- *Resident or regularly occurring populations (assessed to be important at the County level) of the following:*
  - *Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;*
  - *Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;*
  - *Species protected under the Wildlife Acts; and/or*
  - *Species listed on the relevant Red Data list.*
- *Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.*
- *County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP* (Biodiversity Action Plan), *if this has been prepared.*
- *Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.*
- *Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.*

Local Importance (higher value):

- *Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;*
- *Resident or regularly occurring populations (assessed to be important at the Local level) of the following:*
  - *Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;*
  - *Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;*
  - *Species protected under the Wildlife Acts; and/or*
  - *Species listed on the relevant Red Data list.*
- *Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;*
- *Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.*

Local Importance (lower value):

- *Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;*
- *Sites or features containing non-native species that are of some importance in maintaining habitat links.*

A concurrent GIS analysis of the proposed Natural Heritage Areas (pNHA) and designated Natural Heritage Areas (NHA) in terms of their role in supporting the species using Natura 2000 sites was undertaken along with GIS investigation of European sites. These supporting roles mainly relate to mobile fauna such as

mammals and birds which may use pNHAs and NHAs as ecological corridors or "stepping stones" between Natura 2000 sites.

Article 10 of the Habitats Directive and the Habitats Regulations 2011 place a high degree of importance on such non-Natura 2000 areas as features that connect the Natura 2000 network. Features such as ponds, woodlands and important hedgerows were taken into account in the decision process and during the preparation of this chapter of the EIA Report.

There are few habitats of natural or semi-natural value remaining on the Proposed Development site and as such no "stepping stones" are available.

There are no water courses on site and there are no direct source-pathway-receptor linkages from the development areas to European sites in the Zone of Influence. There are no predicted effects from the construction phase.

The footprint habitats are considered of low biodiversity value at a local level. The landscaped boundaries are developing and are considered of high biodiversity value at a local level.

8.4 CHARACTERISTICS OF THE DEVELOPMENT

The Proposed Development, for which a seven-year permission is sought, consists of the construction and operation of a data centre and associated facilities at Cruiserath, Dublin 15 to consist of the following:

- Construction of three data centre buildings (Data Centre E, Data Centre F and Data Centre G), with a gross floor area (GFA) of c. 1,425 sq.m, c. 20,582 sq.m, and c. 20,582 sq.m respectively, each over two storeys (with Data Centre F and G each including two mezzanine levels);
- Data Centre F and G will be located in the north-western portion of the overall landholding, with a primary parapet height of c. 19.8 metres and each will accommodate data halls, associated electrical and mechanical plant rooms, a loading bay, maintenance and storage space, office administration areas, with plant and solar panels at roof level;
- Data Centre E (which will be ancillary to Data Centre F and G) will be located within the south-western portion of the overall landholding, with a primary parapet height of c. 13.1 metres and will accommodate data halls, associated electrical and mechanical plant rooms, a loading bay, maintenance and storage space, office administration areas, with plant at roof level;
- Emergency generators and associated flues will be provided within compounds adjoining each of the three data centre buildings (19 no. for Data Centre F, 19 no. for Data Centre G and 1 no. for Data Centre E);
- The development includes one diesel tank and two filling areas to serve the proposed emergency generators;
- Provision of ancillary structures including two MV buildings, water storage tanks and three bin stores; and
- Construction of access arrangements and internal road network and circulation areas, footpaths, provision of car parking (105 no. spaces), motorcycle parking (12 no. spaces) and bicycle parking (56 no. spaces), hard and soft landscaping and planting (including alteration to a landscaped berm to the north of proposed Data Centre E), lighting, boundary treatments, and all associated and ancillary works including underground foul and storm water drainage network, and utility cables.

A full description of the Proposed Development is provided in Chapter 2 (Description of the Proposed Development).

8.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

8.5.1 Construction Phase

8.5.1.1 Habitats

There will be a permanent minor loss of recolonised ground. The areas concerned are of previously mounded topsoil, disturbed areas where earth movement has taken place and recolonised and in fragmented segments amounting to c. 500m^2. This is an insignificant area of disturbed ground of low ecological value. The potential effects on local ecology are ***neutral*** and ***imperceptible*** for the construction phase.

There will be no effect on the adjacent landscaped wildflower areas.

The Proposed Development site is not located adjacent or within a European site, therefore, there is no risk of habitat loss or fragmentation or any effects on Qualifying Interest (QI) habitats or species directly or ex-situ.

8.5.1.2 Fauna

Badgers

There were no badger setts along field boundaries which would be disturbed and no signs of badgers in the study area. There is no potential for effects on badgers.

Otters

There were no signs of otters and no suitable habitats for otters in the Proposed Development area. There is no potential for effects on otters.

Bats

There will be no loss of bat roosts or bat commuting habitat. The potential effect on bats is ***neutral*** and ***imperceptible*** for the construction phase.

Birds

There will be no loss of nesting habitat or commuting habitat. The potential effect on birds is ***neutral*** and ***imperceptible*** for the construction phase.

8.5.2 Operational Phase

8.5.2.1 Habitats

The operational phase of the Proposed Development will entail the operation of three data centres. There are no predicted emissions to air, water or the environment that could have a significant effect on biodiversity.

As stated in Section 2.2.6.1 of Chapter 2, SUDs measures, i.e. permeable paving, bio-retention areas, wetlands and attenuation, have been incorporated into the design in order to minimise any increase in surface water discharge into the existing system. The remaining hardstanding / paved areas will be connected to the existing onsite

drainage system which will treat the surface water via hydrocarbon interceptors prior to controlled discharge. There are no predicted effects from the operational phase.

Fauna

Badgers

There is no potential for effects on badgers during the operational phase.

Otters

There is no potential for effects on otters or sources of food during the operational phase.

Bats

Guidance on lighting is based on the Bats & Lighting document; (BCI 20, the Bats and artificial lighting in the UK Guidance Note 08/18 (BCT, 2018) and Guidelines for consideration of bats in lighting projects. EUROBATS Publication Series No. 8 (Voigt, 2018). Lighting can alter the behaviour of bats and the insects they prey on. The potential effect on bats from lighting relates to avoidance of feeding habitat. Given the relatively low potential for bat commuting on the site with the existing level of urban light, the predicted effect on bats is not significant for the operational phase.

Birds

There is no potential for effects on birds during the operational phase.

8.6 MITIGATION MEASURES

In addition to retention of existing berms surrounding the overall site, the Proposed Development includes a Landscape Strategy which provides for increased biodiversity through the additional planting.

The protection and enhancement of the existing landscape is an important aspect of the overall landscape strategy. As detailed in the Architectural Design Statement submitted with the planning application, the landscape scheme proposes to enhance the existing green site perimeter features and to integrate the storm water attenuation and wetland areas. The main landscaping features are native woodland and wetland areas, wildflower meadows and tree rows and clusters. Large native trees from advanced nursery stock will be planted at the initial construction stage. All tree and plant species proposed are native.

Planting along site boundaries and on earth berms act as native habitat and form ecological corridors which connect with other landscape elements throughout the site.

There are plans to incorporate bee hives on the finished site.

The proposed landscape strategy will be implemented over a period of 5 to 10 years and will be implemented by employing a landscape management contractor to maintain the landscape plan.

8.7 RESIDUAL IMPACTS OF THE DEVELOPMENT

The Proposed Development is to take place on a brownfield site which is undergoing existing Permitted Development with changes to low value local habitats. The loss or change in use of the remaining low value habitats will not be significant.

With the employment of appropriate mitigation measures outlined in Section 8.6 with regard to local biodiversity, the Proposed Development will have a ***neutral, imperceptible*** and ***long-term effect*** on biodiversity.

The Permitted Developments (as outlined in Table 4 of Appendix 8.1 *Report for the purposes of Appropriate Assessment Screening)* have been granted with conditions relating to sustainable development by the consenting authority, in compliance with the relevant Local Authority Development Plan and in compliance with the Local Authority requirement with regard to the Habitats Directive. The Proposed Development will also be required to meet the Requirements of the Habitats Directive.

Construction

During construction, of the Proposed Development and Permitted Development there will **short term, negative, not significant** cumulative impact on local biodiversity due to the loss of existing vegetation (as greenfield is tuned into hardstand as required for development). As there is no source-pathway-receptor linkage, there will be no cumulative impact on any European sites (refer to Chapter 8 and AA screening).

Operation

Once operational, the Proposed Development and Permitted Developments are required to implement a landscape strategy in line with the requirements of the Local Authority Development Plan. This will enhance and strengthen the existing native floral species, while retaining existing trees where feasible.

With the employment of appropriate landscaping, the cumulative impact is considered to be ***neutral, imperceptible*** and ***long-term effect*** on biodiversity.

Interactions are addressed in Chapter 17 of this EIA Report.

8.8 MONITORING

No ecological monitoring is required during the construction or operational phases of the Proposed Development.

No reinstatement measures are proposed.

