluating-their-significance (iema.net) [Accessed 13/07/2021].
[14] IEMA, 2020, Climate Change Resilience and Adaptation. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 [Accessed 13/07/2021].
[15] EPA Research. (2016). National Risk Assessment of Impacts of Climate Change: Bridging the Gap to Adaptation Action Available at: http://www.epa.ie/pubs/reports/research/climate/Research_Report_346.pdf [Accessed 13/07/2021].
[16] Environmental Protection Agency, 2017. Draft Guidelines on the information to be contained in Environmental Impact Assessment Report (EIAR). Available at: EPA_EIAR_Guidelines.pdf [Accessed 29/11/21].
[17] BSi, 2016, PAS2080 Carbon management in infrastructure.
Available at: https://shop.bsigroup.com/ProductDetail?pid=000000000030323493 [Accessed 13/07/2021].

Table 13-1: GHG Emissions Assessment Boundaries

Item	Description	Input Data	Emissions Factors*
Demolition and Construction Stage			
Embodied GHG emissions	Embodied GHG emissions which are emitted during the manufacture, transport and construction of materials used in the construction works.	Estimated volumes construction materials	University of Bath Inventory of Carbon and Energy[18]
Waste disposal GHG emissions	GHG emissions associated with the disposal of waste from construction, demolition, and excavation (CDE) works.	Estimated volumes of waste arisings and demolition material	UK Government GHG Emissions Factors[19]
On-site GHG emissions	GHG emissions associated to onsite energy requirements during demolition and construction works.	Estimated energy consumption associated to the demolition and construction works	UK Government GHG Emissions Factors[17]
Transport GHG emissions	GHG emissions associated with vehicles travelling to and from the proposed development.	Distances travelled by construction vehicles	UK Emissions Factors Toolkit (EFT) v10.1[20]
Operation Stage			
Operational energy demand	GHG emissions associated with the operation of the proposed development (e.g. lighting)	Kilowatt hours of energy and fuel consumption	UK Government GHG Emissions Factors[17]
Operational GHG emissions	Annual average daily traffic (AADT)	Kilowatt hours of energy and fuel consumption	UK Emissions Factors Toolkit (EFT) v10.1[20]
* UK Government Emissions Factors have been used as there is no Irish Government equivalent available.			

Technical Scope

CCR and ICCI

13.9 The assessment of the potential impacts and likely effects of the proposed development on climate has considered the following:

- Vulnerability of the proposed development to extreme weather and projected climate change; and
- The additive impact that climate and climate change may have on impacts identified by other environmental topics as a result of the proposed development, now and in future years.

GHG Emissions

13.10 The assessment of GHG emissions, associated to demolition, construction, and operational activities, has considered the following emissions sources:

- GHG emissions resulting from demolition and construction stage activities, such as from the material supply including primary extraction, manufacturing, transportation and construction process and site works associated with the proposed development; and
- GHG emissions resulting from the operation of the proposed development.

13.11 Sources of GHG emissions during the demolition and construction stage include:

- GHG emissions associated with the required raw materials, including raw material supply, transport, and manufacture;
- GHG emissions associated with construction processes, including transport to/from works site and construction/installation processes; and
- GHG emissions associated with land use change, e.g. those mobilised from vegetation or soil loss during construction

13.12 Sources of potential GHG emissions during the operation stage include:

- GHG emissions from scope 2 electricity[21] associated with the powering of the data centers;
- GHG emissions associated with ongoing land use change/sequestration; and
- Transport of workers to and from the site.

Spatial Scope

CCR and ICCI

13.13 The study area for the CCR and ICCI assessments comprised the demolition and construction footprint of the proposed development, including compounds and temporary land take (i.e. the site).

GHG Emissions

13.14 For the assessment of GHG emissions associated with the demolition and construction stage, the study area has taken account of emissions associated with the extraction, processing, and transport of materials from outside of the site (red line) boundary as well as site-based emissions that result from the construction activities within the site (red line) boundary.

13.15 The study area for operation stage GHG emissions was consistent with the area selected for the proposed development's traffic model. This area is described in the Study Area section of Chapter 7 Air quality of this EIAR Volume.

Temporal Scope

13.16 In line with EPA guidance, as outline in EIAR Chapter 2: EIA Process and Methodology of this EIAR Volume, the duration of effects has been classified using the following: Momentary (seconds to minutes), Brief (<1 Day), Temporary (<1 Year), Short-term (1 to 7 years), Medium-term (7 to 15 years), Long-term (15 to 60 years), Permeant (>60 years). The assessment has considered impacts arising during the construction stage (TBC) which would be expected to be temporary to short-term in nature and from the operation stage which would be expected to be long-term to permanent.

13.17 The CCR, ICCI and GHG emissions assessments have considered impacts arising during the demolition and construction stage (approximately 2 to 3 years) which would be expected to be temporary to short-term in nature. In addition, the assessments have also considered impacts arising during the operation stage (i.e. design life – i.e. >60 years) of the proposed development. This would be expected to be permanent in nature.

Baseline Characterisation Method

Desk Study

13.18 In order to establish baseline conditions for climate in the study area, relevant data has been reviewed and assessed. Data has been obtained from the following sources:

[18] University of Bath Inventory of Carbon and Energy (ICE) Version 2.0. Available at: http://www.circularecology.com/embodied-energy-and-carbon-footprint-database.html#.XraGoFWWyUk [Accessed 13/07/2021]
[19] UK Government conversion factors for company reporting of greenhouse gas emissions. 2021. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021 [Accessed on 24/11/2021]
[20] UK Emissions Factors Toolkit (EFT) v10.1. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [Accessed on 26/04/2021].
[21] World Resources Institute, 2015. Greenhouse Gas Protocol, Scope 2 Guidance [online]. Available at: https://ghgprotocol.org/sites/default/files/standards/Scope%202%20Guidance_Final_Sept26.pdf [Accessed 12/08/2021].

- EPA, 2019 GHG Emissions Projections Report for 2018-2040 Field Study (2020)[22]; and
- Met Éireann, Irelands Climate: The Road Ahead (2013)[23].

Field study/data collection

13.19 Field study/data collection was not required at the site as the data provided by other sources was deemed to be adequate and representative of the site conditions.

Assessment Method

Methodology

CCR and ICCI

13.20 The CCR assessment has assessed the vulnerabilities of the proposed development to climate change during the demolition and construction and operation stages of the proposed development. The ICCI assessment has evaluated the potential additive impact that climate change may have on receptors identified by other environmental topics. Professional judgement has been used to assess whether projected climate change could increase the magnitude of the effects as identified by the disciplines, change the sensitivity of the receptors, or reduce the effectiveness of embedded mitigation measures. In line with IEMA guidance, qualitative assessments have been undertaken for the CCR and ICCI assessments by:

- Identifying sensitive receptors;
- Analysing current and future climate in the study area using data from the EPA and Met Éireann and assessing projected changes on climate variables;
- Assessing the likelihood and consequence of the climate impact on the proposed development to determine the significance; and
- Identifying mitigation and adaptation measures for any significant effects, in liaison with the proposed development's design team and relevant environmental discipline specialists.

GHG Emissions

13.21 The IEMA guidance indicates that all GHG emissions should be considered as 'significant' in Terms of EIA, but that it is appropriate to contextualise emissions. Therefore, the estimated GHG emissions associated with the proposed development would be compared to the carbon budgets for Ireland to provide a national context. The proposed carbon budgets are listed as follows:

- Carbon Budget 1 (2021-2025)- 295 Mt CO2e;
- Carbon Budget 2 (2026-2030)- 200 Mt CO2e; and
- Carbon Budget 3 (2031-2035)- 151 Mt CO2e.

13.22 The goal of the GHG emissions estimation exercise is to estimate the emissions that would be generated or avoided by the proposed development, within the redline boundary. The purpose of this is to:

- Determine the magnitude of the proposed development's emissions for the relevant scenarios: 'Do-Something' (i.e. with the proposed development) and 'Do-Nothing' (i.e. no proposed development);
- Enable comparison of the 'Do-Something' scenario against the 'Do-Nothing scenario and the Ireland carbon budgets; and
- Enable identification of emissions hot spots within the 'Do-Something' scenario to inform identification and prioritisation of mitigation measures.

13.23 The assessment considers two sources of GHG emissions, during the construction and operation (use) lifecycle stages over a 60-year assessment period, including:

- Construction emissions: Carbon is assessed based on information provided by the design team and information from similar projects, including the use of products or materials, construction transport, construction plant and construction waste; and
- Operational use-related emissions: An estimation of carbon emissions associated with the operation and maintenance of the proposed development.

13.24 In line with IEMA guidance, end of life or decommissioning impacts have not been considered due to the long design life of the proposed development and given that emissions associated with end of life are commonly relatively small.

13.25 Emissions from the considered sources are compared to a baseline 'Do-Nothing' scenario to quantify the impact of the proposed development. The scenarios used for the GHG emissions assessment of the proposed development is summarised in Table 13-2.

Table 13-2: GHG emissions assessment scenarios

Scenario	Description
'Do-Nothing'	'Business as usual' – the proposed development is not implemented.
'Do-Something'	The proposed development is implemented, considering embedded GHG mitigation measures.

13.26 GHG emissions in each scenario have been compared to assess the contribution of the proposed development to climate change. Values are reported in $MtCO_2e$. This measure considers the six Kyoto Protocol gases: carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). This calculation normalises the global warming potential of the main GHG into one measure, based on the global warming potential of CO_2.

13.27 The assessment has also compared operational carbon emissions between the proposed development with, and without embedded mitigation measures; in this case, the incorporation of solar PV panels.

Cumulative Stage

CCR

13.28 The climate resilience effects resulting from the construction and operation stages would be limited in their spatial extent to the site boundary and the proposed development in isolation. Therefore, cumulative climate change resilience effects with other schemes would not be considered.

ICCI

13.29 The in-combination climate impacts resulting from the construction and operation stages would be limited in their spatial extent to the relevant technical assessments in the ES for the proposed development. Therefore, cumulative effects would not be considered for each technical discipline as opposed to in-combination with cumulative schemes.

GHG Emissions

13.30 GHG emissions contribute cumulatively with all sources of GHG emissions globally to cause climate change. In line with IEMA guidance, the assessment would only consider GHG emissions in the context of GHG emissions in local area and the UK.

Assessment Criteria

13.31 The criteria used to assess if an effect is significant or not, has been set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

[22] EPA, 2020. 2019 GHG Emissions Projections Report for 2018-2040 Field Study.

[23] Met Éireann. (2013). Available at: Irelands Climate: the road Ahead. http://edepositireland.ie/handle/2262/71304 [Accessed on 09/04/2021].

Impact Magnitude Criteria

CCR and ICCI

13.32 The magnitude of impact has been assessed using professional judgement as a combination of both the probability (likelihood) of the impact and the consequence of the impact.

13.33 The probability of the impact refers to the likelihood of a climate impact occurring and having an impact on the proposed development, over its lifespan. This includes consideration of existing and embedded mitigation measures within the design. The probability of the impact is classified as unlikely, possible (as likely as not) and likely in accordance with the criteria set out in Table 13-3.

Table 13-3: Probability of Impact Criteria

Likelihood level	Criteria
Unlikely	The climate impact is not anticipated to occur during the lifetime of the proposed development (60 years).
Possible (as likely as not)	The climate impact may occur a limited number of times during the lifetime of the proposed development (60 years).
Likely	The climate impact may occur multiple times during the lifetime of the proposed development (60 years).

13.34 The consequence of the impact occurring considers the geographical extent of the effect or the number of receptors affected (e.g., scale), the complexity of the effect, degree of harm to those affected and the duration, frequency, and reversibility of effect. The consequence of the impact is classified as very low, low, medium, high, and very high in accordance with criteria set out in Table 13-4.

Table 13-4: Consequence of the Impact Criteria

Consequence Level	Health and Safety	Disruption to Construction/ Operation	Cost
Very High	Multiple fatalities	Site-wide disruption lasting more than one week	>10 % of the proposed development construction value
High	Single fatality / multiple long-term injuries	Site-wide disruption lasting more than one day but less than one week	8-10 % of the proposed development construction value
Medium	Long-term injury or illness, prolonged hospitalisation, or inability to work	Partial disruption across elements of the site / proposed development lasting more than one day but less than one week	4-8 % of the proposed development construction value
Low	Lost time injury or medical treatment required, short-term impact on persons affected	Partial disruption across elements of the site / proposed development lasting less than a day	1-3 % of the proposed development construction value
Very Low	Minor harm or near miss	Disruption to an isolated section of the site / proposed development lasting less than a day	<1 % of the proposed development construction value

GHG Emissions

13.35 The IEMA guidance indicates all GHG emissions should be considered as 'significant', but it is appropriate to contextualise emissions. Therefore, the total GHG emissions associated with the proposed development have been compared to the carbon budgets for the Ireland to provide a national context. Additional mitigation has been identified to reduce GHG emissions where necessary.

Scale of Effect Criteria

CCR and ICCI

13.36 Impacts have been assessed on the basis of the probability/likelihood of impact and against consequence of impact to determine the scale of effect as presented Table 13-5.

Table 13-5: CCR and ICCI Scale of Effect Criteria

Consequence Level	Probability/Likelihood of Impact		
	Unlikely	Possible	Likely
Very High	Slight to Moderate	Very Significant to Profound	Profound
High	Slight to Moderate	Very Significant to Profound	Very Significant to Profound
Medium	Imperceptible to Not Significant	Slight to Moderate	Very Significant to Profound
Low	Imperceptible to Not Significant	Imperceptible to Not Significant	Slight to Moderate
Very Low	Imperceptible	Imperceptible to Not Significant	Slight to Moderate

13.37 Based on Environmental Protection Agency's (EPA) Draft Guidelines on the information to be contained in Environment Impact Assessment Reports[16] (2017), as described in Chapter 2: EIA Process and Methodology, effects ranging from 'moderate' to 'profound' are considered 'significant' in Terms of EIA based on professional judgement.

GHG Emissions

13.38 The IEMA guidance indicates all GHG emissions might be considered as 'significant'. Based on professional judgement, moderate and major effects are considered significant in Terms of EIA. In determining the significance of reported effects, consideration has been given to the type of effect i.e. direct, indirect or secondary, the geographical extent of the effect and the duration of the effect i.e. temporary (less than one year), short term (one to seven years) or medium term (7-15 years) or long term (15-60 years) or permanent (more than 60 years).

Nature of Effect Criteria

CCR and ICCI

13.39 The nature of the effect has been described as either negative, neutral, or positive as follows:

- Negative – A detrimental effect to a receptor.
- Neutral – An effect that on balance, is neither positive nor negative to a receptor; or
- Positive – An advantageous effect to a receptor;

GHG Emissions

13.40 There is a presumption of significant effects and the effects are considered negative in nature as any GHG emissions contribute to global climate change

Assumptions and Limitations

CCR and ICCI

13.41 The assessments have relied on data provided by Met Éireann; the climate projections data are generated from Phase 5 of the Coupled Model Intercomparison Project (CMIP5) simulations. It has been assumed that these data sets have been reported correctly.

13.42 Climate projections can be used to determine likely future trends in climate conditions in the locality of the proposed development through its lifetime. The climate trends included in this assessment are based on a range of GHG emissions scenarios which are subject to a degree of uncertainty. How the climate would react to different levels of emissions is also uncertain. There are three key sources of uncertainty within climate projections:

- Natural climate variability: either from natural external influences on climate (e.g. change in atmospheric particulates due to volcanic activity), or changes in the energy received from the sun;
- Incomplete understanding of Earth system processes and their imperfect representation in climate models (modelling uncertainty); and
- Uncertainty in future man-made emissions of GHGs and other pollutants.

13.43 The ICCI assessment has also relied on the data and professional judgement of other chapters within this report.

GHG Emissions

13.44 The GHG emissions assessment presented in this chapter considers the demolition, construction and operational GHG emissions only, and should not be considered a full Whole Life Carbon assessment. For example, emissions associated with end of life of the proposed development are not included in the GHG assessment as they are considered out of scope.

13.45 Estimated quantities of key materials associated to the construction of the proposed development were not available at the time of writing. Therefore, the estimated GHG emissions associated with the demolition and construction stage of the proposed development have been based on data available from two nearby data centers to the site (see Table 13.6). The average of GHG emissions (for each respective lifecycle stage) was calculated. Subsequently, these averages were normalised to generate an estimation for the proposed development, using the GFA (Gross Floor Area) as a benchmark. These developments did not contain materials data within their respective EIAR or associated documents. Therefore, for construction and material quantities were calculated for these developments using the waste generated from demolition and construction as a proxy. Here, construction waste for materials were assumed to be a certain percentage of the total construction materials used in the development, and as such the materials within the demolition and construction stage were aligned to 100 % of the waste values. The percentage of waste material each material was equivalent to the wastage rates as described in the Waste and Resources Action Programme (WRAP) net waste tool[24].

13.46 As complete data on materials and proposed material quantities for embodied carbon calculations are not available at the planning stage and therefore this assessment should be considered indicative. The materials included are those which are considered to represent the majority of embodied carbon emissions. Given the design life of the proposed development (>60 years), technological advancement, application and uptake of circular economy principles, and the recent commitments in Ireland as part of the Climate Action plan and Climate Act 2021 to reach net zero emissions by 2050, it is considered likely that accelerated carbon reduction would have occurred throughout the design life of the proposed development. The emissions from the deconstruction stage cannot be accurately quantified at this stage as a result of future uncertainty in methods of construction, deconstruction and decarbonisation across the industry. The full specification of construction materials is not anticipated to be known until detailed design has been completed.

13.47 Table 13-6 presents the scenarios regarding how energy would be supplied to the proposed development during its operation phase.