8.9 REFERENCES

- CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine; September 2018; Version 1.1 - Updated September 2019. Institute of Ecology and Environmental Management.
- Department of the Environment, Heritage and Local Government (2010) Guidance on Appropriate Assessment of Plans and Projects in Ireland (as amended February 2010).
- EC (2000) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.
- EC (2018) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.
- EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43EEC. European Commission, Brussels.
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive '92/43/EEC: Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interests, compensatory measures, overall coherence and opinion of the Commission. European Commission, Brussels.
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, May 2022.
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- Nairn, R. and J. Fossitt (2004) The Ecological Impacts of Roads, and an Approach to their Assessment for National Road Schemes. In: J. Davenport and J.L Davenport (eds) The Effects of Human Transport on Ecosystems: Cars and Planes, Boats and Trains, 98-114. Dublin. Royal Irish Academy.
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APPENDIX 8.1

REPORT FOR THE PURPOSES OF APPROPRIATE ASSESSMENT SCREENING

PREPARED BY MOORE GROUP 2022

Report for the purposes of Appropriate Assessment Screening

Cruiserath Data Centre Development

Prepared by: Moore Group – Environmental Services

17 October 2022

On behalf of Universal Developers LLC

Project Proponent	Universal Developers LLC
Project	Cruiserath Data Centre Development
Title	Report for the purposes of Appropriate Assessment Screening Cruiserath Data Centre Development

Project Number	22147	**Document Ref**	22147 Cruiserath Data Centre AAS1 Rev3	
Revision	**Description**	**Author**		**Date**
Rev1	Issued to Client	G. O'Donohoe		17 October 2022
Moore Archaeological and Environmental Services Limited				

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Abbreviations

AA	Appropriate Assessment
EEC	European Economic Community
EPA	Environmental Protection Agency
EU	European Union
GIS	Geographical Information System
LAP	Local Area Plan
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
OSI	Ordnance Survey Ireland
pNHA	proposed Natural Heritage Area
SAC	Special Area of Conservation
SPA	Special Protection Area
SuDS	Sustainable Drainage System
WFD	Water Framework Directive

1. Introduction

1.1. General Introduction

This report for the purposes of Appropriate Assessment (AA) Screening has been prepared to support a Planning Application for the Proposed Development (described in Section 3 below). This report contains information required for the competent authority to undertake screening for Appropriate Assessment (AA) in respect of the construction and operation of three proposed data centres and associated facilities at Cruiserath Road, Dublin 15 (hereafter referred to as the Proposed Development) to determine whether it is likely individually or in combination with other plans and projects to have a significant effect on any European sites, in light of best scientific knowledge.

Having regard to the provisions of the Planning and Development Act 2000 – 2021 (the "Planning Acts") (section 177U), the purpose of a screening exercise under section 177U of the PDA 2000 is to assess, in view of best scientific knowledge, if the Proposed Development, individually or in combination with another plan or project is likely to have a significant effect on a European site.

If it cannot be *excluded* on the basis of objective information that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site then it is necessary to carry out a Stage 2 appropriate assessment under section 177V of the Planning Acts.

When screening the project, there are two possible outcomes:

- the project poses no potential for a likely significant effect and as such requires no further assessment; and
- the project has potential to have likely significant effect (or this is uncertain) unless mitigation measures are applied, and therefore an AA of the project is necessary.

This report has been prepared by Moore Group - Environmental Services to enable Fingal County Council to carry out AA screening in relation to the Proposed Development. The report was compiled by Ger O'Donohoe (B.Sc. Applied Aquatic Sciences (GMIT, 1993) & M.Sc. Environmental Sciences (TCD, 1999)) who has 27 years' experience in environmental impact assessment and has completed numerous Appropriate Assessment Screening Reports and Natura Impact Statements on terrestrial and aquatic habitats for various development types.

1.2. Legislative Background - The Habitats and Birds Directives

Article 6(3) and 6(4) of the Habitats Directive is transposed into Irish Law inter alia by the Part XAB of the Planning Acts (in particular section 177U and 177V) which governs the requirement to carry out appropriate assessment screening and appropriate assessment, where required, per Section 1.1 above.

The Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) is the main legislative instrument for the protection and conservation of biodiversity in the European Union (EU). Under the Habitats Directive, Member States are obliged to designate Special Areas of Conservation (SACs) which contain habitats or species considered important for protection and conservation in a EU context.

The Birds Directive (Council Directive 2009/147/EC on the conservation of wild birds), transposed into Irish law by the Bird and Natural Habitats Regulations 2011 as amended, and the Wildlife Act 1976, as amended, is concerned with the long-term protection and management of all wild bird species and their habitats in the EU. Among other things, the Birds Directive requires that Special Protection Areas (SPAs) be established to protect migratory species and species which are rare, vulnerable, in danger of extinction, or otherwise require special attention.

SACs designated under the Habitats Directive and SPAs, designated under the Birds Directive, form a pan-European network of protected sites known as Natura 2000. The Habitats Directive sets out a unified system for the protection and management of SACs and SPAs. These sites are also referred to as European sites.

Articles 6(3) and 6(4) of the Habitats Directive set out the requirement for an assessment of proposed plans and projects likely to have a significant effect on Natura 2000 sites.

Article 6(3) establishes the requirement to screen all plans and projects and to carry out an appropriate assessment if required (Appropriate Assessment (AA)). Article 6(4) establishes requirements in cases of imperative reasons of overriding public interest:

> ***Article 6(3):*** *"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to an appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

2. Methodology

The Commission's methodological guidance (EC, 2002, 2018, 2021 see Section 2.1 below) promotes a four-stage process to complete the AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

Stages 1 and 2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of Article 6(3) or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

Stage 1 Screening: This stage examines the likely effects of a project either alone or in combination with other projects upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant. In order to screen out a project, it must be excluded, on the basis of objective information, that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site.

Stage 2 Appropriate Assessment: In this stage, there is a consideration of the impact of the project with a view to ascertain whether there will be any adverse effect on the integrity of the Natura 2000 site either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are predicted impacts, an assessment of the potential mitigation of those impacts is considered.

Stage 3 Assessment of Alternative Solutions: This stage examines alternative ways of implementing the project that, where possible, avoid any adverse impacts on the integrity of the Natura 2000 site.

Stage 4 Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the sites will be necessary.

To ensure that the Proposed Development complies fully with the requirements of Article 6 of the Habitats Directive and all relevant Irish transposing legislation, Moore Group compiled this report to enable Fingal County Council to carry out AA screening in relation to the Proposed Development to determine whether the Proposed Development, individually or in combination with another plan or project will have a significant effect on a Natura 2000 site.

2.1. Guidance

This report has been compiled in accordance with guidance contained in the following documents:

- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. (Department of Environment, Heritage and Local Government, 2010 rev.).

- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPWS 1/10 & PSSP 2/10.
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (EC, 2018).
- Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EC, 2021).
- Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC, 2021).
- Office of the Planning Regulator (OPR) Practice Note PN01 Appropriate Assessment Screening for Development Management (OPR, 2021).

2.2. Data Sources

Sources of information that were used to collect data on the Natura 2000 network of sites, and the environment within which they are located, are listed below:

- The following mapping and Geographical Information Systems (GIS) data sources, as required:
    - National Parks & Wildlife (NPWS) protected site boundary data;
    - Ordnance Survey of Ireland (OSI) mapping and aerial photography;
    - OSI/Environmental Protection Agency (EPA) rivers and streams, and catchments;
    - Open Street Maps;
    - Digital Elevation Model over Europe (EU-DEM);
    - Google Earth and Bing aerial photography 1995-2022;
- Online data available on Natura 2000 sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie including:
    - Natura 2000 - Standard Data Form;
    - Conservation Objectives;
    - Site Synopses;
- National Biodiversity Data Centre records;
    - Online database of rare, threatened and protected species;
    - Publicly accessible biodiversity datasets.
- Status of EU Protected Habitats in Ireland. (National Parks & Wildlife Service, 2019); and
- Relevant Development Plans;
    - Fingal County Development Plan 2017-2023
    - Draft Fingal County Development Plan 2023-2029
- Data collected during fieldwork (6th July 2022) in the preparation of the Biodiversity Chapter of the Project EIAR.

3. Description of the Existing site & Proposed Development

3.1. Description of the Existing Site

In general, there are few natural habitats in the Proposed Development site area. They have either been modified or are artificial. The following is an overview of the main habitat types present on the subject site.

(WL1) Recolonising ground

This habitat refers to mosaic remnant areas that have been stockpiled with clay and colonised over the period of site preparation. The areas present as a previously disturbed and mounded areas of spoil and the species composition reflects the recolonisation of the spoil over time. Species present includes abundant Rapeseed (*Brassica napus subsp. napus*), abundant Common Vetch, Common ramping fumitory (*Fumaria muralis*), Ragwort, (*Senecio jacobaea*), frequent Red campion (*Silene dioica*), Broadleaved Dock (*Rumex obtusifolius*), Dandelion (*Taraxacum officinale* agg.), Nettle (Urtica dioica), Thistles (*Cirsium* spp.), Creeping buttercup, Clovers (*Trifolium* spp.), Lesser burdock (*Arctium minus*), Ribwort plantain (*Plantago lanceolata*) and occasional Coltsfoot (*Tussilago farfara*).

(BC4) Flower beds and borders

This habitat refers to the surrounding berms and earth banks which have been retained in situ or supplemented with landscaped flower beds planted with wild flowers. The areas are extensive and in full bloom during the site visits providing a myriad of high value biodiversity habitats for insects such as bumblebee, Butterflies and Moths, among which Speckled Wood (*Pararge aegeria*) and Cinnabar moth (*Tyria jacobaeae*) were most commonly recorded during fieldwork.

(BL3) Buildings and artificial surfaces

As previously stated, Building D has recently been constructed within the southernmost portion of the subject site, and an area of approx. 16,000m^2 at the centre of the subject site currently serves as a construction compound (including car parking) for the construction of Buildings B and C.

3.1. Description of the Proposed Development

The Proposed Development, for which a seven-year permission is sought, consists of the construction and operation of a data centre and associated facilities at Cruiserath, Dublin 15 to consist of the following:

- Construction of three data centre buildings (Data Centre E, Data Centre F and Data Centre G), with a gross floor area (GFA) of c. 1,425 sq.m, c. 20,582 sq.m, and c. 20,582 sq.m respectively, each over two storeys (with Data Centre F and G each including two mezzanine levels);
- Data Centre F and G will be located in the north-western portion of the overall landholding, with a primary parapet height of c. 19.8 metres and each will accommodate data halls,

associated electrical and mechanical plant rooms, a loading bay, maintenance and storage space, office administration areas, with plant and solar panels at roof level;

- Data Centre E (which will be ancillary to Data Centre F and G) will be located within the south-western portion of the overall landholding, with a primary parapet height of c. 13.1 metres and will accommodate data halls, associated electrical and mechanical plant rooms, a loading bay, maintenance and storage space, office administration areas, with plant at roof level;
- Emergency generators and associated flues will be provided within compounds adjoining each of the three data centre buildings (19 no. for Data Centre F, 19 no. for Data Centre G and 1 no. for Data Centre E);
- The development includes one diesel tank and two filling areas to serve the proposed emergency generators;
- Provision of ancillary structures including two MV buildings, water storage tanks and three bin stores; and
- Construction of access arrangements and internal road network and circulation areas, footpaths, provision of car parking (105 no. spaces), motorcycle parking (12 no. spaces) and bicycle parking (56 no. spaces), hard and soft landscaping and planting (including alteration to a landscaped berm to the north of proposed Data Centre E), lighting, boundary treatments, and all associated and ancillary works including underground foul and storm water drainage network, and utility cables.

Figure 1 shows the Proposed Development location and Figure 2 shows a detailed view of the Proposed Development boundary on recent aerial photography. Figure 3 shows the layout of the Proposed Development.

Figure 1. Showing the Proposed Development location at Cruiserath, Co. Dublin.

Figure 2. Showing the Proposed Development boundary on recent aerial photography.

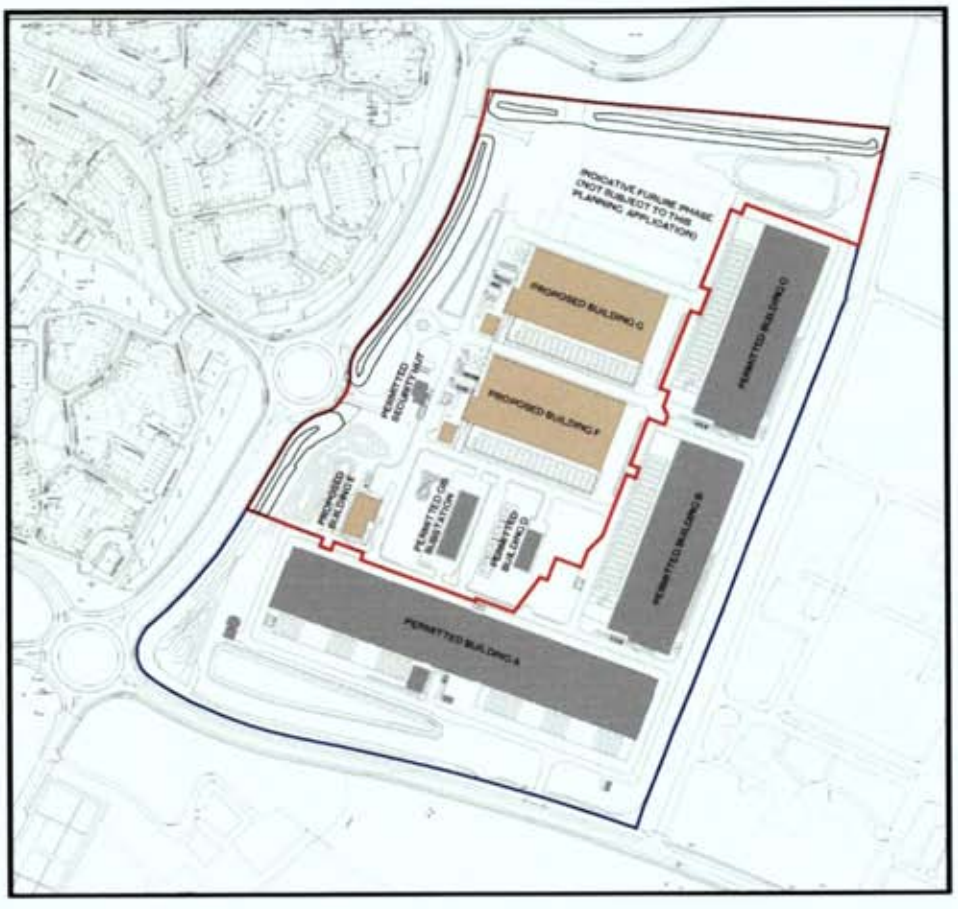

Figure 3. Plan of the Proposed Development.

4. Identification of Natura 2000 Sites

4.1. Description of Natura Sites Potentially Significantly Affected

The European Commission's "*Assessment of plans and projects in relation to Natura 2000 sites guidance on Article 6(3) and (4) of the Methodological Habitats Directive 92/43/EEC*" published 28 September 2021 states at section 3.1.3:

Identifying the Natura 2000 sites that may be affected should be done by taking into consideration all aspects of the plan or project that could have potential effects on any Natura 2000 sites located within the zone of influence of the plan or project. This should take into account all of the designating features (species, habitat types) that are significantly present on the sites and their conservation objectives. In particular, it should identify:

- *any Natura 2000 sites geographically overlapping with any of the actions or aspects of the plan or project in any of its phases, or adjacent to them;*

- *any Natura 2000 sites within the likely zone of influence of the plan or project Natura 2000 sites located in the surroundings of the plan or project (or at some distance) that could still be indirectly affected by aspects of the project, including as regards the use of natural resources (e.g. water) and various types of waste, discharge or emissions of substances or energy;*

- *Natura 2000 sites in the surroundings of the plan or project (or at some distance) which host fauna that can move to the project area and then suffer mortality or other impacts (e.g. loss of feeding areas, reduction of home range);*

- *Natura 2000 sites whose connectivity or ecological continuity can be affected by the plan or project.*

The range of Natura 2000 sites to be assessed, i.e. the zone in which impacts from the plan or project may arise, will depend on the nature of the plan or project and the distance at which effects may occur. For Natura 2000 sites located downstream along rivers or wetlands fed by aquifers, it may be that a plan or project can affect water flows, fish migration and so forth, even at a great distance. Emissions of pollutants may also have effects over a long distance. Some projects or plans that do not directly affect Natura 2000 sites may still have a significant impact on them if they cause a barrier effect or prevent ecological linkages. This may happen, for example, when plans affect features of the landscape that connect Natura 2000 sites or that may obstruct the movements of species or disrupt the continuity of a fluvial or woodland ecosystem. To determine the possible effects of the plan or project on Natura 2000 sites, it is necessary to identify not only the relevant sites but also the habitats and species that are significantly present within them, as well as the site objectives.

The Zone of Influence is determined by considering the Proposed Development's potential connectivity with European sites, in terms of:

- Nature, scale, timing and duration of all aspects of the proposed works and possible impacts, including the nature and size of excavations, storage of materials, flat/sloping sites;
- Distance and nature of potential pathways (dilution and dispersion; intervening 'buffer' lands, roads etc.); and
- Location of ecological features and their sensitivity to the possible impacts.

The potential for source pathway receptor connectivity is firstly identified through GIS interrogation and detailed information is then provided on sites with connectivity. A review of aerial photography, Ordnance Survey Ireland (OSI) mapping and OSI Geographical Information System (GIS) data for rivers and streams indicates that there are no notable surface water features onsite and no direct hydrological pathways to offsite surface water bodies. As such there is no hydrological connectivity to European sites. This was confirmed during fieldwork by the ecologist on 6 July 2022.