Table 13-6: Proposed Development Scenarios

Scenario 1	Q3 2023 to Q4 2024	• DUB11 powered by northern block of multifuel generation plant (MFGP) using hydrogenated vegetable oil (HVO) as the fuel source; • MFGP running 24/7; and • Emergency scenario below applies if there is the MFGP fails.
	Q1 2025 – on-wards	• DUB11and 12 all powered from the EirGrid connection across Falcon Avenue; • MFGP powered by gas from GNI. In a reasonable worst case this is assessed to be operational 24/7 using natural gas. • Emergency scenario below applies if the gas connection from GNI to the MFGP fails and there is a local grid network failure from EirGrid.
Scenario 1 with emer-gency backup	Q2 2023 – on-wards	• Scenario 1 but also including emissions associated with diesel consumption used for day tanks for emergency backup generators in the unlikely event of an outage of the EirGrid connection). In this scenario emergency generators would be assumed to be in operation for up to 48 hours each year.
Scenario 1 with mitiga-tion	Q3 2023 - on-wards	• Scenario 1 but considering emissions savings due to mitigation measures (see GHG assessment section for details).
Scenario 2	Q3 2023 to Q4 2024	• DUB11 powered by northern block of multifuel generation plant (MFGP)using hydrogenated vegetable oil (HVO) as the fuel source; • MFGP running 24/7; and • Emergency scenario below applies if there is the MFGP fails.
	Q1 2025 – on-wards	• DUB11 and 12 all powered from the EirGrid connection across Falcon Avenue; • MFGP not in operation so no emissions; and • Emergency scenario below applies if there is a local grid network failure from EirGrid.
Scenario 2 with emer-gency backup	Q3 2023 – on-wards	• Scenario 1 but also including emissions associated with diesel consumption used for day tanks for emergency backup generators in the unlikely event of an outage of the EirGrid connection (depending on scenario). In this scenario emergency generators would be assumed to be in operation for up to 48 hours each year.
Scenario 2 with Mitiga-tion	Q3 2023 – on-wards	• Scenario 2 but considering emissions savings due to mitigation measures (see GHG assessment section for details).

13.48 For Scenario 2, carbon emissions associated with electricity consumption within the office component of the proposed development have been assumed to be 80 kWh/m². For both the DUB11 and DUB12 data

[24] WRAP, 2021. New Net Waste Tool helps construction projects calculate potential savings in quantities and costs of waste [online]. Available at: https://archive.wrap.org.uk/content/new-net-waste-tool-helps-construction-projects-calculate-potential-savings-quantities-and-co [Accessed 12/08/2021].

centers (the latter of which) which would only be operational from Q1 2025, it has been assumed an energy consumption of 496 MW kWh.

13.49 For scenarios that include the emergency back-up, based on product information it has been estimated that 36 back-up generators would be used in total from DUB11 and DUB12, which would each consume 19.3 l of diesel per 24 hours. Note that in the years 2023 and 2024, this is estimated that only 22 back-up generators would utilised within DUB11. It has been assumed that the back-up emergency generators could be operational for 48 hours per year for the entirety of the proposed development's design life.

13.50 For the scenarios that include mitigation, it has been assumed that the proposed development will have Solar PV which produces 15,000 kwh/yr.

13.51 Vehicle movements associated with access and construction would vary through the demolition and construction stage programme, with short periods of peak Heavy Goods Vehicle (HGV) and Light Goods Vehicle (LGV) movements associated with delivery of material resources and waste. Values have been calculated using the Central Statistics Office Transport Omnibus 2019 Transport statistics.

13.52 Information on Republic of Ireland (ROI) traffic emissions is not readily available. Therefore, traffic emissions for this GHG assessment have been calculated using Defra's Emission Factors Toolkit (EFT) (v11.0). The EFT allows users to calculate road vehicle pollutant emission rates for CO_2e for a specified year, road type, vehicle speed and vehicle fleet composition.

13.53 The EFT allows users to calculate road vehicle pollutant emission rates for CO_2 for a specified year, road type, vehicle speed and vehicle fleet composition. The EFT makes an estimate of future vehicle fleet mix and emission factors in the UK, including Northern Ireland, and provides predicted emission rates for all years up to 2030. The construction emissions were based on 2022 traffic flows provided by the projects Transport Consultant, Ramboll. The operational emissions were based on 2024 traffic flows provided by the projects Transport Consultant, Ramboll. No future traffic flows have been provided and therefore the proposed development traffic flows have been assumed to remain constant during the assessment period.

13.54 The EFT calculates emission factors in the UK, including Northern Ireland, which is assumed as the representative region for the development area. In EFT v11.0, CO_2e emission factors have been factored to consider improved engine efficiency anticipated in the future years, in line with DfT predictions. The EFT is updated periodically, considering the change in vehicle fleet compositions across the UK.

13.55 The proposed development traffic flows are expected to arrive via the main R roads, therefore, an average speed of the 80 kilometres per hour (kph) has been inputted into the EFT, based on the current speed limits. The average vehicle kilometres travelled per year and day were estimated based on information from the Central Statistics Office Transport Omnibus 2019 Transport statistics. Note that this data assumed a decrease in transport emissions overtime in response to committing to the ROI's national net zero targets.

Baseline Conditions

Existing Baseline

CCR and ICCI

13.56 A local climate baseline has been provided by Met Éireann[23] which presents a set of 30-year averages, covering the period 1981-2010 for a range of parameters and locations. The nearest meteorological station to the site is Dublin Airport. Data from this station has been used to provide a baseline for this assessment and is a robust basis.

13.57 Climate data available for Dublin Airport shows a mean annual temperature of 9.8 °C (degrees Celsius), which is within the range for the whole of Ireland of 9-10 °C. The average annual maximum temperature at the vicinity of the proposed development is 13.3 °C; the average annual minimum temperature is 6.4°C with an annual mean of 29.4 air frost days. Higher temperature values in Ireland are generally found in coastal regions[25]. The average annual rainfall within the proximity of the proposed development is 758.0 mm (millimetres), compared to an average for Ireland of 1,230 mm. The Dublin Airport station experiences a mean annual wind speed of 10.3 knots, with an average of 8.2 days with gales per year.

13.58 The Flood Risk Assessment (FRA) (Technical Appendix 10.2: Site-Specific Flood Risk Assessment, EIAR Volume 3) indicates the site is affected by the 0.1 % annual exceedance probability (AEP) and 1.0 % AEP flood events and it is suggested that the site is at risk from fluvial flooding.

13.59 Ireland's Climate: The Road Ahead (2013) details historic climate trends from 1900-2012, which can inform and provide context for future projections. The following trends have been observed across Ireland between 1900-2012:

- mean annual temperature has increased by approximately 0.8 °C;
- 5% increase in mean annual precipitation; and
- increase in the number of days with heavy rain (10 mm or more) in the west and north-west of Ireland.

GHG Emissions

13.60 National CO_2 emissions statistics have been published by the EPA and contain historic emissions data covering 1990-2020 for Republic of Ireland[26]. Total emissions in 2020 were 57.70 $MtCO_2e$, which is 3.6 % lower than emissions in 2019. Emissions reductions have been recorded in 6 of the last 10 years of inventory data (2010-2020). It is estimated that between 1990-2017 there was an overall 17.7 % increase in GHG emissions due primarily to fuel combustion in transport, followed by energy industries.

13.61 Ireland's CO_2 emissions in 2020 consisted of 37.1 % from agriculture, 17.9 % from transport, 15.0 % from energy industries and 12.3 % from residential.

13.62 The total CO_2 emissions in Dublin City in 2016 were 2,810,800 tCO_2e, which is the equivalent to 5.1 tCO_2e per capita. The sectors that produced the greatest emissions were 35 % from residential, 33 % from commercial and 25 % from transport[27].

13.63 In the most recent review by the EPA, which details emissions up to 2018, the data published in 2020 states that Ireland has exceeded its 2018 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by 5.59 $MtCO_2e$. In 2020, Ireland's GHG emissions are estimated to be 57.70 $MtCO_2e$, which is 3.6% lower (2.14 $MtCO_2e$) than emissions in 2019.

Carbon Budgets

13.64 The National Policy Position provides a high-level policy direction for the adoption and implementation by Government of plans to enable Ireland to move to a low carbon economy by 2050. The Government of Ireland have committed to reducing its greenhouse gas emissions by 51 % by 2030 and reaching net zero by 2050 at the latest, across the electricity generation, built environment and transport sectors.

13.65 Note that this means operational emissions from electricity would begin to decline to the gradual greening of the national grid if the Substation follows Scenario 3, in which the proposed development is connected to via a substation.

13.66 The Minister for Communications, Climate Action and Environment has brought forward a new Climate Action (Amendment) Act that adopted the three five-year period carbon budgets presented below. Details of these carbon budgets were released in October 2021 within the Climate Change Advisory Council

[25] Met Éireann. A Summary of Climate Averages for Ireland 1981-2010 [online]. Available at: https://www.met.ie/climate-ireland/SummaryClimAvgs.pdf [Accessed on 09/04/2021].
[26] Environment Protection Agency. Greenhouse Gas Emissions. Current Situation [online]. Available at: http://www.epa.ie/ghg/currentsituation/ [Accessed on 24/11/2021].
[27] Dublin City Baseline Emissions Report 2016. Codema. Available at: https://www.seai.ie/publications/Dublin-City-Baseline-Report.pdf [Accessed on 09/04/2021].

Carbon Budget Technical Report[24], although they have not yet been legislated by the government and Oireachtas.

- Carbon Budget 1 (2021-2025)- 295 Mt CO_2e;
- Carbon Budget 2 (2026-2030)- 200 Mt CO_2e; and
- Carbon Budget 3 (2031-2035)- 151 Mt CO_2e.

Future Baseline

CCR and ICCI

13.67 Future climate projections have been published by EPA through the Regional Climate Model (RCM) simulations which take the outputs from global climate models to produce more refined projections of the potential local and regional impacts of climate change. Climate projections can be used to determine the likely future climate conditions in the locality of the proposed development through its operational life. RCM simulations include projections of a range of climate variables, such as temperature and precipitation.

13.68 Climate projections are subject to uncertainty due to both natural variability and an incomplete understanding of the climate system. These uncertainties can create large outliers in the model ensemble which skew the mean projections. To allow for this, different percentiles are considered which allows a quantification of the likelihood of projections. There are also a number of Representative Concentrations Pathways (RCP) available for RCM simulations with each pathway resulting in a different range of global mean temperature increases over the 21st century. Simulating climatic changes under different RCP scenarios accounts for the uncertainty surrounding future GHG emissions. IEMA guidance recommends the use of RCP 8.5 at the 50 % percentile, for the 2071-2100 timeline to ensure a suitably conservative approach.

13.69 The projections informing this assessment were generated from a regional scale-down of eight datasets from phase 5 of the Coupled Model Intercomparison Project, using three RCMs for Ireland. The high spatial resolution (3.8 and 4 km) of these projections provides a good evaluation of regional climate variation. The RCM simulations were found to be robust when compared to observational datasets.

13.70 The general climate trends for Ireland have been described below, summarised from the RCM projections. The projections are for the future period of 2041-2060 compared to the baseline period of 1981-2000, simulated for RCP8.5:

- an increase of 1.3-1.6 °C in mean annual temperatures, with the largest increases seen in the east of the country;
- warming would be enhanced at the extremes with an increase in summer daytime and winter night-time temperatures of 1-2.4 °C;
- summer heatwave events are expected to occur more frequently, with the largest increases in the south of the country;
- precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events;
- a mean reduction in wind speed of 2.6 %, with a decrease in all seasons; and
- a decrease in the number of frost days of 58 % and ice days of 78 %.

13.71 The climate projections for Dublin indicate increased likelihood of milder wetter winters for the future assessment period in comparison to the 1981-2000 baseline, as shown in Figure 13-1 and Figure 13-2. However, due to natural variability, some cold and dry winters would still occur. Mean wind speeds are projected to decrease in all seasons, with the largest decreases for summer months as shown in Figure 13-3.

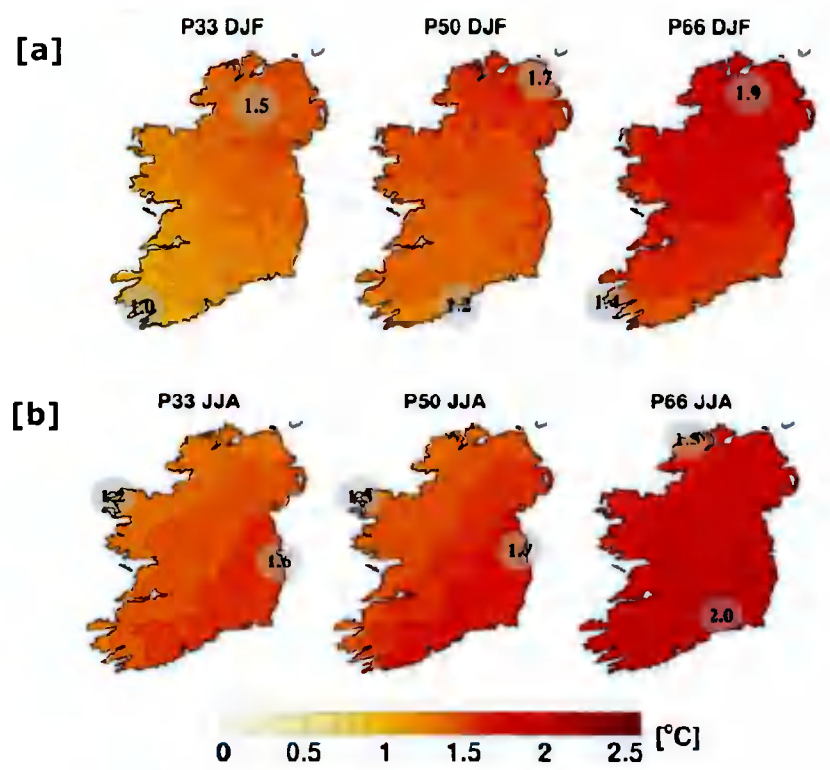


Figure 13-1 The 33rd, 50th and 66th percentiles of [a] winter and [b] summer wind speed projections for the RCP 8.5 scenario. *The future period (2041-2060) is compared with the reference period (1981-2000). The numbers on each plot are the minimum and maximum projected changes at their locations*[Error! Bookmark not defined.].

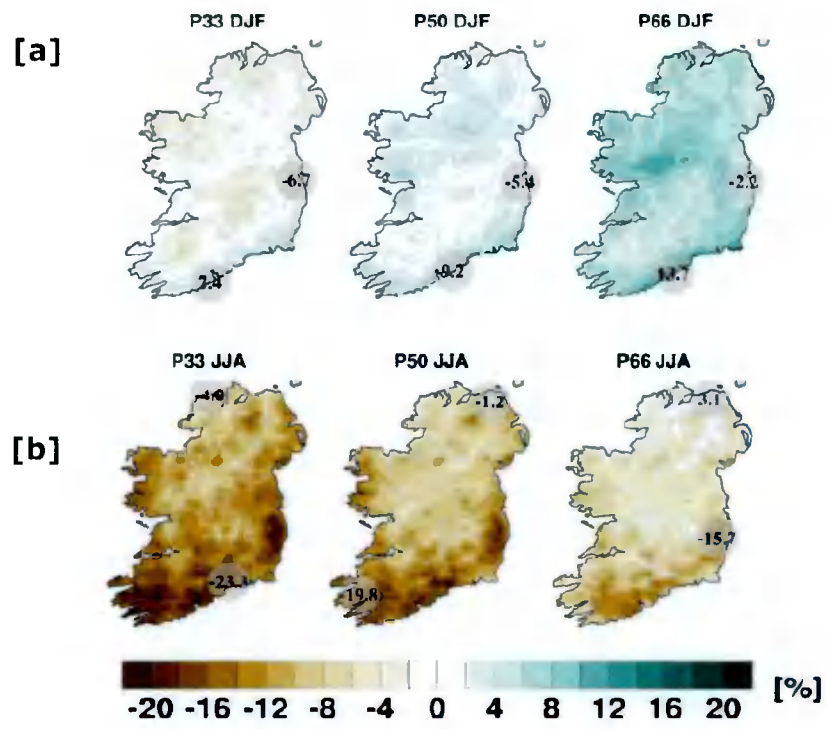


Figure 13-2 The 33rd, 50th and 66th percentiles of [a] winter and [b] summer mean precipitation projections for the RCP 8.5 scenario. *The future period (2041-2060) is compared with the reference period (1981-2000). The numbers on each plot are the minimum and maximum projected changes at their locations*

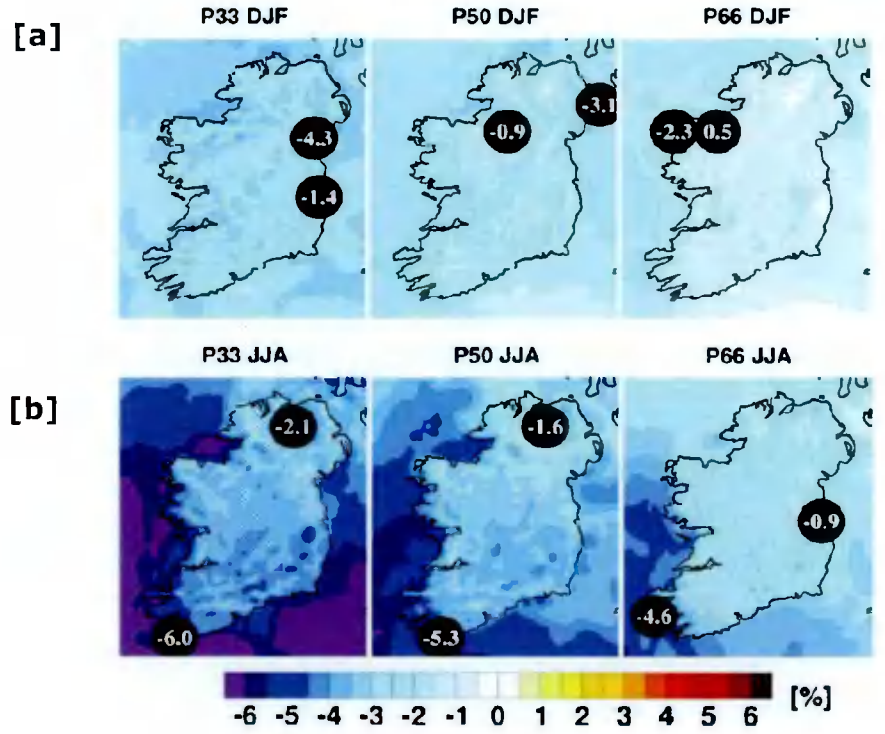


Figure 13-3 The 33rd, 50th and 66th percentiles of [a] winter and [b] summer wind speed projections for the RCP 8.5 scenario. *The future period (2041-2060) is compared with the reference period (1981-2000). The numbers on each plot are the minimum and maximum projected changes at their locations.*

GHG Emissions

13.72 In the absence of the proposed development (do-nothing), the GHG emissions from the site are not anticipated to change compared to the existing baseline.

13.73 The EPA has produced GHG emission projections for two scenarios; 'With Existing Measures' and a 'With Additional Measures' which include implementation of Ireland's 2019 Climate Action Plan. Under the 'With Existing Measures' scenario, the projections indicate that Ireland would have total emissions of 57.96 MtCO2e by 2030. For the energy sector, emissions are project to increase by 1.4 % to 8.6 $MtCO_2e$ over the period 2020 to 2030.