As there is no hydrological connectivity, GIS interrogation was used to locate the closest European sites and these are listed in Table 1 and presented in Figure 4 below. Spatial boundary data on the Natura 2000 network

was extracted from the NPWS website (www.npws.ie) on 19 July 2022. This data was interrogated using GIS analysis to provide mapping, distances, locations and pathways to all sites of conservation concern including pNHAs, NHA and European sites.

Site Code	Site name	Distance (km)[1]
000205	Malahide Estuary SAC	12.44
000206	North Dublin Bay SAC	14.34
000210	South Dublin Bay SAC	14.00
001398	Rye Water Valley/Carton SAC	8.82
004006	North Bull Island SPA	14.33
004024	South Dublin Bay and River Tolka Estuary SPA	11.62
004025	Malahide Estuary SPA	12.56

Table 1. Details of European sites within the potential zone of influence of the Proposed Development.

All European sites are at least 8km distant from the Proposed Development, with the closest being the Rye Water Valley/Carton SAC, 8.82km to the southwest. As outlined above, there is no direct hydrological connectivity to any European site.

[1] Distances indicated are the closest geographical distance between the proposed Project and the European site boundary, as made available by the NPWS. Connectivity along hydrological pathways may be significantly greater.

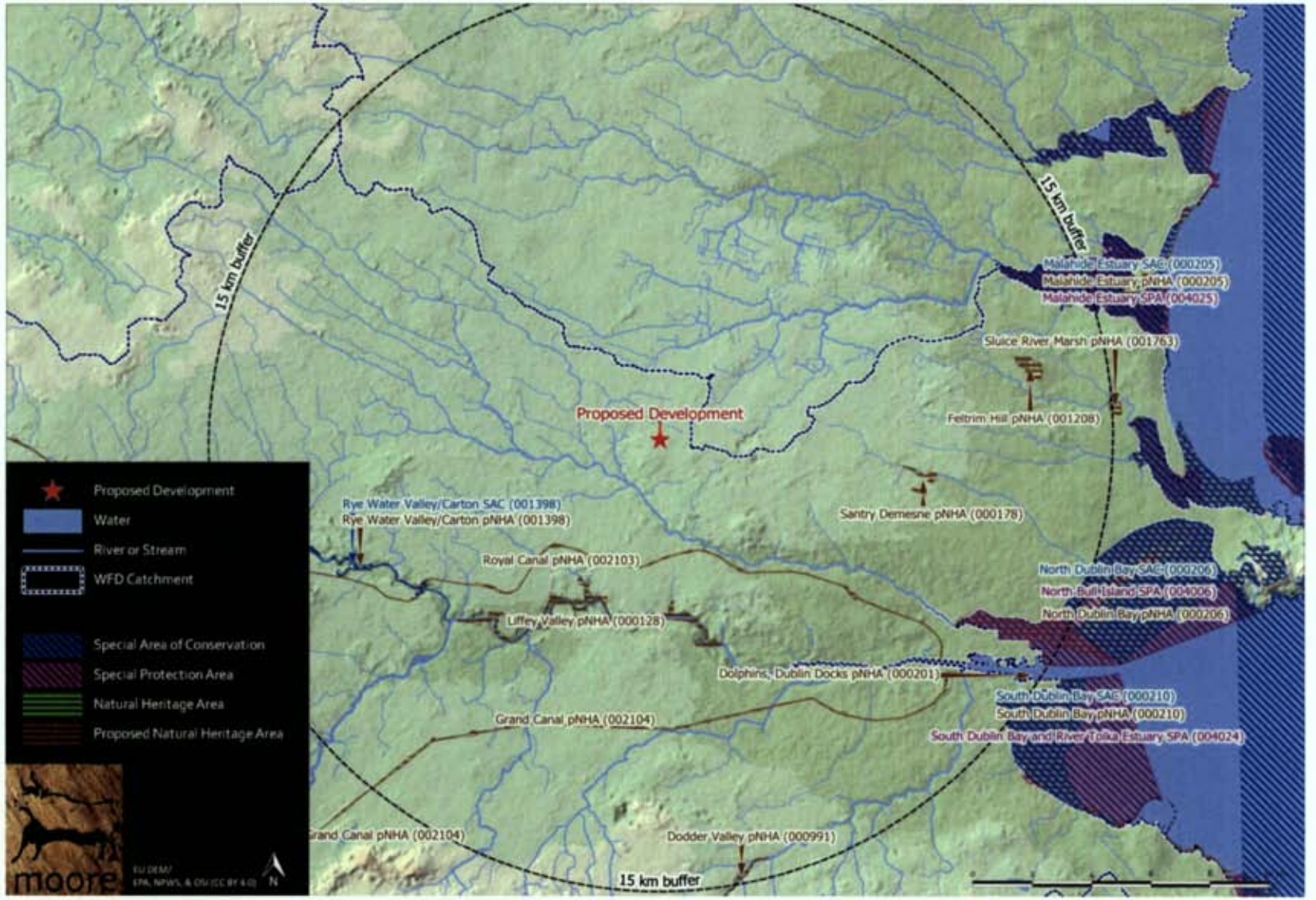

Figure 4. Showing European sites and NHAs/pNHAs within the wider Potential Zone of Influence of the Proposed Development.

4.2. Ecological Network Supporting Natura 2000 Sites

A concurrent GIS analysis of the proposed Natural Heritage Areas (pNHA) and designated Natural Heritage Areas (NHA) in terms of their role in supporting the species using Natura 2000 sites was undertaken along with GIS investigation of European sites. These supporting roles mainly relate to mobile fauna such as mammals and birds which may use pNHAs and NHAs as ecological corridors or "stepping stones" between Natura 2000 sites.

Article 10 of the Habitats Directive and the Habitats Regulations 2011 place a high degree of importance on such non-Natura 2000 areas as features that connect the Natura 2000 network. Based on site survey, features such as ponds, woodlands and important hedgerows were taken into account in the decision process and during the preparation of this AA Screening report.

The NHAs and pNHAs identified in Figure 4 are located outside the Zone of Influence of the Proposed Development as they have no hydrological or biological connectivity to the Proposed Development.

5. Identification of Potential Impacts & Assessment of Significance

The Proposed Development is not directly connected with or necessary to the management of the sites considered in the assessment and therefore potential impacts must be identified and considered.

5.1. Assessment of Likely Significant Effects

There is no direct connectivity to any European sites within or outside the potential Zone of Influence.

The consideration of all potential direct and indirect impacts that may result in significant effects on the conservation objectives of a European site, taking into account the size and scale of the Proposed Development are presented in Table 2 below.

Table 2 Assessment of Likely Significant Effects.

Identification of all potential direct and indirect impacts that may result in significant effects on the conservation objectives of a European site, taking into account the size and scale of the project.	
Potential (direct and Indirect) Impacts:	**Significance of Impacts:**
Construction phase e.g. Vegetation clearance Demolition Surface water runoff from soil excavation/infill/landscaping (including borrow pits) Dust, noise, vibration Lighting disturbance Impact on groundwater/dewatering Storage of excavated/construction materials Access to site Pests	**None** The Proposed Development consists of the construction and operation of three data centres and associated ancillary development. The Proposed Development site is located within the boundary of the Permitted Development Building A, which has been cleared and prepared for development. Construction work on the permitted data centres Buildings B and C has commenced to the east of the Proposed Development. The site undergoing Permitted Development has no connectivity to European sites. It does not have the capacity to host annexed species of any kind. This was confirmed during fieldwork in preparation of the Biodiversity Chapter of the Project EIAR. The site is located at a distance of removal such that there will be no disturbance to qualifying interest species in any European sites.
Operational phase e.g. Direct emission to air from operation of generators Surface water runoff containing contaminant or sediment Lighting disturbance Noise/vibration Changes to water/groundwater due to drainage or abstraction Presence of people, vehicles and activities Physical presence of structures (e.g. collision risks) Potential for accidents or incidents	All foul and surface water runoff, once the facility is operational, will be contained on site and discharged to urban drainage systems. There is no real likelihood of any significant effects on European Sites in the wider catchment area given there are no source - pathway linkages to European sites. There is no direct hydrological linkage and the facility is located at a distance of removal (see section 4.1) such that there will be no disturbance to qualifying interest species in any European sites.
Describe any likely changes to the European site:	

Examples of the type of changes to give consideration to include: Reduction or fragmentation of habitat area Disturbance to QI species Habitat or species fragmentation Reduction or fragmentation in species density Changes in key indicators of conservation status value (water quality etc.) Changes to areas of sensitivity or threats to QI Interference with the key relationships that define the structure or ecological function of the site Climate change	**None.** The site is undergoing Permitted Development with no connectivity to European sites. It does not have the capacity to host annexed species of any kind. This was confirmed during fieldwork in preparation of the Biodiversity Chapter of the Project EIAR. The site is located at a distance of removal such that there will be no disturbance to qualifying interest species in any European sites. The Proposed Development site is not located adjacent or within a European site, therefore there is no risk of habitat loss or fragmentation or any effects on QI habitats or species directly or ex-situ.
Are 'mitigation' measures necessary to reach a conclusion that likely significant effects can be ruled out at screening?	
No	N/A

On the basis of the information supplied, which is considered adequate to undertake a screening determination and having regard to:

- the nature and scale of the Proposed Development,
- the intervening land uses and distance from European sites,
- the lack of direct connections with regard to the Source-Pathway-Receptor model,

It may be concluded that the Proposed Development, individually or in-combination with other plans or projects, would not be likely to have a significant effect on the above listed European sites, in view of the said sites' conservation objectives.

5.2. Assessment of Potential In-Combination Effects

In-combination effects are changes in the environment that result from numerous human-induced, small-scale alterations. In-combination effects can be thought of as occurring through two main pathways: first, through persistent additions or losses of the same materials or resource, and second, through the compounding effects as a result of the coming together of two or more effects.

As part of the Screening for an Appropriate Assessment, in addition to the Proposed Development, other relevant plans and projects in the area must also be considered at this stage. This step aims to identify at this early stage any possible significant in-combination effects of the Proposed Development with other such plans and projects on European sites.

All planning consented by Fingal County Council will have had to comply with the Habitats Directive which requires that all Projects and Plans that could affect the Natura 2000 sites in the same potential Zone of Influence of the Proposed Development site would be initially screened for Appropriate Assessment and if requiring have a Stage 2 AA undertaken. In this way any, in-combination impacts with Plans or Projects for the Proposed Development area and surrounding townlands in which the Proposed Development site is located, would be avoided. The listed developments and operational developments have been granted permission in most cases with conditions relating to sustainable development by the consenting authority in compliance with the relevant Local Authority Development Plan and in compliance with the Local Authority requirement with regard to the Habitats Directive. The development cannot have received planning permission without having met the consenting authority requirement in this regard.

There are no predicted in-combination effects given that it is predicted that the Proposed Development will have no effect on any European site.

A review of the National Planning Application Database was undertaken (within a zone of influence of 500 m) based on the source pathway linkages identified for the Proposed Development) The first stage of this review confirmed that there were no data gaps in the area where the Proposed Development is located. The database was then queried for applications for approval where consent has been made, including refusals subject to appeal and not yet determined which have potential to have cumulative impact, these are presented in Table 4 below.

Table 3.Planning applications granted permission in the vicinity of the Proposed Development.

Planning Ref.	Description of development	Comments
FW19A/0048	(1) Change of use of Ground Floor Unit from Retail to Childcare Use, (2) Upgrade of signage to front and (3) Ancillary Site Works.	No potential for in-combination effects given the scale and location of the Proposed Project and the absence of a source pathway linkage to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0058	Replacement of 36 no. permitted residential units with 43 no. residential units comprising 42 no. 3 bed terrace houses (House Type B8A, B3B, B8B) and 1 no. 3 bed detached house (House Type J2). Relocation of 10 no. House Types H, 1 no. House Type H(i) and provision of 1 no. additional House Type H(i) (4 bed semi-detached). Provision of a 692 sq.m public open space area.	As above

Planning Ref.	Description of development	Comments
FW19A/0087	Construction of two data storage facilities with a maximum overall height of c. 22 metres; Each of the two data storage facilities will accommodate data halls, associated electrical and mechanical Plant Rooms, loading bays, maintenance and storage space, office administration areas, screened plant and solar panels at roof level; Each of the proposed data storage facilities will have a gross floor area over two levels of c. 21,705 sq.m; Emergency generators (24 for each data centre), and associated emission stacks are provided in compounds adjacent to each of the two buildings; diesel tank and a filling area to serve the proposed emergency generators; Construction of internal road network and circulation areas, footpaths, provision of 50 no. car parking spaces for each of the two data storage facilities, and 25 no. cycle parking spaces for each of the two data storage facilities; Connections to vehicular access routes, roads, services and infrastructure permitted under An Bord Pleanála Reg. Ref.: PL06F.248544 / Fingal County Council Reg. Ref.: FW17A/0025; Hard and soft landscaping and planting, lighting, and all associated works including underground foul and storm water drainage network, attenuation area, and utility cables.	As above
FW19A/0088	The development consists of an existing 24 metre high telecommunications support structure, antennas, equipment container and associated equipment within a fenced compound and access track. The development forms part of Vodafone Ireland Limited's existing GSM and 3G Broadband telecommunications network.	As above
FW19A/0125	Permission for 2 no. windows located on the north elevation on mezzanine level of the existing Manufacturing Building and Retention of 3m high windsock located on the roof of Existing Administration Building. All on site of 5.03 hectares which forms part of a previously permitted planning Ref: FW16A/0085 and FW16A/0080.	As above
FW19A/0134	Proposed extension of playground area to include revised boundary realignment and new vehicular access.	As above
FW19A/0177	The Electricity Supply Board (ESB) intends to apply for planning permission for development on a site at this address: (a) Proposed underground cable route originating from the existing Macetown ESB station (on Damastown Avenue in the townland of Macetown Middle) , running in an easterly direction along Damastown Avenue and the R121 (in the townlands of Macetown Middle, Macetown South, Tyrrelstown, Cruiserath and Buzzardstown), to a permitted medium voltage (MV) substation located within a permitted data centre in the townlands of Cruiserath and Tyrrelstown; (b) Proposed underground cable route originating from the existing Corduff ESB station running north along the Corduff Road, then west along the N3-M2 Link Road, then south and east along the R121 to a MV substation located within a data centre in the townlands of Cruiserath and Tyrrelstown. The development will consist of: A c.1m wide trench of depth c. 1m within a 4m wide corridor, in which underground cable ducts and cables will be installed.	As above
FW19A/0212	The development consists of modifications to the development permitted under FW16A/0181 for the construction of a Place of Worship. The modifications consist of reconfiguration of the internal layout of the building at ground floor including the lobby area, bathrooms, family rooms and the addition of 3no. new staircores providing access to a new proposed balcony level within the building envelope. The balcony level will accommodated 457 seats along with storage and plant areas. The number of worshippers within the building will increase from c.744 to c.1201.	As above
FW19B/0049	Planning Permission for a single storey extension (33.4 m.sq.) to rear of dwelling and associated site works.	As above
FW20A/0053	The Electricity Supply Board (ESB) intends to apply for planning permission for development on a 4.8 ha site located in the townlands of Goddamendy and Cruiserath. The development will consist of a 75 MWe (electrical output) aero derivative gas fired turbine for the generation of electricity and will include the following elements: (a) c. 240 sq.m. aero derivative gas fired turbine module up	As above

Planning Ref.	Description of development	Comments
	to c. 15.4 m high with a c. 30 m high stack; (b) ancillary buildings comprising: (1) liquid fuel treatment building; (2) gaseous fire suppression cabinet; (3) water treatment plant and pumps building; (4) generator circuit breaker building; (5) continuous emissions monitoring hut; (6) spare parts storage building; (7) control & instrumentation communications module; (8) power control module; (9) electrical equipment module; (10) compressed air and fire suppression system building; (11) gas compressor building; (12) fire fighting pumps building; (13) gas reducing station building; (14) welfare facilities building; (c) industrial / electrical plant comprising: (1) c.12 m high liquid fuel tank; (2) lube oil skid; (3) liquid fuel forwarding skid; (4) water injection skid; water wash cart; (5) a transformer compound housing a main transformer and a unit transformer; (6) demineralised water tank; (7) raw fire water tank; (8) a house transformer compound; (9) fin fan coolers; (10) gas compressor cooler; (11) fenced gas receiving & metering station containing various items of industrial plant, and elevated pipework; and (12) an emergency diesel generator; (d) boundary and internal palisade fencing and gates; (e) ancillary site clearance and development works including provision of areas of hardstanding and car parking, internal access roads, landscaped berms and planting, pipe bridges, and on-site services including site drainage and attenuation.	
FW20A/0164	The construction of a medium voltage (MV) substation. The MV substation building will have a total gross floor area of c. 30 sq.m, and an overall height of c. 4 metres. The Proposed Development includes the provision of electrical connections associated with the MV substation, along with all associated hard and soft landscaping, services, and all ancillary works. All on a site with an area of 0.33 hectares. The application site is located to the south of the data centre permitted under An Bord Pleanála Reg. Ref. L06F.248544 / Fingal County Council Reg Ref. FW17A/0025.	As above As above
FW20A/0197	Planning permission for alterations to the residential scheme permitted under Reg. Ref FW14A/0108, as amended by Reg. Ref: FW16A/0099 Reg. Ref FW16A/0148, Reg. Ref: fw17a/0016 and Reg. Ref FW18A/0132 (as extended) on site at Hollywoodrath, Hollystown, Dublin 15. The proposed alterations consist of the following: Alterations to permitted House No's 3-8 and 9-14 Hollywoodrath Meadows to provide for a change of house type from 11 no. House Type G2 and 1 no. House Type G2 (i) to 11 no House Type B8B and 1 no. House Type B3B. The alterations result in the creation of four terrace block 3 units each.	As above
FW20A/0210	Planning permission for the revision of previously approved Planning Application FW20A/0011. The revisions include; 1 - To increase capacity from 38 to 44 children, 2 - Change operating hours from previously approved 8.30am - 5.30pm to 7.30am - 6.30pm Monday to Friday , 3 - Retention permission for a single storey roof structure covering the rear outdoor play area (built Autumn 2020), 4 - All associated site works.	As above
FW20B/0129	A ground floor extension to side of existing dwelling with internal modifications and associated site works.	As above
FW21A/0007	The development will consist of the retention and reconfiguration of the existing temporary car park The retention of 4 car parking spaces to the south of existing carpark. 2 new automated traffic barriers and removal of adjoining car spaces .convert an existing temporary contractor's carpark to new 25 staff carpark spaces and a commercial vehicle set down area for 10 vehicles with associated landscaping lighting footpaths, and access stairs. Total car parking spaces 191 (existing car parking planning permission total 136 spaces	As above
FW21A/0039	The Proposed Development comprises the provision of artificial lighting to the substation compound, transformers, and Gas Insulated Switchgear (GIS) building permitted under An Bord Pleanála ref: 30683420 and to the client control building permitted under An Bord Pleanála ref: PL06F.248544/ Fingal	As above