13.74 Under the "With Additional Measures" scenario, which includes changing the source of electricity generation from coal and peat to wind power and diesel, and increasing use of electric vehicle engines, the projections indicate that Ireland would have a total emissions of 47.87 $MtCO_2e$ by 2030[22]. The energy sector emissions are projected to decrease by 24.8% to 6.3 $MtCO_2e$ over the period 2020 to 2030.

Sensitive Receptors

CCR

13.75 Following identification of the future climate projections, the proposed development receptors which are vulnerable to climate change during the construction have been identified as the human health, buildings and infrastructure, including pavements and road surfaces, drainage, geotechnical conditions, signs, traffic signals and lighting, landscape, workforce, plant and equipment and user facilities.

ICCI

13.76 The ICCI assessment includes sensitive receptors in the surrounding environment, as defined by each environmental discipline in their technical assessments.

GHG Emissions

13.77 Demolition, construction and operational GHG emissions associated with the proposed development would be released to the global atmosphere. Therefore, the global atmosphere is considered to be the receptor and is of high sensitivity. In line with standard practice, the sensitivity of human and natural receptors is not considered within this assessment.

Assessment of Effects

CCR

Demolition and Construction Effects

13.78 A summary of potential CCR impacts during the demolition and construction stage and embedded and additional mitigation measures have been provided in Table 13-7.

13.79 The CCR assessment for the proposed development has not identified any significant effects for the demolition and construction stage taking into consideration the embedded mitigation measures of the proposed development. All impacts have been considered to be of low consequence of impact with possible probability/likelihood of impact; therefore, the effects are considered to range from **imperceptible to not significant**, **negative** in nature and **not significant** in terms of EIA.

Operational Effects

13.80 A summary of potential climate resilience impacts during the operation stage are provided in Table 13-7. Several preliminary general mitigation and adaptation measures to address the potential impacts associated with climate change events have been considered. Most weather and climate-related resilience effects during the operation stage are expected to be mitigated through measures embedded in the design of the proposed development, providing a level of resilience throughout operation. Mitigation measures considered in this preliminary assessment include:

- Drainage infrastructure has been designed with sufficient allowance to account for climate change and to withstand extreme rainfall events;
- Provision of flood compensation storage areas; and
- Soft landscape features to be maintained following establishment through watering in periods of dry weather and carrying out periodic inspections to monitor the establishment of new planting.

13.81 A comprehensive list of embedded mitigation and adaption measures for the operation of the proposed development for all climate impacts are included within the existing design and mitigation measures section of Table 13-8. Overall, the effects are considered to range from **imperceptible to not significant** to **slight to moderate**, **negative** in nature and **not significant** in terms of EIA.

Table 13-7: Demolition and Construction Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
Increased frequency and intensity of extreme weather events: Intense rainfall events	Demolition and Construction	**Receptor:** Buildings and infrastructure Extreme rainfall events could result in the erosion of stockpiles and resultant silting of drainage assets. This could result in secondary impacts such as localised flooding.	• As committed to in EIAR Chapter 5: Construction Environmental Management (in this Volume), a detailed Construction Environmental Management Plan (CEMP) would be secured by means of an appropriately worded planning condition and would be prepared in advance of the construction works following the appointment of the key contractors. The detailed CEMP would include a Site Waste Management Plan (SWMP) and would consider specific measures to minimise stockpiling on-site by avoiding and minimising the potential for contamination, for example by: • Ensuring Deliveries would be 'just-in-time' to avoid storing large volumes of materials that could be affected; • Material stockpiles and structures would be inspected before and after extreme weather events to ensure stability and incorporating measures into materials management plans. • Appropriate storage, handling, and management of construction materials with due regard to the potential for mobilisation into surface drainage. Furthermore, re-vegetating earthworks of exposed soil stockpiles would occur as soon as practicable; • Water pollution would be minimised by implementing adequate bunding for dust suppression on site roads, and regular plant maintenance. The Construction Industry Research and Information Association (CRIA) provides guidance on the control and management of water pollution from construction sites[28]; and • As stated in the outline CEMP, material would be stored in sheltered parts of the site to minimise interaction with rainfall and damage by the weather, while stockpiling would be limited when possible. Covering, seeding, fencing/ screening, or damping down of stockpiles would also occur.	**Likelihood level**: Unlikely **Consequence level:** Low as a result of partial disruption across elements of the site lasting less than a day. **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Construction	**Receptor:** Buildings and Infrastructure / Programme Extreme rainfall events and their secondary impacts could affect the ability to undertake certain construction activities leading to programme delays (e.g. pouring of concrete and asphalt) increasing project costs.	In line with best practice, vulnerable activities such as the construction of earthworks would take place in appropriate weather conditions (taking into account construction programme timescale constraints). This would reduce the likelihood of weather-related delays to these activities and would be undertaken in accordance with measures detailed in the CEMP. The contractor would be required to ensure that site activities, such as site preparation works, are postponed during rainfall events. As stated in the outline CEMP, materials would be stored in sheltered parts of the site to minimise interaction with rainfall and damage by the weather, while stockpiling would be limited when possible. Covering, seeding, fencing/ screening, or damping down of stockpiles would also occur.	**Likelihood level**: Unlikely **Consequence level:** Low as a result of partial disruption across elements of the site lasting less than a day. **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Construction	**Receptor:** Environment Extreme rainfall events could result in increased runoff of concrete or cement products when equipment and vehicles are being washed which, as well as flooding of the ground excavations, which could lead to contaminants entering nearby watercourses.	As committed to in EIAR Chapter 5: Construction and Environmental Management (in this Volume), which anticipates the environmental issues and necessary management controls that would need be covered within the CEMP, good practice measures would be employed on site to prevent uncontrolled runoff. This includes provision of on-site pollution control kits and use of settlement system prior to discharge. To ensure no contaminant-pathway-receptors pathways are created and to reduce the potential for contamination to occur during construction, all site activities would be undertaken in accordance with relevant water regulations. The Applicant would also be responsible for obtaining all necessary consents and ensuring compliance with the conditions of the consents.	**Likelihood level**: Unlikely **Consequence level:** Low as a result of partial disruption lasting less than a day. **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

[28] Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors – C532 CIRIA Report (Masters-Wouldiams et al, 2001)

Table 13-7: Demolition and Construction Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
			Within the CEMP, the following provisions would be covered: • Handling of construction materials is undertaken with due care and consideration to minimise the risk of accidental spills; and • Material stockpiles should be adequately protected to avoid being washed or blown away from the immediate area. Potential pathways for contamination would be minimised as follows: • Groundwater would be prevented from entering excavations by dewatering, if required; • Surface water would be prevented from entering excavations by using cut-off ditches, covering the excavation, or captured within the groundwater pumping system; • Concrete preparation would be constrained to dedicated protected areas where contaminated water can be collected; • Contaminated water from excavations would be collected within a settlement tank or lagoon to enable treatment prior to release; • Implementing good construction practices including adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance; and • Adhering to guidance provided by the Construction Industry Research and Information Association (CIRIA), that provide information on the control and management of water pollution from construction sites in their publication[28]. The proximity of the site to potential sources, pathways, and impacts of pollution; and the historical uses of the site would be examined early in project planning and design, to ensure that suitable redesign and mitigation measures are undertaken as necessary. A contingency plan for pollution emergencies should also be developed and regularly updated, which would identify the actions to be taken in the event of a pollution incident. In addition, the construction drainage system for the proposed development would be designed and managed to comply with appropriate industry standards British Standard (BS) 6031:2009[29] (or equivalent), which details methods that should be considered for the general control of drainage on construction sites. Further advice is also contained within BS 8004:2015[30] (or equivalent). Water pollution would be minimised by adequate bunding for oil containers, wheel washers and dust suppression on site roads, and regular plant maintenance. Practises would adhere to guidance specified by CIRIA[28]. As specified within the outline CEMP, Earthwork operations shall be designed with adequate drainage, falls and profile to control run-off and prevent flowing and the contamination of local water courses. Correct management would ensure that there would be minimal inflow of shallow/perched groundwater into any excavation.		

[29] British Standard Institution, 2009. BS6031:2009 British Standard Code of Practice for Earthworks. London. BSi.
[30] British Standard Institution, 2015. BS8004:2015 Code of Practise for Foundations. London. BSi.

Table 13-7: Demolition and Construction Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
			Care would be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces would be within the main excavation site which limits the potential for any offsite impacts.		
Increased frequency and intensity of high temperatures: Drought conditions	Demolition and Construction	**Receptor:** Human health Heatwaves, higher temperatures and drought conditions could impact dust generated during construction activities.	Best practice measures would be employed to reduce dust generating activities such as: storing cement products to prevent dust generation and pollution; dampening down areas of the site that have the potential to give rise to dust (i.e. stockpiles and earthworks); covering or enclosing vehicles that deliver materials with tarpaulins with dust potential covering stored material and on-site skips, and using long reach excavators fitted with crushing attachments, use of. The CEMP would focus on dust management, temporary dust screens as high as any stockpiles, preparing and implementation of a SWMP, and appropriately sourcing materials. Construction practices would adhere to requirements as set out in the Safety, Health and Welfare at Work (Construction) Regulations 2013[31]. Dust generated from construction works would also be managed by means of 2.4 m high site hoarding and dust suppression measures, such as the use of water sprays, dampening down of roads and covering of storage areas, such that the potential for negative dust generation is reduced. Others measures design to mitigate the emissions and impact of dust include: • Carrying out regular dust soiling checks of buildings within 100 m and provide cleaning if necessary; • Removing dusty materials from the application site; • Cutting, grinding or sawing equipment only to be used with suitable dust suppression equipment or techniques; • Re-using and recycling waste to reduce dust from waste materials; and • Using tackifier, a sticky substance that temporally binds the surface of stockpiled material, reducing dust emissions. The outline CEMP stipulates the following dust mitigation measures that would be reviewed at regular monthly intervals during the works to ensure effectiveness of the mitigation: • Monitoring of the contractors' performance to ensure proposed mitigation measures are implemented, as it is the responsibility of the contractor at all times to comply with dust management measures; • The contact details of a person to contact regarding dust issues shall be displayed, while a Complaints Register relate to dust nuisance would be kept on site together with details of any remedial actions carried out; • Overburden material would be protected from exposure to wind by storing the material in sheltered parts of the site, where possible stockpiles should be located downwind of sensitive receptors; • There would be no storage of soil along the cable route; • Where feasible, hoarding would be erected around site boundaries which would prevent larger particles from impacting nearby sensitive receptors; • 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	**Likelihood level**: Unlikely **Consequence level:** Low as a result of health and safety impacts. **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

[31] Government of Ireland, 2013. Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013).

Table 13-7: Demolition and Construction Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
			• At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash.		
Increased frequency of extreme weather events: Windstorms and wind gusts	Construction	**Receptor:** Human health Winds gusts could result in the damage of stockpiles. Secondary impacts could include site personnel welfare impacts.	The following measures would be implemented during the construction of the proposed development: • Best practice measures for stockpile management would be utilised; • Prefabrication off-site would be considered to minimise stockpilingon-site; • Deliveries would generally be 'just-in-time' to avoid storing large volumes of materials. Any construction materials that are stored on-site would be protected to minimise damage by weather; and • Construction practices would adhere to requirements as set out in the Safety, Health and Welfare at Work (Construction) Regulations 2013. The outline CEMP stipulates the following dust mitigation measures that would be reviewed at regular intervals during the works to ensure effectiveness of the mitigation: • The Principal Contractor or equivalent would 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 would 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 would also include head/regional office contact details; • Community engagement shall be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses; • A complaints register would 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 always the responsibility of the contractor to demonstrate full compliance with the dust control conditions herein; • The procedures put in place would be reviewed at regular intervals and monitoring conducted and recorded by the principal contractor. It is recommended that reviews are conducted monthly as a minimum; • Overburden material would be protected from exposure to wind by storing the material in sheltered parts of the site, where possible stockpiles should be located downwind of sensitive receptors; • Regular watering would take place during dry/windy periods to ensure the moisture content is high enough to increase the stability of the soil and suppress dust; • There would be no storage of soil along the cable route; and • Where feasible, hoarding would be erected around site boundaries which would prevent larger particles from impacting nearby sensitive receptors.	**Likelihood level**: Unlikely **Consequence level:** Low as a result of health and safety impacts. **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
Increased frequency and intensity of high temperatures: Heatwaves	Demolition, Construction and operation	**Receptor:** Human health Heatwaves, higher temperatures could impact on site construction personnel welfare, for example, causing heat stress and unsafe working conditions.	All works on-site would be undertaken in accordance with the provisions of the Safety Health and Welfare at Work (Construction) Regulations 2013. The risk of heat stress to site personnel working outdoors would be managed through health and safety procedures. This would include provision of necessary Personal Protective Equipment (PPE) and Toolbox Talks to highlight risks of heatstroke.	**Likelihood level:** Possible **Consequence level:** Low as a result of health and safety impacts relating to heat stress.	Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

Table 13-7: Demolition and Construction Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
				Scale of Effect: Imperceptible to Not Significant **EIA Significance:** Not significant	

Table 13-8: Operation Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
Increased frequency and intensity of extreme weather events: Intense rainfall events	Operation	**Receptor:** Buildings and Infrastructure Extreme rainfall events and increased frequency of intense rainfall events could result in the overwhelming of drainage assets. This could result in secondary impacts such as localised flooding of the proposed development.	The FRA and Engineering Planning report (containing a section on the Proposed Surface Water Drainage) has been prepared to accompany the planning application set out the principles of the drainage design, considering recent national climate change guidance and the design life of the proposed development. Localised flooding would be mitigated by the following: • Storm water mitigation designed in accordance with the Greater Dublin Strategic Drainage Strategy (GDSDS); • Improve the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge; • Storm water from the rear roof areas of the proposed building units and would be directed via rainwater pipes into an on-site reticulation system. This flow would then be transported to the surface water drainage network and discharged into stormwater storage ponds and swales; • A drain on the building's frontal roof areas that drain into the permeable paving sub-base, prior to draining into storage ponds and then ultimate discharge into the ditch / stream to the east; and • Oil inceptors would be installed on all drainages systems that collects surface water from roads, loading docks and parking areas before it gets discharged into storage ponds for attenuation. The total attenuation volume required has been calculated as being approximately 2,391m^3. This would be provided via a combination of storage ponds, swales and permeable paving. For example, there would be 5 storage ponds that in total provide a storage volume of 1835 m^3. Also present is a permeable paving subbase which provides a combined storage volume of 556m^3. This brings the total attenuation volume present as 2391m^3. The storm water drainage within the entire development has been designed to accommodate a 1:2-year storm frequency. The pond, attenuation tank and permeable paving sub-base areas have been designed to accommodate a 1:100 year storm event + 20% climate change. Storm water from all car park areas and access roads / delivery areas would be drained by a series of on-site gullies and channels that drain into a separate system of below ground gravity storm water, and Permeable Paving.	**Likelihood level:** Unlikely **Consequence level:** Medium as a result of partial disruption lasting more than one day but less than one week. **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	According to the FRA, Section 9-Residual Risk, there is a residual flood risk that must be addressed during their operational life, for example the failure of building drainage due to lack of maintenance. At present the site has blockages surrounding its inlets and culverts, for example, there is potential, for example in the event of culvert collapse, of the stream surcharging within the site to a level in excess of that predicted by the models. To address this residual risk, it is recommended that a Site-Specific Flood Risk Mitigation Plan prepared in accordance with the guidelines is implemented throughout the operational life of the proposed development. This must include a maintenance regime for all drainage features within the site and for regular inspection of drainage features immediately upstream and downstream of the site. This would mitigate against the effects.

Table 13-8: Operation Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
			Additionally, consideration of levels and topography across the site has been undertaken and it is proposed to provide a graduated fall in levels away from the proposed buildings to avoid pooling of water. According to the Engineering Report, storm water drainage proposals for the site have been designed in accordance with the Surface water Drainage Strategy and incorporate on site storm water attenuation to limit discharge of storm water from the developed site to the equivalent Q-bar run-off rates. Furthermore, the FRA, Section 2.6 Pluvial Flooding states that the site is not at risk from pluvial flooding and further assessment is not required.		
	Operation	**Receptor:** Buildings and Infrastructure Extreme rainfall events could lead to flooding of the underground foundations or services (electrical cables)	Publicly available flood risk mapping (OPW, CFRAM and SFRA (as described in Chapter 10: Water Resources & Flood Risk) suggests that there is a potential fluvial flood risk at the site during extreme events, for example 1% and 0.1% (1 in 100 and 1 in 1,000) annual exceedance probability (AEP) rainfall events. However cumulatively, the proposed development would increase floodplain storage by 2,018 m3 and so the proposed development would lead to a slight reduction in flood risk. It is noted in the SFRA that if all surface water mitigation measures in the Engineering report are implemented, then the proposed development would not be at risk of fluvial flooding and would not give rise to fluvial flood risk elsewhere. The materials used in the manufacture of electrical cables and ducts would be in accordance with BS 3506:1996[32] (or equivalent) to protect against weathering (Section 4.3 of Tender Document Volume 5: Scope 5.2 Contract Specifications). Furthermore, the FRA, Section 8 Pluvial Flooding states that the site is not at risk from pluvial flooding and further assessment is not required.	**Likelihood level:** Unlikely **Consequence level:** Medium as a result of partial disruption lasting more than one day but less than one week. **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Operation	**Receptor:** Buildings and Infrastructure Extreme rainfall events could lead to fluvial flooding, includ-ing of the Baldonnel stream highlighted within the FRA. This conclusion was identified based from a visual assessment of the channel of the stream and the culverts suggests that the culverts would have a significantly lower hydraulic capacity than the channel.	Publicly available flood risk mapping (OPW, CFRAM and SFRA (as described in Chapter 10: Water Resources & Flood Risk) suggests that there is a potential fluvial flood risk at the site during extreme events. A hydrological model was prepared as part of the FRA (Technical Appendix 10.2) to simulate flow patterns during the 1% and 0.1% (1 in 100 and 1 in 1,000) annual exceedance probability (AEP) rainfall events. Parts of the site were found to be affected by both of these scenarios. In the absence of mitigation this could create the potential for the proposed development to displace floodplain storage and thereby increase flood risk elsewhere. In order to mitigate against this, it is proposed that finished floor levels (FFLs) be raised above the peak modelled flood levels to between 74.0 and 74.25m OD. Compensatory storage would also be provided as specified within the FRA (provided by reducing the ground level in the landscape area adjoining the northern boundary) to replace the displaced storage. Storm water from the proposed development has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and ensures that Best Management Practice has been incorporated into the design.	**Likelihood level**: Possible **Consequence level**: Medium **Scale of Effect**: Imperceptible to Not Significant **EIA Significance:** Not significant	The condition and size of the culvert downstream of the blockages is unknown and there is potential (e.g. culvert collapse), of the stream surcharging within the Site, that exceeds models' predictions. To mitigate this risk, as part of the proposed development, an overflow would be constructed from the Site which would allow such excess to discharge to the stream immediately downstream of the Nangor Road as recommended in the FRA. A Site-Specific Flood Risk Mitigation Plan should also be prepared in accordance with the Guidelines is implemented throughout the

[32] BSi, 1998. BS EN ISO 3506-3:1998 - Mechanical properties of corrosion-resistant stainless-steel fasteners. Set screws and similar fasteners not under tensile stress.