Planning Ref.	Description of development	Comments
	County Council Reg. Ref; FW17A/0025, along with all associated site and ancillary works.	
FW21A/0060	Permission for a permanent construction compound , located to the centre of the BMS site consisting of 4 no. single storey workshops sized 70 square metres and 4.1 meters high, 1 no. toilet facility sized 50 meters square and 3.1 meters high and office/canteen facility sized 50 square meters and 3.1 meters high, all previously granted permission under planning ref: FW17A/0097 but not constructed within the period of validity as set out under condition 2 (ii) of the Grant requiring that the life of the permission is limited to previously approved planning application, planning ref: FW15A/0043.	As above
FW21A/0069	The Proposed Development is for a centralised waste yard which comprises a bunded and fenced enclosure with vehicular entrance & exit points, pedestrian access gate, a single storey waste storage building, a separate sheltered drum wash station, and associated site works & lighting.	As above
FW21A/0120	Permission for construction of single storey extension to the side/rear of existing dwelling comprising of family room c/w flat roof within a Strategic Development Zone 1.	As above
FW21A/0153	Planning permission to erect 8,807.00 m2 of 17.77 MV of photovoltaic panels on the roof of the following buildings of electrical, central utility, manufacturing, warehouse, utilities compound and administration in our industry with all associates site works.	As above
FW21A/0173	Minor amendments to existing planning approvals (FW16A/0181; FW18A/0103; FW19A/0212). The development shall consist of the provision of new vehicle & pedestrian entrance gates (to remain open during the adjoining school term hours) and associated fencing; amended external finishes; amended external entrance canopy; extended louvre screening at first floor level; and the retention of minor elevation adjustments, a revised fire escape stairs enclosure and a new retaining wall on the east boundary of the site.	As above
FW21A/0174	Permission for construction of warehouse extension to the east of existing warehouse and associated works. The development will comprise of ground floor and two internal technical mezzanine floors split over 2 levels of total floor area 2545m ^{2} and total building height of 12.4m. Proposed development will be constructed in 2 phases.	As above
FW21A/0223	Construction of a single storey extension (24.0 sq.m) with flat roof at ground floor level to the rear of existing house, 1 no. of rooflight, alterations to elevations & internal layout. relocation of garden pedestrian gate and all associated site development works.	As above
FW21B/0031	Permission for the construction of a single storey extension with apex roof and relocation of existing access gate to the rear wall along with a new window to the side elevation at ground floor.	As above
FW22B/0032	The development will consist of a new single-story extension to rear of existing dwelling, modification to internal plan layout together with associated site works.	As above.

Any new applications for the Proposed Development area will be assessed on a case by case basis *initially* by Fingal County Council which will determine the requirement for AA Screening as per the requirements of Article 6(3) of the Habitats Directive.

6. Conclusion

There is no direct connectivity to any European sites within or outside the potential Zone of Influence.

There are no predicted effects on any European sites given:

- The distance between the Proposed Development and any European Sites, approximately 8.82km;
- The lack of direct connectivity between the Proposed Development and any hydrological pathways; there are no watercourses within the Proposed Development boundary and there is no direct connectivity between the Proposed Development site and any watercourses that lead to any European sites;
- The Proposed Development is to be connected to the existing public sewer network for the treatment of wastewater.
- There are no predicted emissions to air, water or the environment during the construction or operational phases that would result in significant effects.

It has been objectively concluded by Moore Group Environmental Services that:

1. The Proposed Development is not directly connected with, or necessary to the conservation management of the European sites considered in this assessment.
2. The Proposed Development is unlikely to either directly or indirectly significantly affect the Qualifying interests or Conservation Objectives of the European sites considered in this assessment.
3. The Proposed Development, alone or in combination with other projects, is not likely to have significant effects on the European sites considered in this assessment in view of their conservation objectives.
4. It is possible to conclude that significant effects can be excluded at the screening stage.

It can be *excluded*, on the basis of objective information, that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site.

An appropriate assessment is not, therefore, required.

A final determination will be made by the consenting authority in this regard.

7. References

Department of the Environment, Heritage and Local Government (2010) Guidance on Appropriate Assessment of Plans and Projects in Ireland (as amended February 2010).

European Commission (2000) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

European Commission (2007) Guidance document on Article 6(4) of the 'Habitats Directive '92/43/EEC: Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interests, compensatory measures, overall coherence and opinion of the Commission. European Commission, Brussels.

European Commission (2018) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

European Commission (2021) Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Brussels 28.9.21.

European Commission (2021) Guidance document on the strict protection of animal species of Community interest under the Habitats Directive, Brussels 12.10.21.

NPWS (2019) The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

NPWS (2022) National Parks and Wildlife Service Metadata available online at https://www.npws.ie/maps-and-data

Office-of-the-Planning-Regulator (2021) Appropriate Assessment Screening for Development Management OPR Practice Note PN01. March 2021

Appendix A

FINDING OF NO SIGNIFICANT EFFECTS REPORT

Finding no significant effects report matrix

Name of project or plan

Cruiserath Data Storage

Name and location of the Natura 2000 site(s)

A review of aerial photography, Ordnance Survey Ireland (OSI) mapping and OSI Geographical Information System (GIS) data for rivers and streams indicates that there are no notable surface water features onsite and no direct hydrological pathways to offsite surface water bodies. This was confirmed during fieldwork on 6 July 2022.

All European sites are at least 8km distant from the Proposed Development, with the closest being the Rye Water Valley/Carton SAC, 8.82km to the southwest. There is no connectivity to any European site.

Description of the project or plan

The Proposed Development consists of the construction and operation of three data centres and associated ancillary development. The Proposed Development site is located within the boundary of the Permitted Development Building A, which has been cleared and prepared for development. Construction work on the permitted data centres Buildings B and C has commenced to the east of the Proposed Development.

Is the project or plan directly connected with or necessary to the management of the site(s)

No

Are there other projects or plans that together with the projects or plan being assessed could affect the site

A review of the National Planning Application Database was undertaken. The first stage of this review confirmed that there were no data gaps in the area where the Proposed Development is located. The database was then queried for applications for approval where consent has been made, including refusals subject to appeal and not yet determined, these are presented in the Table below.

Planning applications granted permission in the vicinity of the Proposed Development.

Planning Ref.	Description of development	Comments
FW19A/0048	(1) Change of use of Ground Floor Unit from Retail to Childcare Use, (2) Upgrade of signage to front and (3) Ancillary Site Works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0058	Replacement of 36 no. permitted residential units with 43 no. residential units comprising 42 no. 3 bed terrace houses (House Type B8A, B3B, B8B) and 1 no. 3 bed detached house (House Type J2). Relocation of 10 no. House Types H, 1 no. House Type H(i) and provision of 1 no. additional House Type H(i) (4 bed semi-detached). Provision of a 692 sq.m public open space area.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0087	Construction of two data storage facilities with a maximum overall height of c. 22 metres; Each of the two data storage facilities will accommodate data halls,	No potential for in-combination effects given