Table 13-8: Operation Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
			The total attenuation volume required has been calculated as being approximately 2,391m^3. This would be provided via a combination of storage ponds, swales and permeable paving. For example, there would be 5 storage ponds that in total provide a storage volume of 1835 m^3. Also present is a permeable paving subbase which provides a combined storage volume of 556m^3. This brings the total attenuation volume present as 2391m^3. The subject site currently comprises a greenfield site and the proposed surface water measures are aimed at improving the general surface water management of the site, by introducing interceptors, attenuation measures and by restricting the ultimate discharge to an acceptable rate. SuDS measures have been designed to accommodate a 1 in 100 annual probability storm event plus a 20% climate change allowance (a 20% increase in peak rainfall depths). The outflow from the proposed development would be to the Baldonnel Stream and would be restricted by way of a Hydrobrake which would limit the total discharge to 4.4 l/s (the calculated QBAR greenfield run-off rate). Moreover cumulatively, the proposed development would increase floodplain storage by 2,018 m^3 and so the proposed development would lead to a slight reduction in flood risk. The proposed development therefore meets the requirements of the Guidelines for Compensatory Storage. Storm water from all car park areas and access roads / delivery areas would be drained by a series of on-site gullies and channels that drain into a separate system of below ground gravity storm water, and Permeable Paving. Permeable paving is increased over the original application and green roofs are added over the office parts of the datacenters to aid rainwater disposal and retention. It is noted in the FRA that if all surface water mitigation measures are implemented, then the proposed development would not be at risk of fluvial flooding and would not give rise to fluvial flood risk elsewhere.		operational life of the proposed development. This must include a maintenance regime for all drainage features within the Site and for regular inspection of drainage features immediately upstream and downstream of the site. This would ensure that the long-term residual operation effects would remain as reported in the assessment of effects section.
	Operation	**Receptor:** Buildings and Environment and infrastructure Extreme rainfall events could lead to flooding of the drainage assets which could result in overflow of contaminated water from the foul and surface water infrastructure impacting the water quality and ecology of nearby watercourses.	Water quality would also be monitored to achieve the agreed discharge license levels with SDCC. The storm water drainage within the entire development has been designed to accommodate a 1:2-year storm frequency. The pond, attenuation tank and permeable paving sub-base areas have been designed to accommodate a 1:100-year storm event +20 % climate change. The peak flows from the development the diverged stream would be restricted to match existing flow rates to ensure existing drainage regime is maintained. Storm water attenuation measures, e.g., SuDS would be incorporated into the proposed development as mentioned previously. All appropriate methods would be utilised to ensure that surface water arising during construction activities would contain minimum sediment, prior to the ultimate discharge to the proposed attenuation pond/tanks and the existing stream.	**Likelihood level**: Unlikely **Consequence level**: Low **Scale of Effect**: Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

Table 13-8: Operation Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
			Grease traps would be installed on foul sewers where necessary. Best practice in design and construction would be employed for the installation of surface water and sanitary drainage. Within FRA section 8, it is stated that pluvial flooding does not pose a risk and further assessment is not required. As specified in the Engineering report, road gullies would be precast trapped gullies to the relevant standard BS5911:Part2:1982, which would minimise the risk of floating contamination of the surface water system. Hydrocarbon interceptors would be provided on storm water drainage sewers from car parking areas as required. A range of Separators for use within the Surface Water Drainage strategy, which would be used to prevent hydrocarbons from mixing with clean water located within drainage systems. This includes implementation of an oil alarm system. Prior to discharging into the proposed pond, the storm water from the car park and access roads, which is drained via the methods as described above, would be directed through an appropriately sized Conder Separators (or similar approved) petrol interceptor. Source control SUDS must also be considered and incorporated where suitable.		
	Operation	Wetter winters and increased frequency of intense rainfall events could result in increased groundwater levels.	The FRA covers the risk of groundwater ingress in relation to the proposed development. As specified in EIAR Chapter 4: Proposed Development Description of this Volume, the lowest level basement slab would be designed to alleviate the effects of hydrostatic pressure (ground heave) that may arise because of intense rainfall events. There would be sufficient self-weight from the buildings over the basement zone to avoid flotation. There is currently no evidence of standing groundwater and there are no indicators to suggest that the Site is at risk from groundwater flooding.	**Likelihood level**: Unlikely **Consequence level**: Low as a result of disruption across elements of the site lasting less than a day. **Scale of Effect**: Imperceptible to Not Significant **EIA Significance**: Not significant	Additional mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather
	Operation	**Receptor:** Human health Increased frequency of intense rainfall events could result in wet pavement surface leading to reduced skid resistance leading to unsafe conditions for site personnel.	As committed to in the Engineering Report, storm water from all car park areas and access roads / delivery areas would be drained by a series of on-site gullies and channels that drain into a separate system of below ground gravity storm water, and Permeable Paving. The pavement markings would be skid resistant through application of a glass bead and grain mix improving the safety of site personnel.	**Likelihood level**: Unlikely **Consequence level**: Medium as a result of health and safety impacts requiring medical treatment. **Scale of Effect**: Imperceptible to Not Significant **EIA Significance:** Not significant	Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
Increased frequency and intensity of high temperatures:	Operation	**Receptor**: Environmental receptors Increased frequency and severity of extreme heat events	Climate change and long-term maintenance requirements would be key considerations for the selection of vegetation species:	**Likelihood level**: Possible **Consequence level**: Low due to cost	Additional Mitigation not required – Existing design and mitigation measures are appropriate to

Table 13-8: Operation Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
Heatwave		(i.e., heat waves) could result in the landscape design being compromised (e.g., tree and shrubs die).	• A diverse tree planting palette would be used to increase overall resilience to disease and climate change; • The detailed planting design would promote sustainable planting by developing planting designs that are appropriate for their location, including the availability of sunlight and water; and • Drought tolerant and low maintenance species would be considered for street trees and planting to minimise water use. Excess water from the data center's cooling system can be used to water vegetation.	implications of replacing plants **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	account for climate change/ extreme weather.
	Operation	**Receptor**: Buildings and Infrastructure Increased frequency and severity of extreme heat events could result in overheating of the electrical equipment (e.g. data servers).	As stated in the energy strategy, the recommended range of the data servers is 18-27 °C, and the allowable range is 15-32 °C. Under the RCP8.5 scenario, it is not predicted that the average temperature for the future baseline would exceed both the recommended and allowable ranges regularly. It is predicted future heatwaves with extreme high temperatures would occur more frequently. Air conditioning would be used to mitigate extreme heat on such days. Heating would reduce the risk of internal cold temperatures during operation. Electrical specification for electrical equipment including cabinets, would account for appropriate temperature thresholds to reduce risks of overheating during operation.	**Likelihood level:** Unlikely **Consequence level:** low **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Operation	**Receptor**: Buildings and Infrastructure Transformers affected by urban heat islands and coincident air conditioning demand leading to overloading in summer months.	The proposed development is anticipated to meet the energy demand of the Data Centers that it is supplying, including any peaks in energy demand associated with using air conditioning in the summer. For example, the MFGP and back-up generators can be used in addition to use of electricity from the grid. Smart grid technology should be explored in order to store energy ready for peaks in energy demand.	**Likelihood level:** Unlikely **Consequence level:** Medium **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not Significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Operation	**Receptor**: Buildings and Infrastructure High temperatures and heatwaves could result in overheating and unsuitable conditions e.g., discomfort for occupants in ancillary buildings and office spaces	Within the energy strategy, the Applicant has reviewed the following passive design measures for reducing overheating risk in the residential elements: • Building shape and detailing e.g., blinds – (Minimising internal heat generation); • Reasonable amounts of glazing-to-solid areas – lower g-values glazing (Reducing the amount of heat entering the building in summer); • Openable windows which allow natural ventilation and cross ventilation (Passive Ventilation); and • Mechanical ventilation with heat recovery is proposed for all accommodation.	**Likelihood level:** Unlikely **Consequence level:** Low **Scale of Effect:** Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
	Operation	**Receptor**: Buildings and Infrastructure Heatwaves, higher temperatures could damage the building structure	As stated in the EIAR, Management Plans would specify measures to regularly inspect the data center. Materials required to construct the Vantage data center should be selected that provide increased tolerance to high temperatures in accordance with BS EN 1367-4:2008[33] - Test	**Likelihood level:** Unlikely **Consequence level:** Medium	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

[33] BSi, 2009. BS EN 1367-4:2008 – Tests for thermal and weathering properties of aggregates. Determination of drying shrinkage. June 2009.

Table 13-8: Operation Stage CCR Effects

Climate Change Trend	Stage	Climate (Change) Impact on Receptor	Existing Design and Mitigation Measures	Significance of Effect	Additional Mitigation Required
			for thermal and weathering properties of aggregates – Part 4: Determination of dry shrinkage.	**Scale of Effect**: Imperceptible to Not Significant **EIA Significance:** Not significant	
	Operation	**Receptor**: Buildings and Infrastructure Heatwaves, high temperatures and increased humidity could lead to lightning striking the data center resulting in damage to infrastructure or loss of power.	It is understood that emergency response and contingency plans would be put in place to manage the risk of lightning strikes. Back-up generators would be present to ensure the continual running of the data center despite a lack of electrical power.	**Likelihood level:** Unlikely **Consequence level:** High as a result of health and safety impacts and disruption to operations **Scale of Effect**: Slight to Moderate **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
Increased frequency and intensity of high temperatures: Drought	Operation	**Receptor**: Infrastructure and human heath Prolonged periods of drought could lead to vegetation drying, increasing risk of grassland fires near the Data center. Secondary impacts include infrastructure damage and vegetation	Emergency response and contingency plans would be put in place to manage the risk of fires. As stated in the EIAR, Maintenance and Management Plans would specify measures to effectively manage vegetation to reduce risk of grassland fires. Native trees, shrub species and meadow grass seed mix would be planted that are suitable for the climate conditions of the area. Water used to cool the data center could be used to ensure vegetation did not become dry.	**Likelihood level:** Unlikely **Consequence level:** High as a result of health and safety impacts. **Scale of Effect**: Slight to Moderate **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.
Increased frequency and intensity of high temperatures: Drought	Operation	**Receptor:** Human health receptors Prolonged periods of drought could affect water and potable water availability.	The proposed development would comply with the following: • A leak detection system capable of detecting a major water leak on the mains water would be installed. • Installation of flow control devices and water efficient sanitary fittings on WCs.	**Likelihood level**: Unlikely **Consequence level:** Low **Scale of Effect**: Imperceptible to Not Significant **EIA Significance:** Not significant	Additional mitigation not required. Existing design and mitigation measures areappropriate to account for climate change/ extreme weather.
Extreme weather events: Cold weather events	Operation	**Receptor:** Buildings and Infrastructure and human health Freeze-thaw could damage the proposed development, e.g. cracking, deformation, that reduces the proposed development's service life.	Materials required to construct the proposed development should be selected that offer increased tolerance to temperatures in accordance with BS EN 1367-4:2008 - Test for thermal and weathering properties of aggregates – Part 4: Determination of dry shrinkage.	**Likelihood level**: Low **Consequence level**: Low **Scale of Effect**: Imperceptible to Not Significant **EIA Significance:** Not significant	Additional Mitigation not required. Existing design and mitigation measures are appropriate to account for climate change/ extreme weather.

ICCI

Demolition and Construction Effects

13.82 A summary of potential ICCI effects during the demolition and construction stage is provided in Table 13-9. The assessment is based on professional judgment informed by a review of individual technical assessments within the EIAR.

13.83 The ICCI assessment for the proposed development has not identified any significant effects for the demolition and construction stage, taking into account embedded mitigation measures of the proposed development. All effects are therefore considered to be **imperceptible** to **imperceptible to not significant**, **negative** in nature and **not significant** in terms of EIA.

Operation Effects

13.84 A summary of potential ICCI effects during the operational stage is provided in Table 13-10. The assessment is based on professional judgment informed by a review of individual technicalassessments within the EIAR.

13.85 The ICCI assessment for the proposed development has not identified any significant effects for the operation stage once existing design mitigation measures are taken into account. All effects are therefore considered to be **imperceptible to not significant**, **negative** in nature and **not significant** in terms of EIA.

Table 13-9: Demolition and Construction Stage ICCI Effects

Effect of Proposed Development on Receptors	Existing Design and Mitigation Measures	Climate Change Trend	Potential In-Combination Climate Impact on Individual Technical Effects or Embedded Mitigation	Is there a Significant In-Combination Climate Impact?	Additional Mitigation Required?
Transport Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Population and Human Health Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Air Quality					
Exposure of sensitive receptors to dust from demolition and construction activities.	An Air Quality Dust Management Plan (AQDMP) would be prepared for the site and included as part of the CEMP. This would be secured by means of an appropriately worded planning condition. The AQDMP would include measures such as the implementation of dust suppression techniques. The CEMP would also include mitigation measures to minimise impactsfrom construction HGV traffic.	Increased frequency and intensity of high temperatures: Drought conditions.	Extended periods of drought could arise as a result of warmer summer months and limited precipitation. This may increase dust production and reduce deposition which has the potential to affect human health.	Not significant due to the design and mitigation measures committed to in the CEMP (e.g. increase the frequency of inspections during activities with a high potential to create dust or in prolonged dry weather; development and implementation of an AQDMP).	No additional measures required.
Exposure of sensitive receptors to dust from demolition and construction activities.	Control of dust would rely upon good site management and mitigation techniques including some that rely on water, such as ensuring effective water suppression during demolition.	Increased frequency and intensity of high temperatures: Drought conditions.	Drought conditions may reduce the availability of water for dust suppression mitigation measures, which would reduce the effectiveness of embedded mitigation measures.	Not significant due to mitigation measures which do not rely on wateras committed to in the CEMP (e.g. covering stockpiles and minimising stockpile size).	No additional measures required. Temporary storage of water could be considered during the construction stage to be used for dust suppression in drought conditions.
Noise and Vibration Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Ecology Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Ground Conditions Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Waste Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Material Assets Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Landscape and Visual Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Cultural Heritage Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					

Table 13-10: Operational Stage ICCI

Effect of Proposed Development on Receptors	Existing Design and Mitigation Measures	Climate Change Trend	Potential In-Combination Climate Impact on Individual Technical Effects or Embedded Mitigation	Is there a Significant In-Combination Climate Impact?	Additional Mitigation Required?
Population and Human Health Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Transport Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Air Quality Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Noise and Vibration Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Water Resources and Flood Risk Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Ecology Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Ground Conditions Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Waste Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Material Assets Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Landscape and Visual Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					
Cultural Heritage Potential interactions of climate change with the identified effects are considered to be imperceptible to not significant, negative (not significant in terms of EIA) based on professional judgement and review of the topic EIAR chapter.					

GHG Emissions

13.86 The proposed development would result in GHG emissions during the demolition and construction and operation stages. Embedded mitigation measures and potential impacts have been identified in this section and a preliminary assessment of effects has also been provided below.

Embedded Mitigation

13.87 Consideration has been given to the proposed development's opportunities to reduce, minimise or avoid GHG emissions. In line with the Government of Ireland National Mitigation Plan (2017)[34], the Government of Ireland Climate Action Plan (2019)[35], and more specifically the SDCC Climate Change Action Plan 2019-2024[36], which set out the Irish Government's carbon reduction plan targets, as part of the design process potential impacts on GHG emissions have been considered.

13.88 The following mitigation hierarchy has been and would continue to be considered to reduce GHG emissions from the proposed development:

- **avoid/prevent** – maximise potential for re-using and/or refurbishing existing assets to reduce the extent of new construction required, and/or explore alternative lower carbon options to deliver the development objectives;
- **reduce** – low carbon and/or reduced resource consumption solutions (including technologies, materials and products) to minimise resource consumption during demolition and construction, operation, and at end of life; and
- **remediate** – measures to further reduce carbon through on- or off-site offsetting or sequestration.

Construction and Demolition Stage

13.89 The proposed development has sought to minimise GHG emissions, wherever possible, to contribute to the achievement of Ireland's GHG reduction targets and carbon budgets. The embedded mitigation measures relevant to the construction and demolition stage of the proposed development have been presented in Table 13-11.

Table 13-11: GHG mitigation measures during construction and demolition stage

Mitigation measure	Mitigation detail	Method of reduction
Excavation of materials	Material excavated during construction would be processed for use in the works wherever possible to reduce the amount of material disposed of off-site as well as imported from other sources, and associated GHG emissions. Possible uses of excavated materials include general fill and other graded materials. Processing of material would take place on-site.	Reduce
Sustainable materials	Using sustainability sourced, recycled or secondary materials with lower embedded GHG emissions and water consumption; e.g. Specifying products with a high recycled content and (e.g. Pulverised Fuel Ash (PFA) replacement for up to 30 % of the cementitious material (i.e. as replacement for Portland cement); Using recycled crushed concrete in granular sub-base materials in pavements sourced from existing pavements on site to be demolished as part of the works;	Reduce
Reporting	Energy consumption and materials use would be recorded and reported on an ongoing basis during the construction phase of the development;	Reduce
Equipment	Using low-emissions or electric construction plant, including the potential for portable PV for use in powering temporary compound and equipment;	Reduce
Procurement	Procuring materials with Environmental Product Declarations (EPD) to allow for the most informed procurement choices; and procuring materials from suppliers that offer take back schemes, where possible;	Reduce
Reuse	Reusing the materials from the pre-existing building wherever possible.	Avoid/ prevent
Minimising waste during construction	Following measures would be proposed in the SWMP to minimise waste generation on-site; ordering the quantity of materials required for the job, thus reducing over-ordering.	Reduce

13.90 In addition, and to reduce GHG emissions associated with vehicles from workers, the following mitigation measures would be implemented:

- Cycle parking would be provided, and this would be covered and secure;
- Facilities for changing and storing cycling clothes would be provided;
- The developer would investigate the provision of public transport vouchers to encourage workers to travel to the application site by bus or rail;
- The contractor would encourage workers to car share where possible and would set up a car sharing database to identify where matches could be made;
- Incentives such as a free breakfast once a week for those walking, cycling, car sharing or using public transport would be provided;
- Selecting electrically driven equipment where possible in preference to internal combustion powered; hydraulic power in preference to pneumatic; and wheeled in lieu of tracked plant;
- Operating plant at low speeds where possible and incorporating automatic low speed idling; and
- Switching off vehicle engines where vehicles are standing for extended periods and avoid unnecessary revving of vehicle engines.

Operational Stage

13.91 Embedded mitigation measures have been described in Table 13-12.

Table 13-12: GHG mitigation measures during operation stage

Mitigation measure	Mitigation detail	Method of reduction
Renewable Energy	Photovoltaic panels would be installed on the roof above the Administration block of both data centers. These would provide approximately 15,000 kwh of electricity per year.	Avoid/prevent
Internal Lighting	Internal lighting shall be provided by high-efficient, low energy LED luminaires combined with presence detection controls or local switching where appropriate, to reduce operational energy demand. LED luminaires are also to be used for the emergency lighting installation, which is de-signed to reduce energy demand;	Reduce
External Lighting	External lighting would make use of high efficiency, low energy LED luminaires. Secondary external lighting in areas such as the generator compound would be operated via daylight detection to minimize hours of operation and thus keep energy usage to a minimum.	Reduce
Transformers	To reduce electrical losses between HV/MV/LV conversions, the applicant would install low loss transformers which comply with the Ecodesign directive 2009/125/EC as a minimum.	Reduce

[34] Department of Communications, Climate Action & Environment. National Mitigation Plan (2017). Available at: https://www.climatecaseireland.ie/wp-content/uploads/2018/04/National-Mitigation-Plan-2017.pdf [Accessed 12/04/2021]

[35] Government of Ireland. Climate Action Plan (2019). Available at: https://assets.gov.ie/25419/c97cdecddf8c49ab976e773d4e11e515.pdf [Accessed 12/04/2021]

Table 13-12: GHG mitigation measures during operation stage		
Cooling system	Chilled water would be produced by premium efficiency air-cooled chillers; The chillers would be selected for elevated supply and return temperature to maximise system efficiency; Hot aisle containment would be used to separate supply and return air paths and maximize system efficiency by allowing elevated supply air temperatures; and Chillers would have an integral economizer capability to allow the compressor energy to be reduced or eliminated as the outside ambient temperature decreases. This reduces energy consumption in weather conditions where they are not required.	Reduce
Ventilation System	Hot Aisle containment would be used to separate supply and return air paths and maximize system efficiency by allowing elevated supply air temperatures; During winter conditions the ambient air would be pre-heated using low temperature hot water (LTHW) supplied by the roof mounted heat pump (described later); and Ventilation units used to provide outside air to each data module would be equipped with a total enthalpy wheel to recover heat before exhaust.	Remediate
Direct Drive EC Fans	Air supply and extract systems serving the data module rooms would be provided with high efficiency direct drive fans. The EC direct drive fan would be the most efficient fan solution available to facilitate demand control. These fans are lighter in weight and require less power than a traditional centrifugal fan with variable speed drive (VSD). Such fans save 10-20% in power consumption than that of a centrifugal fan.	Reduce
Waste Heat Recovery	Waste heat from the data modules would be used to heat the administration office areas, assisted by heat pump technology. The chilled water system would offer the flexibility to reject heat into a local heat network by introducing heat exchangers into the system, should there be a local demand in the future. This could supply heat energy to a future district heating scheme developed by others external to the site boundary. This would benefit from the above heat recovery that district heating infrastructure external to the site including plate heat exchangers, pumps and distribution networks would need to be developed.	Remediate
Multi Fuel Generation Plant (MFGP)	Between Q3 2023-Q1 2025, The MFGP would be used to power DUB11 and would operate solely on HVO, a second-generation biofuel, in the short-term. This HVO would produce lower emissions and have higher efficiency than fossil fuels. The MFGP would also be future proofed to accommodate it running on any biogas / hydrogen gas mix that Gas Network Ireland could potentially add to mains supply in the future as the MFGP will operation on natural gas from GNI from Q1 2025 onwards	Reduce
Emergency Back-Up Generators-	Standby power to each electrical room would be provided by containerised, diesel powered emergency back-up generators. These generators would only provide emergency back-up power in event of loss of the utility supply and therefore would be non-operational for most of time. The possibility of replacing diesel with HVO to serve the back-up generators may be possible at later stage.	Reduce
Offices & Ancillary Areas	Building Energy Rating BER - A3 or higher is targeted for the office development with the utilisation of roof mounted air cooled free cooling chillers and roof mounted PV Panels to generate onsite renewable electricity, in compliance with nZEB "Nearly Zero – Energy Buildings" requirements. Heating to the office area would be provided by heat pumps that would recover heat from the data module cooling system. This would allow the heat pump system to operate at higher efficiencies compared to air cooled systems operating at standard ambient conditions. The fresh air ventilation system for the office area would be served using energy efficient heat recovery units, which would recover waste heat from the office spaces and re-use to pre-heat the air with the HRU. This would reduce the overall energy consumption for this system, and subsequently GHG emissions.	Remediate
Materials	Specifying materials/assets for longer lifespans to avoid future need for replacement	Avoid/ prevent
Innovative technologies	The implementation and investing in projects and processes that reduce GHG emissions and actively remove carbon would be considered.	Remediate
External Areas	There would be built 14 car parking spaces dedicated to EV charging. There would also be provided within the proposed development an ample amount of cycle storage, cycle parking spaces. This would encourage the use of low carbon transport during the proposed development's operation.	Avoid/ prevent

GHG Emissions Effects

13.92 This assessment presents an estimation of the GHG emissions for the 'Do Something' scenario, a comparison against the 'Do Nothing' baseline, and assessment against Ireland's carbon budgets. The GHG emissions in this section are a high-level indication only and would be updated and refined as the proposed development's design develops and updated traffic and air quality modelling becomes available.

13.93 Due to the embedded nature of the mitigation measures proposed, some of which have already been incorporated into the design and some of which are yet to be incorporated, it is not practicable to complete a quantitative assessment of 'before' and 'after' mitigation. Rather, the assessment shows a snapshot of the current design and an assessment with and without the use of Solar PV.

Construction and Demolition Stage

13.94 A high-level breakdown of construction and demolition activities GHG emissions is presented in Table 13-13. Construction and demolition activities have been broken down into a product's life cycle stages as specified in PAS2080[17]

Table 13-13: Estimated GHG Emissions from Construction and Demolition Activities				
Main stage of project lifecycle	**Sub-stage of lifecycle**		**Emissions (tCO2e)**	**% of total construction emissions**
Construction stage	Product stage; including raw material supply, transport, and manufacture		24,387	11.62%
	Construction process stage	Transport to/from works site	7,914	3.77%
		Construction/installation processes	177,427	84.57%
		Waste treatment / disposal	76	0.04%
	Total		**209,804**	100.00%

13.95 Emissions from the construction phase are predicted to total in the region of 210,000 tCO_2e. The largest GHG emissions during the construction and demolition activities (84.57%) is likely to arise from on-site construction processes required for the construction of the proposed development. GHG emissions associated to materials, equate to 11.62% of the total construction and demolition GHG emissions, and transport of materials accounts for 3.77% of the GHG emissions.

Operation Stage

13.96 For the estimation of GHG emissions associated with the operation of the proposed development, including maintenance and refurbishment, it has been assumed that certain assets would be replaced periodically during the assumed 60-year design life of the proposed development.

Table 13-14: Estimated Operation ('use stage') GHG emissions for modelled opening year (2025) and total over the assumed 60-year operational period (2026-2082)

Main stage of project lifecycle	Sub-stage of lifecycle	Emissions (tCO2e)	
		2025 (modelled opening year)	Total (cumulative) over modelled 60-year operation (2023*-2084)
Operation ('use-stage')	Use of the proposed development by the end-user – Scenario 1	2,024,425	151,986,822
	Use of the proposed development by the end-user – Scenario 1 with emergency backup	2,028,556	152,227,825
	Use of the proposed development by the end-user – Scenario 1 with mitigation outlined in Table 13.12	2,024,421	151,983,905
	Use of the proposed development by the end-user – Scenario 2	105,339	6,323,046
	Use of the proposed development by the end-user – Scenario 2 with emergency backup	109,470	6,564,050
	Use of the proposed development by the end-user – Scenario 2 with mitigation outlined in Table 13.12	105,335	6,320,130
	Traffic associated with the proposed development	247	3,484.52

The opening modelled year has been assessed as 2025 as this is the first year that DUB12 is operational, with electricity being consumed from EirGrid and with the MFGP running 24/7 on natural gas (Scenario 1), and electricity is being consumed from EirGrid with no MFGP in operation (Scenario 2). *DUB11 is operational from Q3 2023 and the GHG emissions associated with its operation using HVO in 2023 and 2024 is captured in the above.

Assessment against Ireland's carbon budgets

13.97 The construction and demolition GHG emissions have been reported in tCO_2e for the duration of the construction and demolition activities (approximately 2.5 years) for each scenario. The operational GHG emissions have been reported in tCO_2e for the anticipated opening year of the proposed development (Q1 2025) and for the period covering Ireland's carbon budgets (2021 to 2025, 2026 to 2030 and 2031 to 2035). It is expected that GHG emissions would continue to decrease year on year, primarily due to increasing generation of electricity from sources that produce less GHG emissions and the development of cleaner fuels. This approach is therefore considered to be conservative.

13.98 For Scenario 1, the demolition, construction and operation of the proposed development is expected to contribute 0.759% of Ireland's proposed 295 $MtCO_2e$ carbon budget for 2021-2025, 6.828% of the 250 $MtCO_2e$ 2026-2030 carbon budget, and 8.296% of the 151 Mt 2031-2035 carbon budget. In addition, when including emissions from the emergency back-up system as a worst case scenario, the demolition, construction and operation of the proposed development is expected to contribute 0.762% of Ireland's proposed 295 $MtCO_2e$ carbon budget for 2021-2025, 6.838% of the 2026-2030, and 8.309% for 2031-2035.When including mitigation outlined within Table 13.12, the demolition, construction and operation of the proposed development is expected to contribute 0.759 % of Ireland's proposed 295 MtCO2e carbon budget for 2021-2025, 6.828 % of the 2026-2030, and 8.296 % for 2031-2035.

13.99 For Scenario 2, the demolition, construction and operation of the proposed development is expected to contribute 0.109% of Ireland's proposed 295 $MtCO_2e$ carbon budget for 2021-2025, 0.264% of the 2026-2030, and 0.349% of the 2031-2035. In addition, when including emissions from the emergency back-up system, the demolition, construction and operation of the proposed development is expected to contribute 0.111% of Ireland's proposed 295 MtCO2e carbon budget for 2021-2025, 0.274% of the 2026-2030, and 0.363% for 2031-2035. When considering embedded mitigation outlined within Table 13.12, the demolition, construction and operation of the proposed development is expected to contribute 0.109% of Ireland's proposed 295 MtCO2e carbon budget for 2021-2025, 0.264% of the 2026-2030, and 0.349% for 2031-2035.

13.100 In the absence of any significance criteria or a defined threshold, IEMA guidance[13] states all GHG emissions contribute towards climate change and might be considered 'significant'. However, IEMA guidance also states that it is down to the practitioner's professional judgement on how best to contextualise a project's GHG emissions impact. Emissions from Scenario 1 of the operation stage are not insignificant in relation to the proposed Irish carbon budgets. However, it is not likely the MFGP will be operational 24/7. Rather, the MGFP will operate as a peaking power unit, providing capacity and equalling energy supply to the energy consumed on-site as required, as well as providing security to the local and wider area. From Q1 2025, the MGFP will be operated when required as dictated by EirGrid. Furthermore, as part of the greener decarbonised gas supply, at some point in the future the intention by GNI is that natural gas would be decarbonised and mixed with 20% hydrogen or biogas. The MFGP has the resilience and flexibility to operate using these different fuel types. This fuel mix would have a lower emission factor than natural gas, which is currently as the primary fuel source for Scenario 1. Moreover, it is the likely that under normal operating conditions that the MFGP would not be in operation 24/7 with energy consumed solely from the EirGrid (Scenario 2, which produced less emissions than Scenario 1). Therefore, the total emissions in comparison with the Irish Carbon budget are not likely to be as high as in Scenario 1.

13.101 However, with the embedded mitigation measures outlined in Table 13-10 and Table 13-11 implemented, the construction and operational stages are considered **significant** in terms of EIA.

13.102 There are predicted impacts to climate during the operation phase of the proposed development. Therefore, the operation stage is considered **negative** for climate and **significant** in terms of EIA.

Assessment of Residual Effects

Additional Mitigation

13.103 As this assessment is based on preliminary information, it is important to note that many aspects of mitigation would continue to be considered during the design process.

Demolition and Construction Stage

13.104 The proposed development has been designed to improve its resilience to climate change through a range of design and construction standards, good engineering practice. No additional mitigation measures for the CCR, ICCI and GHG assessments beyond the mitigation already described in Table 13-12 would be required for the demolition and construction stage.

Operation Stage

CCR

13.105 The following CCR mitigation is proposed in addition to the embedded mitigation already described in Table 13-7:

- Regular inspection of drainage infrastructure and structures has been specified to assess the condition after extreme weather events.
- Site-Specific Flood Risk Mitigation Plan to be prepared for the operation stage. This must include a maintenance regime for all drainage features within the site and for regular inspection of drainage features immediately upstream and downstream of the site. This further mitigation would be used against our effects.

13.106 Accordingly, the risk of flooding would be unlikely, and the associated climate resilient effect would be reduced to **not significant**

ICCI

13.107 No additional mitigation is proposed for ICCI.

GHG Emissions

13.108 IEMA best practice guidance states all GHG emissions contribute towards climate change and are significant. It is recommended that the Energy Statement (accompanying the application) recommendations are considered further at the detailed design stage to reduce GHG emissions.

Enhancement Measures

13.109 None identified.

Demolition and Construction Residual Effects

CCR and ICCI

13.110 As no additional mitigation would be required, the residual demolition and construction effects remain as reported in the Assessment of Effects section.

GHG Emissions

13.111 As no additional mitigation would be required, the residual demolition and construction effects remain as reported in the Assessment of Effects section.

13.112 IEMA best practice guidance states all GHG emissions contribute towards climate change and are significant therefore a residual significant effect has been identified. It is important to acknowledge that significant climate change effects relate to cumulative global GHG emissions resulting from multiple sources of emissions driving up atmospheric temperatures.

Operation Residual Effects

CCR

13.113 Assuming that the residual risk of flooding from the Baldonnel stream and overwhelming of the drainage system would be mitigated through a detailed flood mitigation plan that identified mitigation measures would be implemented accordingly, the residual effects would be reduced to not significant.

13.114 As such the impact of consequence of these residual effects have been downgraded as followed:

- Overwhelming of drainage assets: Likelihood level: **Possible**; Consequence level: **Low**; Scale of Effect: **Imperceptible to Not Significant** (**Not Significant** in terms of EIA); and
- Flooding of the Baldonnel stream: Likelihood level: **Possible**; Consequence level: **Low**;; Scale of Effect: **Imperceptible to Not Significant** (**Not Significant** in terms of EIA).

ICCI

13.115 As no additional mitigation would be required, the residual completed development effects remain as reported in the Assessment of Effects section.

GHG Emissions

13.116 IEMA best practice guidance states all GHG emissions contribute towards climate change and are significant therefore a residual significant effect has been identified. It is important to acknowledge that significant climate change effects relate to cumulative global GHG emissions resulting from multiple sources of emissions driving up atmospheric temperatures.

13.117 No additional mitigation would be required for the other impacts. Therefore, the remaining residual operation effects remain as reported in the assessment of effects section.

Summary of Residual Effects

13.118 Table 13-15 provides a tabulated summary of the outcomes of the (discipline) assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 13-15: Summary of Residual Climate Change Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect**	Nature of Residual Effect*				
				+ -	R IR	D I	L U	M B T St Mt Lt P
Demolition and Construction								
CCR								
Buildings and Infrastructure	Heavy rainfall leading to stockpile erosion and siltation of drainage assets	Implementation of Flood Mitigation Strategy	Imperceptible to Not Significant	-	R	D	U	St
Buildings and infrastructure	Heavy rainfall leading to an inability to undertake demolition/ construction activity and programme delays.	None required	Imperceptible to Not Significant	-	R	D	U	Mt
Environment	Heavy rainfall leading to increased runoff and contamination of nearby watercourses.	None required	Imperceptible to Not Significant	-	R	I	U	Mt
Human Health	Heatwaves and high temperatures leading to increased dust generation.	None required	Imperceptible to Not Significant	-	R	D	U	Mt
Human Health	Strong winds leading to damage of stockpiles and secondary impacts on site personnel welfare.	None required	Imperceptible to Not Significant	-	R	I	U	Mt
Human Health	Heatwaves and high temperatures affecting site personnel welfare.	None required	Imperceptible to Not Significant	-	R	D	U	Mt
ICCI								
Population and Human Health Sensitive Receptors	Potential interactions of climate change with the identified Population and Human Health effects	None required	Imperceptible to not significant	-	R	D	U	Mt
Transport Sensitive Receptors	Potential interactions of climate change with the identified transport effects.	None required	Imperceptible to not significant	-	R	D	U	Mt
Air Quality - Sensitive Receptors	Extended period of drought could increase exposure of sensitive receptors to dust generated from demolition and construction activities	None required	Not significant	-	R	D	U	Mt
Air Quality - Sensitive Receptors	Extended period of drought could reduce availability of water for dust suppression which would reduce the effectiveness of embedded mitigation measures.	Temporary storage of water could be considered during the construction stage to be used for dust suppression in drought conditions.	Not significant	-	R	D	U	Mt
Noise and Vibration Sensitive Receptors	Potential interactions of climate change with the identified Noise and Vibration effects.	None required	Imperceptible to not significant	-	R	D	U	Mt
Ecology Sensitive Receptors	Potential interactions of climate change with the identified ecological effects.	None required	Imperceptible to Not significant	-	R	D	U	Mt
Water Resource and Flood Risk Sensitive Receptors	Potential interactions of climate change with the identified Water Resource and Flood Risk effects.	None required	Imperceptible to Not significant	-	R	D	U	Mt
Ground Conditions Sensitive Receptors	Potential interactions of climate change with the identified Ground Conditions effects.	None required	Imperceptible to Not significant	-	R	D	U	Mt
Waste Sensitive Receptors	Potential interactions of climate change with the identified Waste effects	None required	Imperceptible to Not significant	-	R	D	U	Mt
Material Assets	Potential interactions of climate change	None required	Imperceptible to Not significant	-	R	D	U	Mt