Planning Ref.	Description of development	Comments
	associated electrical and mechanical Plant Rooms, loading bays, maintenance and storage space, office administration areas, screened plant and solar panels at roof level; Each of the proposed data storage facilities will have a gross floor area over two levels of c. 21,705 sq.m; Emergency generators (24 for each data centre), and associated emission stacks are provided in compounds adjacent to each of the two buildings; diesel tank and a filling area to serve the proposed emergency generators; Construction of internal road network and circulation areas, footpaths, provision of 50 no. car parking spaces for each of the two data storage facilities, and 25 no. cycle parking spaces for each of the two data storage facilities; Connections to vehicular access routes, roads, services and infrastructure permitted under An Bord Pleanála Reg. Ref.: PL06F.248544 / Fingal County Council Reg. Ref.: FW17A/0025; Hard and soft landscaping and planting, lighting, and all associated works including underground foul and storm water drainage network, attenuation area, and utility cables.	the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0088	The development consists of an existing 24 metre high telecommunications support structure, antennas, equipment container and associated equipment within a fenced compound and access track. The development forms part of Vodafone Ireland Limited's existing GSM and 3G Broadband telecommunications network.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0125	Permission for 2 no. windows located on the north elevation on mezzanine level of the existing Manufacturing Building and Retention of 3m high windsock located on the roof of Existing Administration Building. All on site of 5.03 hectares which forms part of a previously permitted planning Ref: FW16A/0085 and FW16A/0080.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0134	Proposed extension of playground area to include revised boundary realignment and new vehicular access.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0177	The Electricity Supply Board (ESB) intends to apply for planning permission for development on a site at this address: (a) Proposed underground cable route originating from the existing Macetown ESB station (on Damastown Avenue in the townland of Macetown Middle) , running in an easterly direction along Damastown Avenue and the R121 (in the townlands of Macetown Middle, Macetown South, Tyrrelstown, Cruiserath and Buzzardstown), to a permitted medium voltage (MV) substation located within a permitted data centre in the townlands of Cruiserath and Tyrrelstown; (b) Proposed underground cable route originating from the existing Corduff ESB station running north along the Corduff Road, then west along the N3-M2 Link Road, then south and east along the R121 to a MV substation located within a data centre in the townlands of Cruiserath and Tyrrelstown. The development will consist of: A c.1m wide trench of depth c. 1m within a 4m wide corridor, in which underground cable ducts and cables will be installed.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19A/0212	The development consists of modifications to the development permitted under FW16A/0181 for the construction of a Place of Worship. The modifications consist of reconfiguration of the internal layout of the building at	No potential for in-combination effects given the scale and location of

Planning Ref.	Description of development	Comments
	ground floor including the lobby area, bathrooms, family rooms and the addition of 3no. new staircores providing access to a new proposed balcony level within the building envelope. The balcony level will accommodated 457 seats along with storage and plant areas. The number of worshippers within the building will increase from c.744 to c.1201.	the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW19B/0049	Planning Permission for a single storey extension (33.4 m.sq.) to rear of dwelling and associated site works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW20A/0053	The Electricity Supply Board (ESB) intends to apply for planning permission for development on a 4.8 ha site located in the townlands of Goddamendy and Cruiserath. The development will consist of a 75 MWe (electrical output) aero derivative gas fired turbine for the generation of electricity and will include the following elements: (a) c. 240 sq.m. aero derivative gas fired turbine module up to c. 15.4 m high with a c. 30 m high stack; (b) ancillary buildings comprising: (1) liquid fuel treatment building; (2) gaseous fire suppression cabinet; (3) water treatment plant and pumps building; (4) generator circuit breaker building; (5) continuous emissions monitoring hut; (6) spare parts storage building; (7) control & instrumentation communications module; (8) power control module; (9) electrical equipment module; (10) compressed air and fire suppression system building; (11) gas compressor building; (12) fire fighting pumps building; (13) gas reducing station building; (14) welfare facilities building; (c) industrial / electrical plant comprising: (1) c.12 m high liquid fuel tank; (2) lube oil skid; (3) liquid fuel forwarding skid; (4) water injection skid; water wash cart; (5) a transformer compound housing a main transformer and a unit transformer; (6) demineralised water tank; (7) raw fire water tank; (8) a house transformer compound; (9) fin fan coolers; (10) gas compressor cooler; (11) fenced gas receiving & metering station containing various items of industrial plant, and elevated pipework; and (12) an emergency diesel generator; (d) boundary and internal palisade fencing and gates; (e) ancillary site clearance and development works including provision of areas of hardstanding and car parking, internal access roads, landscaped berms and planting, pipe bridges, and on-site services including site drainage and attenuation.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW20A/0164	The construction of a medium voltage (MV) substation. The MV substation building will have a total gross floor area of c. 30 sq.m, and an overall height of c. 4 metres. The Proposed Development includes the provision of electrical connections associated with the MV substation, along with all associated hard and soft landscaping, services, and all ancillary works. All on a site with an area of 0.33 hectares. The application site is located to the south of the data centre permitted under An Bord Pleanála Reg. Ref. L06F.248544 / Fingal County Council Reg Ref. FW17A/0025.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW20A/0197	Planning permission for alterations to the residential scheme permitted under Reg. Ref FW14A/0108, as amended by Reg. Ref: FW16A/0099 Reg. Ref FW16A/0148, Reg. Ref: fw17a/0016 and Reg. Ref FW18A/0132 (as extended) on site at Hollywoodrath, Hollystown, Dublin 15. The proposed alterations consist of the following: Alterations to permitted House No's 3-8 and 9-14 Hollywoodrath Meadows to provide for a change of house type from 11 no. House Type G2 and 1 no. House Type G2 (i) to 11 no House Type B8B and 1 no. House Type B3B. The alterations result in the creation of four terrace block 3 units each.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.

Planning Ref.	Description of development	Comments
FW20A/0210	Planning permission for the revision of previously approved Planning Application FW20A/0011. The revisions include; 1 - To increase capacity from 38 to 44 children, 2 - Change operating hours from previously approved 8.30am - 5.30pm to 7.30am - 6.30pm Monday to Friday , 3 - Retention permission for a single storey roof structure covering the rear outdoor play area (built Autumn 2020), 4 - All associated site works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW20B/0129	A ground floor extension to side of existing dwelling with internal modifications and associated site works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0007	The development will consist of the retention and reconfiguration of the existing temporary car park The retention of 4 car parking spaces to the south of existing carpark. 2 new automated traffic barriers and removal of adjoining car spaces .convert an existing temporary contractor's carpark to new 25 staff carpark spaces and a commercial vehicle set down area for 10 vehicles with associated landscaping lighting footpaths, and access stairs. Total car parking spaces 191 (existing car parking planning permission total 136 spaces	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0039	The Proposed Development comprises the provision of artificial lighting to the substation compound, transformers, and Gas Insulated Switchgear (GIS) building permitted under An Bord Pleanála ref: 30683420 and to the client control building permitted under An Bord Pleanála ref: PL06F.248544/ Fingal County Council Reg. Ref; FW17A/0025, along with all associated site and ancillary works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0060	Permission for a permanent construction compound , located to the centre of the BMS site consisting of 4 no. single storey workshops sized 70 square metres and 4.1 meters high, 1 no. toilet facility sized 50 meters square and 3.1 meters high and office/canteen facility sized 50 square meters and 3.1 meters high, all previously granted permission under planning ref: FW17A/0097 but not constructed within the period of validity as set out under condition 2 (ii) of the Grant requiring that the life of the permission is limited to previously approved planning application, planning ref: FW15A/0043.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0069	The Proposed Development is for a centralised waste yard which comprises a bunded and fenced enclosure with vehicular entrance & exit points, pedestrian access gate, a single storey waste storage building, a separate sheltered drum wash station, and associated site works & lighting.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0120	Permission for construction of single storey extension to the side/rear of existing dwelling comprising of family room c/w flat roof within a Strategic Development Zone 1.	No potential for in-combination effects given the scale and location of the project, the lack of

Planning Ref.	Description of development	Comments
		pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0153	Planning permission to erect 8,807.00 m2 of 17.77 MV of photovoltaic panels on the roof of the following buildings of electrical, central utility, manufacturing, warehouse, utilities compound and administration in our industry with all associates site works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0173	Minor amendments to existing planning approvals (FW16A/0181; FW18A/0103; FW19A/0212). The development shall consist of the provision of new vehicle & pedestrian entrance gates (to remain open during the adjoining school term hours) and associated fencing; amended external finishes; amended external entrance canopy; extended louvre screening at first floor level; and the retention of minor elevation adjustments, a revised fire escape stairs enclosure and a new retaining wall on the east boundary of the site.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0174	Permission for construction of warehouse extension to the east of existing warehouse and associated works. The development will comprise of ground floor and two internal technical mezzanine floors split over 2 levels of total floor area 2545m ^{2} and total building height of 12.4m. Proposed Development will be constructed in 2 phases.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21A/0223	Construction of a single storey extension (24.0 sq.m) with flat roof at ground floor level to the rear of existing house, 1 no. of rooflight, alterations to elevations & internal layout. relocation of garden pedestrian gate and all associated site development works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW21B/0031	Permission for the construction of a single storey extension with apex roof and relocation of existing access gate to the rear wall along with a new window to the side elevation at ground floor.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the environment that could affect European sites.
FW22B/0032	The development will consist of a new single-story extension to rear of existing dwelling, modification to internal plan layout together with associated site works.	No potential for in-combination effects given the scale and location of the project, the lack of pathways to European sites and determination of no emissions to the

Planning Ref.	Description of development	Comments
		environment that could affect European sites.

The Fingal County Development Plan (and Draft Plan going forward) in complying with the requirements of the Habitats Directive requires that all Projects and Plans that could affect the Natura 2000 sites in the same potential Zone of Influence of the Proposed Development site would be initially screened for Appropriate Assessment and if requiring Stage 2 AA, that appropriate employable mitigation measures would be put in place to avoid, reduce or ameliorate negative impacts. In this way any, in-combination impacts with Plans or Projects for the Proposed Development area and surrounding townlands in which the Proposed Development site is located, would be avoided.