Table 13-15: Summary of Residual Climate Change Effects

Sensitive Receptors	with the identified material effects							
Landscape and Visual Sensitive Receptors	Potential interactions of climate change with the identified Landscape and Visual effects.	None required	Imperceptible to Not significant	-	R	D	U	Mt
Cultural Heritage Sensitive Receptors	Potential interactions of climate change with the identified Cultural Heritage effects	None required	Imperceptible to Not significant	-	R	D	U	Mt
GHG Emissions								
Global Climate	GHG Emissions	None required	Significant	-	IR	D	L	LT
Operation								
CCR								
Buildings and Infrastructure	Increased frequency of intense rainfall leading to overwhelming of drainage assets and flooding.	Detailed flood mitigation strategy provided and implemented. Regular monitoring and maintenance of drainage facilities and culverts	Imperceptible to Not Significant	-	R	D	U	Lt
Infrastructure	Flooding of the underground foundations or services (electrical cables	None required	Imperceptible to Not Significant	-	R	D	U	Lt
Environment, Buildings and Infrastructure	Flooding of Baldonnel stream	Detailed flood mitigation strategy provided and implemented. Regular monitoring and maintenance of drainage facilities and culverts	Imperceptible to Not Significant	+	R	D	L	Lt
Environment	Overflow of contaminated water, impacting nearby watercourses	None required	Imperceptible to Not Significant	-	R	I	U	Lt

Table 13-15: Summary of Residual Climate Change Effects

Buildings and infrastructure	Increased frequency of intense rainfall leading to increased groundwater levels.	None required	Imperceptible to Not Significant	-	R	D	L	Lt
Human Health	Rainfall events resulting in wet pavement surface leading to reduced skid resistance leading to unsafe conditions	None required	Imperceptible to Not Significant	-	R	D	U	Lt
Environment	Drought conditions affecting landscape mitigation planting.	None required	Imperceptible to Not Significant	-	R	D	U	Lt
Buildings and infrastructure	Extreme heat events could result in overheating of the electrical equipment (e.g., data servers)	None required	Imperceptible to Not Significant	-	IR	D	U	Lt
Buildings and infrastructure	Extreme heat events could result in increased use of air conditioning and energy demand	None required	Imperceptible to Not Significant	-	R	I	U	Lt
Human health	Increased mean temperatures and heatwaves leading to overheating in ancillary buildings and office spaces	None required	Imperceptible to Not Significant	-	R	D	U	Lt
Buildings	Higher temperatures could damage the building structure	None required	Imperceptible to Not Significant	-	IR	D	U	Lt
Buildings and infrastructure	Higher temperatures leading to increased lightning strikes, resulting in damage to infrastructure or power loss.	None required	Slight to Moderate	-	IR	D	U	Lt
Buildings and infrastructure, Human Health	Drought could lead to vegetation drying, increasing risk of vegetation fires	None required	Slight to Moderate	-	R	I	U	Lt
Human health	Drought conditions affecting water and potable water availability.	None required	Imperceptible to Not Significant	-	R	D	LU	Lt

Table 13-15: Summary of Residual Climate Change Effects

Buildings and infrastructure	Freeze-thaw could damage of the proposed development, e.g., cracking,	None required	Imperceptible to Not Significant	-	IR	D	U	Lt
ICCI								
Population and Human Health Sensitive Receptors	Potential interactions of climate change with the identified Population and Human Health effects	None required	Imperceptible to not significant	-	R	D	U	P
Transport Sensitive Receptors	Potential interactions of climate change with the identified transport effects.	None required	Imperceptible to not significant	-	R	D	U	P
Air Quality Sensitive Receptors	Potential interactions of climate change with the identified Air Quality effects	None required	Imperceptible to not significant	-	R	D	U	P
Noise and Vibration Sensitive Receptors	Potential interactions of climate change with the identified Noise and Vibration effects	None required	Imperceptible to Not Significant	-	R	D	U	P
Water Resources and Flood Risk Sensitive Receptors	Potential interactions of climate change with the identified Water Resources and Flood Risk effects	None required	Imperceptible to imperceptible to not significant	-	R	D	U	P
Ecology Sensitive Receptors	Potential interactions of climate change with the identified Ecological effects	None required	Imperceptible to not significant	-	R	D	U	P
Ground Conditions Sensitive Receptors	Potential interactions of climate change with the identified Ground Conditions effects	None required	Imperceptible to Not Significant	-	R	D	U	P
Waste Sensitive Receptors	Potential interactions of climate change with the identified Waste effects	None required	Imperceptible to Not Significant	-	R	D	U	P
Material Assets Sensitive Receptors	Potential interactions of climate change with the identified Material effects	None required	Imperceptible to Not Significant	-	R	D	U	P
Landscape and Visual Sensitive Receptors	Potential interactions of climate change with the identified Landscape and Visual effects	None required	Imperceptible to Not Significant	-	R	D	U	P
Cultural Heritage Sensitive Receptors	Potential interactions of climate change with the identified Cultural Heritage effects	None required	Imperceptible to Not Significant	-	R	D	U	P
GHG Emissions								
Global Climate	GHG Emissions	None required	Significant	-	IR	D	L	LT

Notes: * - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, ID = Indirect; L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = medium-term, Lt = Long-term, P = Permanent, R = Reversible. ** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound.

Cumulative Effects

Intra-Project Effects

13.119 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in Chapter 16: Cumulative Effects. However, in the instance of this climate assessment, in line with IEMA guidance, intra-cumulative effects have been considered in the ICCI assessment.

Inter-Project Effects

CCR

13.120 The climate resilience effects identified as a result of the demolition and construction and completed development stages are limited in their spatial extent to the site boundary and the proposed development in isolation. Therefore, cumulative climate change resilience effects with other schemes have not been considered.

ICCI

13.121 The in-combination climate impacts identified as a result of the demolition and construction and completed development stages are limited in their spatial extent to the relevant technical assessments in the ES for the proposed development. Therefore, cumulative effects have been considered for each technical discipline as opposed to in-combination with cumulative schemes.

GHG Emissions

13.122 GHG emissions contribute cumulatively with all sources of GHG emissions globally to cause climate change. In line with IEMA guidance, this assessment has considered GHG emissions in the context of GHG emissions of Dublin and Ireland and no further consideration of the proposed developments GHG emissions with other sources of GHGs is necessary.

Summary of Assessment

Background

13.123 This chapter has detailed the potential climate change effects due to the construction and operation stages of the proposed development. The assessment of construction and completed development stages has been undertaken taking into account the relevant national and local guidance and regulations.

Demolition and Construction Effects

13.124 During demolition and construction works, it is expected that general climate trends for Ireland, including extreme weather events (e.g., increased wind speeds, drought, intensity of precipitation events) would continue to occur irrespective of whether the proposed development is built or not.

CCR

13.125 The CCR assessment has reviewed the potential vulnerability of the proposed development to extreme weather and projected climate change. Considering embedded mitigation measures, all effects have been of low or medium magnitude and therefore the effects are considered to range from **imperceptible to not significant**, **negative** in nature and **not significant** in terms of EIA.

ICCI

13.126 The basis of this assessment was to review the identified effects, the receptors and embedded mitigation measures for each technical assessment contained within the EIAR. Professional judgement has been used bassess whether projected climate change could increase the magnitude of the effects as identified by the disciplines, change the sensitivity of the receptors, or reduce the effectiveness of embedded mitigation measures.

13.127 Overall, the effects are considered to be **imperceptible** to **imperceptible to not significant**, **negative** in nature and **not significant** in terms of EIA.

GHG Emissions

13.128 The high-level GHG emissions assessment has estimated the demolition and construction of the proposed development would result in approximately 209,804t CO_2eover the course of the demolition and construction stage based on information available at the time of the assessment.

13.129 IEMA best practice guidance states all GHG emissions contribute towards climate change and are **significant**. However, implementation a CEMP with best practice measures would contribute to reducing GHG emissions associated with the demolition and construction stage of the proposed development.

Operation Effects

13.130 During the completed development stage, it is expected that general climate trends for Ireland, including extreme weather events, would continue to occur irrespective of whether the proposed development is built or not. This includes:

- an increase in mean annual temperatures;
- warming would be enhanced at the extremes with an increase in summer daytime and winter night-time temperatures;
- summer heatwave events are expected to occur more frequently;
- precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events;
- a mean reduction in wind speeds; and
- a decrease in the number of frost days and ice days.

CCR

13.131 The CCR assessment has reviewed the potential vulnerability of the proposed development to extreme weather and projected climate change. Considering embedded mitigation measures, a medium effect was considered for the flooding of the Baldonnel stream, and the overwhelming of drainage assets, causing secondary flooding. However, with the consideration of additional mitigation, i.e. the implementation of a Flood Risk Mitigation Plan, the residual effects have been of low or medium magnitude. This effect is therefore considered to be **imperceptible to not significant**, **negative** in nature and **not significant** in terms of EIA.

13.132 Considering embedded mitigation measures, all other effects have been of low magnitude and are therefore considered to range from **imperceptible to not significant** to **slight to moderate**, **negative** in nature and **not significant** in terms of EIA.

ICCI

13.133 The basis of this assessment was to review the identified effects, the receptors and embedded mitigation measures for each technical assessment contained within the EIAR. Professional judgement has been used bassess whether projected climate change could increase the magnitude of the effects as identified by the disciplines, change the sensitivity of the receptors, or reduce the effectiveness of embedded mitigation measures.

13.134 Overall, the effects are considered to be **imperceptible to not significant**, **negative** in nature and **not significant** in terms of EIA.

GHG Emissions

13.135 In Scenario 1, the GHG assessment has estimated that the operational proposed development would result in approximately 151,986,822tCO_2e during the operation stage of the proposed development without back-up generation being used, approximately 152,227,825tCO_2e with back-up generation being used, and approximately 151,983,905 when mitigation (Solar PV) was included.

13.136 In Scenario 2, the GHG assessment has estimated that the operational proposed development would result in approximately 6,326,531tCO_2eduring the operation stage of the proposed development without back-up generation being, and approximately 6,564,050tCO_2e with back-up generation.

13.137 IEMA best practice guidance states all GHG emissions contribute towards climate change and are **significant**.

13.138 For Scenario 1, the demolition, construction and operation of the proposed development is expected to contribute 0.759 % of Ireland's proposed 295 MtCO2e carbon budget for 2021-2025, 6.828 % of the 250 MtCO2e 2026-2030 carbon budget, and 8.296 % of the 151 Mt 2031-2035 carbon budget (assuming no requirement for back-up technologies). For Scenario 2, the demolition, construction and operation of the proposed development is expected to contribute 0.109 % of Ireland's proposed 295 MtCO2e carbon budget for 2021-2025, 0.264 % of the 2026-2030, and 0.349 % of the 2031-2035.

13.139 The proposed development's GHG emissions for Scenario 1 is not insignificant in comparison with Ireland's carbon budgets. However, it should be noted that this scenario is unlikely to occur 24/7 and therefore the scale of emissions is not likely to be this extensive. Emissions from Scenario 2 would be minor in comparison to the Ireland Carbon Budgets, but still **significant** in terms of EIA.

Cumulative Effects

CCR

13.140 The CCR identified are limited in their spatial extent to the site boundary and therefore no cumulative effect with other committed developments has been considered.

ICCI

13.141 The ICCI assessment identified are limited in their spatial extent to the relevant technical assessments in the EIAR for the proposed development. Therefore, cumulative effects have been considered for each technical discipline as opposed to in-combination with cumulative schemes.

GHG Emissions

13.142 GHG emissions contribute cumulatively with all sources of GHG emissions globally to cause climate change. This assessment has considered GHG emissions in the context of GHG emissions in Ireland and no further consideration of the proposed developments GHG emissions with other sources of GHGs is considered necessary.

14 WASTE

Introduction

14.1 This chapter of the EIAR reports on the likely significant waste effects to arise from the demolition and construction stage, and the operation stage of the proposed development.

14.2 The chapter describes the waste policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely waste effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

14.3 There are no technical appendices supporting this chapter.

Methodology

14.4 The assessment has been informed by the following legislation, policies, and published guidance:

- International Legislation:
  - Waste Framework Directive (2008/98/EC)[1];
- National Legislation and Policy:
  - Waste Management Act 1996 (as amended)[2];
  - Waste Management (Licencing) Regulations 2004[3];
  - European Communities (Waste Directive) Regulations 2011[4];
  - Draft Best Practice Guidelines for the Preparation of Waste Management Plans for Construction Demolition Projects (2021)[5] – which revised previous Guidelines set in 2006[6]; and
  - Environmental Protection Agency (EPA) National Waste Statistics Summary Report for 2018[7].
- Regional Policy:
  - Eastern Midlands Regional Waste Management Plans 2015-2021 (2017)[8];
  - Construction and Demolition (C&D) Waste: Soil and Stone Recovery/Disposal Capacity, Update Report (2020)[9];
- National guidance and industry standards:
  - Waste Action Plan for a Circular Economy 2020-2025 (2021)[10];
  - Guidance on Soil and Stone By-Products (2019)[11];
  - Materials and Waste in Environmental Impact Assessment (2020)[12]; and
  - A Resource Opportunity – Waste Management Policy in Ireland (2012)[13].

Assessment Scope

14.5 In considering the generation and management of waste, it is important to define when, under current legislation and understanding, a material is considered to be waste. The Waste Framework Directive (2008/98/EC) defines waste as *"...any substance or object which the holder discards, intends to discard or is required to discard"*.

14.6 More specifically, the Waste Action Plan for a Circular Economy (2021) describes C&D waste as waste from any building works, demolition, and development (including transport infrastructure).

14.7 The IEMA guidance relating to Materials and Waste in Environmental Impact Assessment[12]/ EPA Best Practice Guidelines for the Preparation of Waste Management Plans for Construction Demolition Projects was used in the assessment. Furthermore, 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 taken account of all applicable legislation, policy, and industry guidance.

14.8 The site is located within the jurisdiction of South Dublin County Council (SDCC) and the SDCC Development Plan 2016-2022[14] sets out a number of objectives and actions for the South Dublin area in line with the objectives of the Eastern Midlands Region (EMR) Waste Management Plan (WMP) 2015-2021. The waste objectives with a particular relevance to the proposed development are as follows:

- IE5 Objective 1: To support the implementation of the EMR WMP 2015-2021 by adhering to overarching performance targets, policies, and policy actions.
- IE5 Objective 2: To support waste prevention through behavioural change activities to de-couple economic growth and resource use.
- IE5 Objective 3: To encourage the transition from a waste management economy to a green circular economy to enhance employment and increase the value recovery and recirculation of resources.
- IE5 Objective 8: To secure appropriate provision for the sustainable management of waste within developments, including the provision of facilities for the storage, separation, and collection of such waste.

14.9 The waste types and estimated quantities used in this assessment have been based on published data by the Environmental Protection Agency (EPA) in National Waste Statistics[15], data recorded from similar previous developments, and other available research sources.

[1] European Union, 2008. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance). Document 32008L0098.
[2] Government of Ireland, 1996. Waste Management Act 1996 (as amended). Updated to 27 August 2020.
[3] Government of Ireland, 2004. Waste Management (Licencing) Regulations, 2004.
[4] Government of Ireland, 2011. European Communities (Waste Directive) Regulations 2011.
[5] Government of Ireland, 2021. C&D Waste. Available at: https://www.gov.ie/en/publication/c305a-construction-and-demolition-cd-waste/ [Last Accessed 30/06/21].
[6] Department of the Environment, Heritage and Local Government, 2006. Best Practice Guidelines of the Preparation of Waste Management Plans for C&S projects. Available at: https://www.leanbusinessireland.ie/includes/documents/BPGConstructionand%20demolition.pdf [Last Accessed 30/06/21].
[7] Environmental Protection Agency (EPA), 2018. National Waste Statistics Summary Report for 2018. Available at: EPA_Nat_Waste_Stats_Report_Web.pdf [Last Accessed 4/8/2021]
[8] Eastern Midlands Region, 2017. Eastern Midlands Region Waste Management Plan 2015-2021. Available at: http://emwr.ie/emwr-plan/ [Last Accessed 04/08/21].
[9] Government of Ireland, 2020. C&D Waste Soil and Stone Recovery/ Disposal Capacity Update Report. Available at: http://southernwasteregion.ie/sites/default/files/National%20C%20%20D%20Report%20Dec%202020%20for%20Publication.pdf [Last Accessed 30/06/21].
[10] Government of Ireland, 2020. Waste Action Plan for a Circular Economy. Available at: https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/ [Last Accessed 30/06/21].
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[12] Institute of Environmental Management and Assessment (IEMA), 2020. Materials and Waste in Environmental Impact Assessment 2020. Available at: https://www.iema.net/resources/reading-room/2020/03/30/materials-and-waste-in-environmental-impact-assessment [Last Accessed 4/8/2021].
[13] Government of Ireland, 2012. A Resource Opportunity – Waste management policy in Ireland. Available at: https://www.gov.ie/en/publication/a9d98-a-resource-opportunity-waste-management-policy-in-ireland/ [Last Accessed 4/8/2021].

Technical Scope

14.10 The assessment of the likely effects of the proposed development due to the generation and management of waste has considered the remaining landfill void capacity that would be depleted by waste produced during the demolition and construction stage and operation stage of the proposed development.

Spatial Scope

14.11 There are two main study areas for the waste assessment:

- A wider study area of the Eastern Midlands Region of Ireland. This area has been used for baseline data investigation, and to locate potential sensitive receptors off-site, including surrounding landfill sites and other waste management infrastructure.
- A study area of 500 m from the site boundary. This area has been determined by means of a number of cumulative developments, listed in Chapter 2: EIA Process and Methodology of this EIAR Volume. An extensive review of these schemes is imperative for the cumulative stage assessment and for generating waste estimates for the proposed development.

Temporal Scope

14.12 The assessment has considered impacts arising during the demolition and construction stage which would be of expected to be temporary to short-term in nature (i.e. from Q2 2022 to Q4 2024 – 2 to 3 years) and from the operation stage which would be expected to be permanent in nature (i.e. >60 years).

Baseline Characterisation Method

Desk Study

14.13 In order to establish baseline waste conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- South Dublin County Council Plan 2016-2022[16];
- EMR WMP 2015-2021[8];
- Draft Best Practice Guidelines for the Preparation of Waste Management Plans for Construction Demolition Projects[5];
- Waste Action Plan for a Circular Economy[10];
- C&D Waste Soil and Stone Recovery/Disposal Capacity Update Report 2020[9];
- Project Ireland 2040[17]; and
- National Development Plan 2018-2027[18].

Field Study

14.14 Field study/data collection was not required at the site as the data provided by other sources was deemed to be adequate and representative of the site conditions.

Assessment Method

Methodology

Demolition and Construction Stage

14.15 The impacts of the proposed development, arising from the generation and management of waste, has been assessed. Due to the absence of EPA/Irish guidelines for waste assessments in EIA, the assessment has considered the methodology specified in Institute of Environmental Management and Assessment (IEMA) Materials and Waste in Environmental Impact Assessment guidance documents[12]. An extensive document review to assist in identifying current and future requirements of waste management including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports has also been undertaken.

14.16 To assess the potential effects arising from the generation of waste during the construction, and operation stages, a desk study was carried out which included:

- A review of applicable policy and legislation to create the legal framework for waste management in Ireland.
- Description of the typical waste materials that will be generated during the construction and operation stages; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

14.17 The waste estimates calculated for the demolition and construction stage of the proposed development have been calculated from a detailed review of similar consented developments in the surrounding area, namely Microsoft Grange (SDCC planning reference: SD20A/0283) and Cyrus One (SDCC planning reference: SD18A/0134). When conducting the review, the proposed development's Gross Floor Area (GFA) was used to normalise the data and create key performance indicators to estimate potential waste volumes for the proposed development. Additionally, the assessment has taken into consideration published data by the EPA in National Waste Reports.

14.18 Mitigation measures were also proposed to minimise the proposed development's environmental effects during the demolition and construction stages.

Operation Stage

14.19 The methodology for assessing likely operation stage effects is the same as that presented for the demolition and construction stage above.

Cumulative Scenario

14.20 The combined effects of the proposed development and the cumulative development on a given receptor have been assessed for both stages of the proposed development.

14.21 As part of the cumulative assessment, consideration has also been given to the proposed permanent electrical connection for the site that will be located <50m to the south-east of the site. This is likely to comprise a 110 kV gas insulated substation (GIS) substation and two underground circuit transmission lines and will be subject to a strategic infrastructure development (SID) application to An Bord Pleanála (ABP) in due course. This cumulative assessment has been considered qualitatively.

Assessment Criteria

14.22 The criteria used to assess if an effect is significant or not, is set out in subsequent sub-sections. This is determined by consideration of the sensitivity of the receptor, magnitude of impact and scale of the effect. In considering the significance of an effect, consideration has been given to the duration of the effect, the geographical extent of the effect and the application of professional judgement.

Receptor Sensitivity/Value Criteria

14.23 The sensitivity of waste relates to availability of regional (and where appropriate, national) landfill void capacity in the absence of the proposed development. Landfill capacity is recognised as an unsustainable and increasingly scarce option for managing waste.

[16] South Dublin County Council, 2016. Plan 2016-2022. Available at: https://www.sdcc.ie/en/services/planning/development-plan/plan-2016-2022/ [Last Accessed 30/06/21].
[17] Government of Ireland, 2019. Project Ireland 2040 Documents and Information. Available at: https://www.gov.ie/en/collection/580a9d-project-2040-documents/ [Last Accessed 30/06/21].
[18] Government of Ireland, 2018. National Development Plan 2018-2027. Available at: https://www.gov.ie/en/policy-information/07e507-national-development-plan-2018-2027/?referrer=/en/national-development-plan-2018-2027/ [Last Accessed 30/06/21].

14.24 Information presented in Table 14.1 has been used to determine the sensitivity of landfill void capacity. For the purposes of EIA, 'negligible' and 'low' are classed as Low; 'medium' is classed as Medium and 'high' and 'very high' are classed as High.

Table 14.1: Receptor Sensitivity Criteria

Sensitivity	Criteria
Negligible	Across construction and/or operation phases, the baseline/future baseline (i.e., without development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to remain unchanged or is expected to increase through a committed change in capacity.
Low	Across construction and/or operation phases, the baseline/future baseline (i.e., without development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce minimally by <1 % as a result of wastes forecast.
Medium	Across construction and/or operation phases, the baseline/future baseline (i.e., without development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce noticeably by 1-5 % because of wastes forecast.
High	Across construction and/or operation phases, the baseline/future baseline (i.e., without development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce considerably by 6-10 % because of wastes forecast.
Very High	Across construction and/or operation phases, the baseline/future baseline (i.e., without development) of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to reduce very considerably (by >10 %); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.

Impact Magnitude Criteria

14.25 The magnitude of impact has been classified as 'no change', 'negligible', 'minor', 'moderate' and 'major' in accordance with the criteria set out in Table 14.2. For the purposes of EIA, 'no change' and 'negligible' are classed as Low; 'minor' is classed as Medium and 'moderate' and 'major' are classed as High.

Table 14.2: Impact Magnitude Criteria

Magnitude	Criteria
No Change	In construction and/or operation, a development is expected to achieve 100 % landfill diversion.
Negligible	In construction and/or operation, a development is expected to achieve 90-99 % landfill diversion.
Minor	In construction and/or operation, a development is expected to achieve 60-89 % landfill diversion.
Moderate	In construction and/or operation, a development is expected to achieve 30-59 % landfill diversion.
Major	In construction and/or operation, a development is expected to achieve <30 % landfill diversion.

Scale of Effect Criteria

14.26 Impacts have been assessed based on the value and sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in Table 14.3.

Table 14.3: Scale of Effect Criteria

Magnitude	Sensitivity of Receptors		
	Low	Medium	High
Low	Imperceptible to Not Significant	Not Significant to Slight	Slight to Moderate
Medium	Not Significant to Slight	Slight to Moderate	Moderate to Significant
High	Slight to Moderate	Moderate to Significant	Very Significant to Profound

14.27 Based on professional judgement, effects of 'moderate' significance and above are considered 'significant' in EIA terms. The description off effects used within this Chapter are in accordance with EPA Guidance as set out in Table 2.1 of Chapter 2: EIA Process and Methodology.

Nature of Effect Criteria

14.28 The nature of the effect has been described as either negative, neutral, or positive as follows:

- Positive – An advantageous effect to a receptor;
- Neutral – An effect that on balance, is neither positive nor negative to a receptor; or
- Negative – A detrimental effect to a receptor.

Assumptions and Limitations

14.29 The assessment for waste receptors has been based on a review of the baseline information available at the time of assessment. Whilst the baseline data sources used in this assessment have been obtained from the most recently available information, it is still possible that conditions could have changed since their publication.

14.30 The quantities of materials to be used for the demolition and construction stage of the proposed development design, sources of materials and their mode of transport are yet to be finalised. Values have been estimated based on data obtained from a review of other similar data center applications in the surrounding area. It has been assumed that these data sets have been reported correctly.

14.31 It has been assumed that a Site Waste Management Plan (SWMP) would be developed by the contractor. The SWMP will ensure suitable management of construction, demolition, and excavation (CDE) waste, prevent (where practicable) and minimisation of waste arising and maximisation of waste re-use and recycling.

Baseline Conditions

Existing Baseline

14.32 For waste planning purposes, Ireland is divided into three regions: Connacht-Ulster; Southern; and Eastern Midlands[10]. SDCC lies within the Eastern Midlands Region (EMR)[8]. Therefore, reference to Waste management, generation, and capacity of landfills will refer to both the wider EMR in addition to the local authority SDCC. In terms of waste management, the local authority responsible for setting and administering waste management activities in the site area is SDCC. Waste management activities within the area is governed by the requirements set out in the EMR WMP 2015-2021.

14.33 The EU Waste Framework Directive 2008/98/EC requires that a target of 70% recovery by weight of construction and demolition) C&D waste generated be met by the year 2020. The latest figures published by the Environment Protection Agency (EPA) state that Ireland is on track to meet this target.

14.34 In general, the largest element of C&D waste consisted of excavated soil (making up approximately 77% of total C&D waste)[5]. The remainder included concrete, brick, tiles, metal, glass, wood, plastic, and metal[10]. Currently, the majority of C&D waste generated in Ireland is recovered or reused. Where recovery or reuse is not feasible, it is disposed of at suitably licensed facilities.

14.35 Within Ireland, the total mass of waste produced in the year 2018 was 14.1 million tonnes across all sectors[7]. For C&D waste, approximately 6.2 million tonnes were collected by authorised waste collectors for treatment in 2018. This was significantly greater than the 4.7 million tonnes reported in 2017, which corresponded with increases in construction activity nationally[7]. In 2015, 5.1 million C&D waste was processed[7]. All C&D waste arise predominantly from demolition of existing structures, and from materials brought to site that were not used for their intended purposes, such as damaged items, cut offs and surplus materials.

14.36 According to the latest figures, most of the C&D waste collected in 2018 consisted of soil and stones (77%). The remainder was made up of concrete, bricks, tiles, and gypsum waste (12%) and mixed C&D waste (7%). Only three per cent of C&D waste was collected separately as single material streams (wood, glass, plastic, or metal). Soil and stone waste are typically managed at Local Authority–permitted infill sites. Backfilling activities account for a significant portion of the recovery rate being achieved. The most recent figures available for C&D waste arising in Ireland, and that waste's disposal and recovery routes, are shown in Table 14.4. It should be noted that these figures are likely to have increased since then and will continue to do so in the coming years, due to the renewed growth in the economy.

Table 14.4: Collection and Management of C&D Waste Excluding Soil and Stone

Management	Recycling (tonnes)	Energy recovery (tonnes)	Backfilling (tonnes)	Disposal (tonnes)	Total (tonnes)
Metal waste	185,000	0	0	0	185,000
Segregated wood, glass, and plastic waste	43,023	0	7,596	181	50,800
Concrete, brick, tile, and gypsum waste	181,192	11	592,479	20	773,702
Waste bituminous mixtures	19,943	0	40,603	0	60,546
Mixed construction and demolition waste	66,158	1,049	23,859	7,022	98,089
Waste soils, stones, and dredging spoil	7,804	14	4,664,819	26,242	4,698,879
Waste treatment residues	20,413	17,959	168,912	112,184	319,469
Total	**523,534**	**19,033**	**5,498,268**	**145,649**	**6,186,485**

14.37 According to the C&D Waste Update Report (2020)[9] there are 106 authorised facilities in the EMR for soil and stone acceptance, including:

- Four active licenced soil recovery facilities;
- Six licenced soil recovery facilities due to start providing capacity;
- Four active inert landfills;
- 49 permitted facilities; and
- 43 registered facilities with a Certificate of Registration (CoR).

14.38 Overall, licensed Soil Recovery Facility (SRF) capacities in the EMR are concentrated in the local authority areas of Fingal, Meath, Kildare, and Wicklow. There are no licensed SRFs outside the Greater Dublin Area (GDA).

14.39 Waste licence facilities in the EMR are of the scale required by the markets[5]. EMR's current active and available annual licenced market capacity for SRF (Soil Recovery facilities) is 2.4 million tonnes (Mt). Waste licence facilities in the EMR Region are of the scale required by the market. Six of the ten licenced sites have annual capacity of 300,000 tonnes or more and one facility is licenced to accept 1,500,000 tonnes of soil wastes each year. This capacity is concentrated in the Greater Dublin Area. Licensed capacity is authorised on an annual basis. The capacity for uncontaminated soil comprises of 2.4 million tonnes annual licenced capacity

14.40 The permitted and registered facilities offer a much smaller capacity to the Region. The EMR remaining permitted lifetime capacity is 1.3 million tonnes (at end-2018). The registered remaining lifetime capacity in the region is much smaller by comparison with just over 188,000 tonnes available (at end-2018). while permitted and registered capacity is authorised on a lifetime capacity, meaning that these cannot be aggregated and are reported separately, and 1.52 million tonnes lifetime capacity provided by permitted and registered sites.

14.41 The geographical spread of these sites is reasonably good. The local authorities within Dublin County have low counts of permitted or registered facilities with no area having more than one of each. A number of local authorities (Laois, Louth, Offaly, and Westmeath) have low registered capacities and are reliant on permitted facilities.

14.42 There are three inert landfills in Ireland, plus the Tara Mines facility, which are all located in the EMR, providing predominantly disposal capacity. The four active inert landfill facilities have approximately 6.1 million tonnes of remaining lifetime capacity to accept lightly contaminated soils.

14.43 The Integrated Materials Solutions Limited Partnership (IMS) facility had 3.9 million tonnes remaining, with 2.1 million tonnes remaining at Walshestown, at the end of 2018.

14.44 In addition, there are a number of non-hazardous municipal landfill sites in the region which have an ongoing requirement for soil and stone material for daily cover, capping and other remediation activities at the sites. These facilities relevant to the proposed development are presented in Table 14.5.

14.45 The acceptance of non-hazardous waste and inert soils has reduced since 2016 as available void capacity has diminished. At the end of 2018, the remaining capacity at Drehid was 636,085 m^3 compared to 5,006,968 m^3 of available capacity when the site commenced activity. Conversely, Ballynagran increased the intake of non-hazardous soil waste for recovery from 163 tonnes in 2017, to 22,002 tonnes in 2018 in response to market demand.

Table 14.5: Licensed Capacity at Active Landfills

Landfill Facility Name	Waste for disposal (maximum tonnes per annum	Waste types for disposal (maximum tonnes per annum)	Waste types for recovery (maximum tonnes per annum)
Knockharley Landfill - Co. Meath	175,000	100,000 household 45,000 commercial 30,000 industrial	25,000 (C&D) 70,000 (inert waste)
Ballynagran Residual Landfill - Co. Wicklow	175,000	62,500 household 67,500 commercial 45,000 industrial	28,000 (C&D)
Drehid Waste Management Facility - Co. Kildare	120,000	120,000 non-hazardous municipal, commercial, and industrial wastes	No limit for inert waste were used in landfill engineering
Total	**470,000**	**-**	**-**

14.46 There are also a number of materials recover facilities/waste transfer stations in operation in the region which are suitable for the acceptance of C&D wastes should they be required. Details of the facilities relevant to the proposed development are presented in Table 14-56.

Table 14.6: Licensed Waste Transfer Stations that could potentially accept C&D waste	
Waste Transfer Station Name	**Licensed Limitation from Acceptance of C&D Waste at Active Sites (tonnes per annum) at start of 2016**
Starrus Eco Holdings Limited (now Greenstar) – Bray Depot	54,040
Nurendale Ltd., trading as Panda Waste – Rathdrinagh	120,000
Greyhound Recycling and Recovery – Clondalkin	3,000
Thorntons Recycling Centre – Dunboyne	28,020
Nurendale Ltd., trading as Panda Waste – Finglas	40,000
Dean Waste Company Ltd. – Upper Sherriff Street	105,000
Labre Park Civic Amenity Site – Ballyfermot	6,000
Total	**356,060**

14.47 There is no dedicated 'hazardous waste to energy' or landfill treatment capacity in Ireland. Hazardous soil materials, depending on the nature of the contamination, are treated, and stabilised at specialised indigenous facilities. Treatment activities at some of these facilities can change the characterisation of soil wastes from hazardous to non-hazardous, whereby the soil can then be directed back to non-hazardous facilities. The lack of final treatment capacity for hazardous soils nationally creates a reliance on overseas facilities for final treatment.

14.48 There has been a significant increase in the treatment of contaminated soils in Ireland. This rise in treatment of hazardous soil waste domestically, is associated with a drop in the volumes exported; in 2018 Ireland exported almost 75,000 tonnes of hazardous soil, a drop of over 26,000 tonnes from 2017, as presented in Table 14.7.

Table 14.7: Hazardous Soil Treatment and Exportation in Ireland					
Type	**Waste (tonnes)**				
	2014	**2015**	**2016**	**2017**	**2018**
Irish hazardous waste treatment facilities	1,630	5,938	682	608	18,733
Exported	5,701	14,329	79,591	101,440	74,912

Future Baseline

14.49 Prediction of C&D waste was projected to increase to 8.2 million tonnes by 2025, and then increase again to 10 million tonnes by 2029. This figure is almost double that of the 2020 figure[9].

14.50 The generation of C&D waste, and the need for adequate management, is expected to grow over the medium- to long-term in line with the planned delivery of housing and infrastructure projects set out in Project Ireland 2040[17], which sets out Ireland's ambition and vision in terms of development over the next 20 years. The plan includes a number of major construction projects which presents huge potential in terms of preventing and recycling construction waste, as well as a challenge in terms of ensuring the generated waste is managed correctly.

14.51 If Ireland is to meet the targets as set out in the National Development Plan 2018-2027[18], it is vital that there is sufficient capacity for the recovery and/or disposal of the envisaged increased C&D waste. However, short-term growth is being negatively impacted by the COVID-19 pandemic, which has led to significant contraction in the economy, and this is expected to reduce C&D waste generation in 2021.

14.52 In July 2020, there were three license applications for new waste facilities in the EMR. The combined capacity of un-commenced facilities is 1.5 million tonnes per annum. This capacity contains 73 % of the future capacity expected nationally (including new applications and un-commenced operations), which is expected to exceed 2.1 million tonnes.

Sensitive Receptors

14.53 The receptors identified as sensitive to the proposed development and which have been 'scoped-in' to the assessment are summarised in Table 14.8.

Table 14.8: Summary of Sensitive Receptors	
Receptor	**Sensitivity**
Waste management infrastructure	High
Landfills (i.e. reduction in capacity from disposal of waste)	High

Assessment of Effects

Demolition and Construction Stage

Embedded Mitigation

14.54 Following the successful discharge of relevant pre-commencement planning conditions, and receipt of other required statutory permissions, on-site works would commence with enabling works (described in Chapter 5: Construction Description of this EIAR Volume and will be outlined in the CEMP).

14.55 Prior to commencement of construction works, a SWMP would be prepared and agreed with the planning authority. This would be in accordance with the most up to date WMP for the EMR. The following mitigation measures would also be implemented at the demolition and construction stage:

- All excavations would be carefully monitored by a suitably qualified person to ensure that potentially contaminated soil is identified and segregated, if encountered. If any potentially contaminated material is encountered, it will be segregated from clean/inert material, tested, and classified as either non-hazardous or hazardous and further classified as clean, inert, non-hazardous, or hazardous in accordance with the EC Council Decision 2003/33/EC[19], which establishes the criteria for the acceptance of waste at landfills. All excavated material would be used.
- Waste materials generated at the site compound would be stored in suitable receptacles in designated areas of the site compound.
- On-site segregation of waste materials would be carried out to increase opportunities for off-site reuse, recycling, and recovery, to ensure that the majority of construction materials are either recyclable or recoverable – it is anticipated that the following waste types, at a minimum, would be segregated: made ground, soils and stones and trees/shrubbery. In addition, the following wastes would be segregated at the site compound: organic (food) waste, packaging (paper/card/plastic), mixed dry recyclables and mixed non-recyclable waste.
- All waste contractors collecting waste from the site would hold a valid collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO).
- Construction wastes would be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, recycling, recover and/or disposal. As stated in the baseline section, there are numerous licensed waste facilities in the local region that have sufficient capacity to accept both hazardous and non-hazardous waste materials and could manage C&D waste from the proposed development.

[19] European Union, 2003. 2003/33/EC: Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC. Document 32003D0033.

- All waste leaving site will be reused, recycled, or recovered where possible to avoid material designated for disposal.
- All waste leaving the site would be transported by suitable permitted contractors and taken to suitably registered, permitted, or licenced facilities.
- All waste leaving the site would be recorded and copies of relevant documentation maintained.
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) would also be segregated and would be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager would be appointed by the main contractor to ensure effective management of waste during the excavation and construction works.
- All construction staff would be provided with training regarding the waste management procedures.
- The waste from delivers into the two-bay truck loading bay would be compacted on-site.

14.56 These mitigation measures will ensure that the waste arising from the C&D phases of the development are dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, and associated regulations including the Litter Pollution Act 1997 (as amended to 2009)[20] and the EMR WMP (2015-2021). It will also ensure optimum levels of waste reduction, reuse, recycling, and recovery are achieved and will encourage sustainable consumption of resources.

Waste Generation

14.57 Waste arising from the site clearance, primary infrastructure and earthworks is expected to comprise of made ground/topsoil, rubble, bricks, concrete, tarmac from former hard standings, gravel, and clay material. It is important to note that the volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated.

14.58 As stated in the methodology, the estimated waste arisings from the proposed development, presented in Table 14.9, have been calculated from an extensive review of surrounding relevant data centers and normalised using the GFAs.

Table 14.9: Estimated Demolition Waste and End Destination

Waste Type	Estimated Quantities	Reuse		Recycle/ Recovery		Disposal	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes
Glass	12	0	0	85	11	15	2
Concrete, bricks, Tiles, Ceramics	71	95	67	0	0	5	4
Plasterboard	6	0	0	85	5	15	1
Asphalts	114	0	0	95	108	5	6
Metals	21	0	0	95	20	5	1
Slate	11	0	0	85	9	15	2
Timber	17	0	0	90	15	10	2
Total	**251**	**-**	**67**	**-**	**168**	**-**	**16**

[NOTE: Values have been rounded to the nearest 1 tonne.]

14.59 Site preparation, excavations and levelling works required to facilitate construction of the underground fuel storage tanks, foundations, access roads and the installation of services would generate approximately 17,830 m^3 of excavated. It is currently proposed that all excavated material would be reused on-site.

14.60 The importation of approximately 36,594 m^3 of fill materials would be required for construction of foundations and other ground preparation works. If any soils/stones are imported onto the site from another construction site as a by-product, this would need to be carried out in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011.

14.61 As stated in the methodology, the estimated construction waste arisings from the proposed development, presented in Table 14.10, have been calculated from an extensive review of surrounding relevant data centers and normalised using the GFAs.

Table 14.10: Estimated Construction and Excavation Waste and End Destination

Waste Type	Estimated Quantities	Reuse		Recycle/ Recovery		Disposal	
	Tonnes	%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D Waste	775	0	0	90	697	10	78
Timber	658	0	0	90	592	10	66
Plasterboard	235	0	0	90	211	10	24
Metals	188	0	0	100	188	0	0
Concrete	141	100	141	0	0	0	0
Other (including cabling, ducting, conduits, packaging, and plastic	352	0	0	80	282	20	70
Topsoil	24,645	100	24,645	0	0	0	0
Excavated materials	17,830	100	17,830	0	0	0	0
Total	**44,472**	**-**	**42,616**	**-**	**1,970**	**-**	**238**

[NOTE: Values have been rounded to the nearest 1 tonne.]

14.62 It is expected that wastes generated from other construction activities, such as from construction workers, would be Imperceptible and Not Significant. These wastes would generally be organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins, and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided at the site compound during the demolition and construction stage.

Waste Infrastructure and Landfill Sites

14.63 Recycling all inert and non-hazardous waste on-site and implementing the SWMP would ensure that impacts of construction waste are minimised. In this assessment, it has been estimated that approximately 44,500 tonnes of C&D waste would be generated and there would be 1,786,000 tonnes of capacity remaining in the waste management facilities and 470,000 tonnes of capacity remaining in landfill sites.

14.64 Therefore, the reduction in capacity of waste management facilities would be around 0.12 % and the reduction in landfill capacity would be around 0.05 %. In addition, it is expected that 99.5 % of the C&D waste and over 90 % of operational waste would be diverted from landfill. This represents a minimal

[20] Government of Ireland, 1997/2009. Litter Pollution Act 1997; Electoral (Amendment) (No. 2) Act 2009 – An Act To Regulate Expenditure By Political Parties And Candidates; To Amend The Local Elections (Disclosure Of Donations And Expenditure) Act 1999; To Amend The Litter Pollution Act 1997; And To Provide For Related Matters.

reduction in capacity of waste infrastructure in the region (less than 1 %) and therefore, the sensitivity is Low. As the diversion from landfill is over 90 %, the magnitude of impact is negligible and the effect on the waste management infrastructure and landfill sites is likely to be **Temporary to Short-term**, **Imperceptible/Not Significant,** and **Not Significant** in EIA terms.

14.65 Similarly, the residual effect on void space in landfill sites: **Permanent**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in terms of EIA).

Operation Stage

Embedded Mitigation

14.66 The following mitigation measures would be implemented during the operation stage of the proposed development:

- 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 would be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins would be clearly labelled with the approved waste type to ensure there is no cross contamination of waste materials.
- All waste collected from the development would be reused, recycled, or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available.
- A network of waste facilities would be used to ensure waste is managed efficiently. The waste hierarchy would be implemented, and waste recovery techniques would be employed if recycling is not possible.
- All waste leaving the site would be transported by suitable permitted contractors and taken to suitably registered, permitted, or licensed facilities.
- All waste leaving the site would be recorded and copies of relevant documentation maintained.
- Any waste classified as hazardous would be stored in a designated area (suitably bunded, where required) and would be removed off site by a licensed hazardous waste contractor(s).

14.67 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.

14.68 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, and associated regulations including the Litter Pollution Act 1997 and the EMR WMP (2015-2021). It will also ensure optimum levels of waste reduction, reuse, recycling, and recovery are achieved.

Waste Generation

14.69 The proposed building's primary waste stream would come from use of toilets, with a calculated 45 staff per building, totalling 135 permanent staff once completed.

14.70 Waste would be managed to according to relevant national and regional legislation such as the waste framework directive. Waste collection vehicles would service the development regularly to ensure the resources are dedicated to ensuring efficient waste management practices.

14.71 Additionally, 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 classified as a hazardous waste (depending on the volume and concentration of contaminants).

14.72 If the waste materials are not managed and stored correctly on-site, it is likely to lead to litter, health issues or pollution events at the site and/or on adjacent developments. As stated previously, the secondary effect of litter issues is the potential presence of vermin.

Waste Infrastructure and Landfill Sites

14.73 The nature of the proposed development means that the generation of waste materials during the operation stage is unavoidable. However, it has not been possible to estimate the quantities of waste that would be generated by the proposed development due to the lack of data.

14.74 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 into recycled products (e.g. paper mills and glass recycling).

14.75 Overall, the effect on the waste management infrastructure and landfill sites is likely to be **Permanent** and **Imperceptible/Not Significant**, **Negative** in nature and **Not Significant** in terms of EIA.

14.76 Similarly, the residual effect on void space in landfill sites: **Permanent**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in terms of EIA).

Assessment of Residual Effects

Additional Mitigation

14.77 No additional mitigation measures are proposed in respect of waste.

Enhancement Measures

14.78 No enhancement measures are proposed in respect of waste.

Demolition and Construction Residual Effects

14.79 The residual effects are as previously report in the Assessment of Effects section, which are:

- Effect on waste infrastructure capacity: **Temporary to Short-term**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in terms of EIA); and
- Effect on void space in landfill sites: **Permanent**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in terms of EIA).

Operation Residual Effects

14.80 The residual effects are as previously report in the Assessment of Effects section, which are:

- Effect on waste infrastructure capacity: **Long-term**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in terms of EIA); and
- Effect on void space in landfill sites: **Permanent**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in terms of EIA).

Summary of Residual Effects

Table 14.10 provides a tabulated summary of the outcomes of the waste assessment of the proposed development. Where **significant positive** effects are likely these are highlighted in bold green and where **significant negative** effects are predicted these are highlighted in bold red.

Table 14.10: Summary of Residual Ground Conditions Effects

Receptor	Description of Residual Effect	Additional Mitigation	Scale and Significance of Residual Effect**	Nature of Residual Effect*				
				+ -	L U	D I	R IR	M B T St Mt Lt P
Demolition and Construction								
Waste Management Infrastructure	Effect on capacity	None required	Imperceptible/not significant	-	L	D	IR	T to St
Landfill Sites	Effect on void space	None required	Imperceptible/not significant	-	L	D	IR	P
Operation								
Waste Management Infrastructure	Effect on capacity	None required	Imperceptible/not significant	-	L	D	IR	Lt
Landfill Sites	Effect on void space	None required	Imperceptible/not significant	-	L	D	IR	P

Notes: * - = Negative/ + = Positive / +/- = Neutral; R = Reversible, IR = Irreversible; D = Direct, IR = Indirect; L= Likely, U = Unlikely; M = Momentary, B = Brief, T= Temporary, St = Short-term, Mt = medium-term, Lt = Long-term, P = Permanent, R = Reversible. ** Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant, Profound.

Cumulative Effects

Intra-Project Effects

14.81 As explained in Chapter 2: EIA Process and Methodology, intra-project cumulative effects are discussed in Chapter 16: Intra Cumulative Effects.

Inter-Project Effects

14.82 There are numerous cumulative developments planned for in the surrounding area (as presented in Chapter 2: EIA Process and Methodology) that would have a cumulative impact by in-combination effects throughout the demolition and construction stage, and operation stage of the proposed development. However, it is not considered possible to reasonably undertake a quantitative cumulative assessment of the likely significant effects regarding waste for the reasons explained in the Assumptions and Limitations section of this chapter. Therefore, a qualitative assessment has been carried out.

14.83 It is reasonably considered that all the cumulative developments would be developed in line with the similar policy requirements as the proposed development; in particular with the requirements for maximising reuse and recycling of CDE waste through a SWMP (or equivalent) and the meeting of targets for recycling and composting waste during operation. Therefore, results would be similar to that presented for residual effects; resulting in the following effects:

- Demolition and Construction Stage:
  - Effect on waste infrastructure capacity: temporary to short-term, **Imperceptible/Not Significant**, and **Negative** (**Not Significant** in terms of EIA); and
  - Effect on void space in landfill sites: **Permanent**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in EIA terms);
- Operation Stage:
  - Effect on waste infrastructure capacity: **Long-term**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in EIA terms); and
  - Effect on void space in landfill sites: **Permanent**, **Imperceptible/Not Significant,** and **Negative** (**Not Significant** in EIA terms).

Summary of Assessment

Background

14.84 This chapter has detailed the potential waste effects for the demolition and construction stage, and operation stage of the proposed development. The assessment has been undertaken considering the relevant national and local guidance and regulations.

14.85 The baseline assessment was undertaken using publicly available information and indicates that:

- The local authority responsible for setting and administrating waste management activities in the site area is SDCC.
- There are 106 authorised facilities in the EMR for soil and stone acceptance.
- Licensed SRF capacities in the EMR are concentrated in the local authority areas of Fingal, Meath, Kildare, and Wicklow.
- Waste licence facilities in the EMR are of the scale required by the current markets.
- The four active inert landfill facilities located in the EMR have approximately 6.1 million tonnes of remaining lifetime capacity to accept lightly contaminated soils.
- There are a number of non-hazardous municipal landfill sites in the region which have an ongoing requirement for soil and stone material for daily cover, capping and other remediation activities at the sites.
- There are a number of materials recover facilities/waste transfer stations in operation in the region which are suitable for the acceptance of C&D wastes (should they be required).
- There is no dedicated 'hazardous waste to energy' or landfill treatment capacity in Ireland.

14.86 Overall, the results of the baseline assessment identified numerous waste management infrastructure facilities and landfill sites within the surrounding area. Many of the facilities/sites were indicated to have sufficient capacity to support future influxes of C&D and operational waste.

Demolition and Construction Effects

14.87 During the demolition and construction stage, waste would be produced from the demolition of the single storey dwelling on-site, and the construction of the data centers and accommodating facilities.

14.88 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 into recycled products (e.g. paper mills and glass recycling). According to the C&D Waste Update Report (2020)[9] there are 106 authorised facilities in the EMR for soil and stone acceptance, three landfill sites for C&D waste and a number of materials recover

facilities/waste transfer stations in operation in the region which are suitable for the acceptance of C&D wastes should they be required.

14.89 It is anticipated that the proposed development would generate approximately 44,500 tonnes of C&D waste in addition to operational waste. However, mitigation measures such as segregating of waste, using appropriate storage, and implementing a SWMP (and CEMP) would reduce likely negative impacts and maximise the reuse and recycling and/or recovery of waste. Therefore, the reduction in capacity of waste management facilities, due to the estimated waste arisings from the proposed development, would only be approximately 0.12 % and the reduction in landfill capacity would be approximately 0.05 %. In addition, it is expected that 99.5 % of the C&D waste and over 90 % of operational waste would be diverted from landfill. This represents a minimal reduction in capacity of waste infrastructure in the region (less than 1 %) and therefore, the sensitivity is Low. As the diversion from landfill is over 90 %, the magnitude of impact is negligible and the effect on the waste management infrastructure and landfill sites is likely to be neutral or slight.

14.90 Overall, it is considered, with embedded mitigation in place, that the demolition and construction stage activities would result in a **Negative**, **Direct**, and **Imperceptible/Not Significant** effect (**Not Significant** in terms of EIA) on waste management facilities and landfill sites.

Operational Effects

14.91 During the operation stage, waste would be managed in accordance with relevant national and regional legislation such as the Waste Framework Directive. Waste collection vehicles would service the development regularly to ensure the resources are dedicated to ensuring efficient waste management practices.

14.92 Additionally, 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 classified as a hazardous waste (depending on the volume and concentration of contaminants).

14.93 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 into recycled products (e.g. paper mills and glass recycling).

14.94 Overall, the effect on the waste management infrastructure and landfill sites is likely to be **Negative**, **Direct**, **Imperceptible/Not Significant,** and **Not Significant** in terms of EIA.

Cumulative Effects

14.95 It is reasonably assumed that all the cumulative developments would be developed in line with the similar policy requirements as the proposed development, including the requirements for maximising reuse and recycling of CDE waste through a SWMP (or equivalent) and the meeting of targets for recycling and composting waste during operation. Therefore, results would be similar to that of the proposed development, resulting in a cumulative effect that is **Negative**, **Direct**, **Imperceptible/Not Significant,** and **Not Significant** in terms of EIA.

15 MATERIAL ASSETS

Introduction

15.1 This chapter of the EIAR reports on the likely significant material asset effects to arise from the demolition and construction stage and the operation stage of the proposed development.

15.2 The chapter describes the material assets policy context; the methods used to assess the potential impacts and likely effects; the baseline conditions at and surrounding the site; the likely material assets effects taking into consideration embedded mitigation; the need for additional mitigation and enhancement; the significance of residual effects; and inter-project cumulative effects.

15.3 There are no technical appendices supporting this chapter.

Methodology

15.4 The assessment has been informed by the legislation, policies and published guidance identified within Chapter 2: EIA Process and Methodology.

Assessment Scope

15.5 The 2011 EIA Directive (2011/92/EU) state that material assets include architectural and archaeological heritage. In accordance with the 2014 EIA Directive, those heritage aspects are dealt with as components of cultural heritage which is assessed in EIAR Volume 2 Chapter 2: Cultural Heritage.

15.6 Additionally, the EPA Draft EIA Report Guidelines 2017 state that material assets are now taken to mean built services and infrastructure, roads, and traffic, as well as waste management.

15.7 In this EIAR, the impacts on the material assets listed above have been considered in the following Chapters and are not considered further in this Chapter:

- Chapter 6: Population and Human Health;
- Chapter 7: Transport;
- Chapter 8: Air Quality; and
- Chapter 14: Waste.

15.8 The European Commission 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 and are not considered further in this Chapter:

- Chapter 10: Water Resources and Flood Risk; and
- Chapter 12: Ground Conditions.

15.9 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.

Technical Scope

15.10 The technical scope of the assessment has considered the following:

- Direct disturbance and damage to existing or proposed infrastructure; and
- Indirect disturbance of assets in the surrounding area.

15.11 It has been assumed that the Proposed Development would not impact on any other structures.

15.12 The potential impacts on built services and infrastructure, if any, have been assessed in terms of the following:

- Power and Electricity Supply;
- Gas Supply;
- Water Services (including surface water and foul drainage infrastructure and water supply); and
- Telecommunications.

15.13 As several of the assets mentioned above have been addressed in other chapters within this EIAR, they are not discussed in detail in this chapter, but references are provided to other EIAR chapters where appropriate.

15.14 Mitigation measures are proposed (where required) to minimise the effect of the proposed development on the environment during the demolition and construction and operation stages.

Spatial Scope

15.15 The site lies within the South Dublin County Council (SDCC) area in the north of the Profile Park. The study area is considered to comprise the surrounding utility network within Profile Park and the wider area.

Temporal Scope

15.16 The assessment has considered impacts arising during the demolition and construction stage, which would be expected to be temporary and short term (1-7 years) in nature, and from the operation stage which would be expected to be permanent and long-term in nature (i.e. more than 20 years).

Baseline Characterisation Method

Desk Study

15.17 In order to establish baseline material assets conditions in the study area, relevant data was reviewed and assessed. Data was obtained from the following sources:

- Proposed 220 and 11 ESB ducts drawing[1]
- Combined service and levels drawing[2]
- Engineering Planning Report[3]

Field Study

15.18 Field study/data collection was not required at the site as the data provided by other sources was deemed to be adequate and representative of the site conditions.

[1] Doherty Finegan Kelly, 2019. Proposed 220 and 110 ESB Ducts Sheet Legend, no. 01473/329
[2] Pinnacle Consulting Engineers, 2021. Combined Service and Levels, no. C290
[3] Pinnacle Consulting Engineers, 2021. Engineering Planning Report ref P210501