The listed developments have been granted permission in most cases with conditions relating to sustainable development by the consenting authority in compliance with the relevant Local Authority Development Plan and in compliance with the Local Authority requirement for regard to the Habitats Directive. The development cannot have received planning permission without having met the consenting authority requirement in this regard. There are no predicted in-combination effects given that it is predicted that the Proposed Development will have no effect on any European site.

There are no predicted in-combination effects given that the reasons discussed in the 'Comments' column of the Table above and given that the Proposed Development is unlikely to have any adverse effects on any European sites.

Any new applications for the Proposed Development area will be assessed on a case by case basis *initially* by Fingal County Council which will determine the requirement for AA Screening as per the requirements of Article 6(3) of the Habitats Directive.

THE ASSESSMENT OF SIGNIFICANCE OF EFFECTS

Describe how the project or plan (alone or in combination) is likely to affect the Natura 2000 site.

A review of aerial photography, Ordnance Survey Ireland (OSI) mapping and OSI Geographical Information System (GIS) data for rivers and streams indicates that there are no notable surface water features onsite and no direct hydrological pathways to offsite surface water bodies. This was confirmed during fieldwork on 6 July 2022.

All European sites are at least 8km distant from the Proposed Development, with the closest being the Rye Water Valley/Carton SAC, 8.82km to the southwest. There is no connectivity to any European site.

Explain why these effects are not considered significant.

There are no predicted effects on any European sites given:

- The distance between the Proposed Development and any European Sites, approximately 8.82km;
- The lack of direct connectivity between the Proposed Development and any hydrological pathways; there are no watercourses within the Proposed Development boundary and there is no direct connectivity between the Proposed Development site and any watercourses that lead to any European sites;
- The Proposed Development is to be connected to the existing public sewer network for the treatment of wastewater.

List of agencies consulted: provide contact name and telephone or e-mail address

The requirement for Appropriate Assessment Screening was determined during pre-planning discussion with Fingal County Council.

Response to consultation

N/A.

DATA COLLECTED TO CARRY OUT THE ASSESSMENT

Who carried out the assessment

Moore Group Environmental Services.

Sources of data

NPWS database of designated sites at www.npws.ie

National Biodiversity Data Centre database http://maps.biodiversityireland.ie

Level of assessment completed

Desktop Assessment. Fieldwork was carried out as part of the EIA process.

Where can the full results of the assessment be accessed and viewed

Fingal County Council Planning web portal.

OVERALL CONCLUSIONS

There is no connectivity to any European sites within or outside the potential Zone of Influence.
There are no predicted effects on any European sites given:

- The distance between the Proposed Development and any European Sites, approximately 8.82km;
- The lack of direct connectivity between the Proposed Development and any hydrological pathways; there are no watercourses within the Proposed Development boundary and there is no direct connectivity between the Proposed Development site and any watercourses that lead to any European sites;
- The Proposed Development is to be connected to the existing public sewer network for the treatment of wastewater.
- There are no predicted emissions to air, water or the environment during the construction or operational phases that would result in significant effects.

It has been objectively concluded by Moore Group Environmental Services that:

1. The Proposed Development is not directly connected with, or necessary to the conservation management of the European sites considered in this assessment.
2. The Proposed Development is unlikely to either directly or indirectly significantly affect the Qualifying interests or Conservation Objectives of the European sites considered in this assessment.
3. The Proposed Development, alone or in combination with other projects, is not likely to have significant effects on the European sites considered in this assessment in view of their conservation objectives.
4. It is possible to conclude that significant effects can be excluded at the screening stage.

It can be *excluded*, on the basis of objective information, that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site.

An appropriate assessment is not, therefore, required.

A final determination will be made by the consenting authority in this regard.

9.0 AIR QUALITY & CLIMATE

9.1 INTRODUCTION

This chapter evaluates the impacts which the Proposed Development may have on Air Quality & Climate as defined in the EPA EIA Report Guidelines 2022.

This chapter has been prepared having regard to the following legislation and guidelines:

- EPA 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (2022)
- EPA Draft 'Advice Notes for Preparing Environmental Impact Statements' (2015)
- EPA 'Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)' (2020)
- Institute of Environmental Management and Assessment (IEMA) guidance note on "Assessing Greenhouse Gas Emissions and Evaluating their Significance" (2022)
- Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013
- Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021)
- Climate Action Plan 2021 (Government of Ireland 2021)
- Fingal Climate Action Plan (FCC and Codema, 2019)

The Proposed Development involves the construction of three new data centre buildings (referred to herein as Buildings E, F, and G) along with associated structures and emergency generators, parking and vehicular routes, landscaping, and associated development on a site located at Cruiserath Road, Dublin 15. Impacts to air quality and climate have been assessed for both the construction and operational phases of the Proposed Development. Construction phase impacts primarily related to construction dust emissions and vehicle exhaust emissions. In terms of the operational phase a detailed air dispersion modelling assessment of emissions associated with the standby diesel generators for the site has been conducted to determine the impact to air quality. The impact to climate has focussed on the indirect greenhouse gas (GHG) emissions as a result of the electricity generated to operate the Proposed Development. In addition, the vulnerability of the project to future climate change has also been considered within this assessment. A cumulative assessment of the Proposed Development and the full masterplan development for the site (which includes the Permitted Developments Building A (ABP Reg. Ref.: PL06F.248544 / FCC Reg. Ref.: FW17A/0025) and Building B and C (Reg. Ref.: FW19A/0087) and any other relevant developments within the vicinity of the site has also been conducted as per the requirements of the EPA EIA Report Guidelines 2022. A Gas Insulated Switchgear (GIS) building (Building D) with associated electrical infrastructure (permitted under ABP ref. VA06F.306834) is located at the southern portion of the Proposed Development site although there are no air emissions associated with this building. The results of the assessment are outlined within Section 9.5 and Section 9.7.

In relation to the Proposed Development, Building F and Building G will each have 18 back-up generators and associated stacks which will have a minimum height of 25m above ground level. In addition, Building F and Building G will each have one house generator at a stack height of 4.6m. Building E will have one back-up generator and

associated 16m stack. The Permitted Development (Building A, Building B and Building C), each have 22 back-up generators with a minimum stack height of 20m above ground level. Building B and Building C each have a 1 no. house generator with associated stack at a height of 4.6m. In total, the air dispersion modelling has assumed that there will be 107 back-up diesel generators at the site upon completion of the Proposed Development. Four existing emission points in the neighbouring Bristol Myers Squibb (BMS) facility and four emission points in the neighbouring Alexion Pharma International facility were also included in the air dispersion model to allow for cumulative impacts to be assessed (see Section 9.2.3.1 for further details).

9.2 METHODOLOGY

9.2.1 Criteria for Rating of Impacts

9.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, the Department of the Environment, Climate and Communications in Ireland and the European Parliament and Council of the European Union have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 9.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which give effect to European Commission Directive 2008/50/EC which has set limit values for a number of pollutants. The limit values in relation to NO_2, PM_{10}, and $PM_{2.5}$ are relevant to this assessment as these will be emitted as a result of the construction or operational phases of the Proposed Development. Council Directive 2008/50/EC replaces the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and also includes ambient limit values relating to $PM_{2.5}$.

Pollutant	Regulation [Note 1]	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3 NO_2
		Annual limit for protection of human health	40 µg/m^3 NO_2
		Critical limit for protection of vegetation	30 µg/m^3 NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
$PM_{2.5}$	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Table 9.1 Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

9.2.1.2 Dust Deposition Guidelines

The concern from a health perspective in relation to dust emissions is focused on particles of dust which are less than 10 microns and the EU ambient air quality standards outlined in section 9.2.1.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day) averaged over a one year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled 'Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006). The document recommends that the TA Luft limit of 350 mg/(m^2*day) be applied to the site boundary of quarries. This limit value will be implemented with regard to dust impacts from construction of the Proposed Development.

9.2.1.3 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% below 2005 levels), 65 kt for NO_X (49% reduction), 43 kt for VOCs (25% reduction), 108 kt for NH_3 (1% reduction) and 10 kt for $PM_{2.5}$ (18% reduction).

The National Emissions Ceiling Directive 2016/2284/EU (NECD) which repealed European Commission Directive 2001/81/EC, prescribes the same emission limits as the 1999 Gothenburg Protocol. A National EPA Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005. The data available from the EPA in 2021 indicated that Ireland complied with the emissions ceiling for sulphur dioxide (SO_2) in recent years but failed to comply with the ceilings for ammonia (NH_3), nitrogen oxides (NO_X) and non-methane volatile organic compounds (NMVOCs). Directive (EU) 2016/2284 "*On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC*" was published in December 2016. The Directive applied the 2010 NECD limits until 2020 and established new national emission reduction commitments which in the first instance have applied since 2020 and with more stringent limit values applying from 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020-29 emission targets set out under Directive 2016/2284/EU are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets as set out under Directive 2016/2284/EU, are 10.9 kt (85% below 2005 levels) for SO_2, 40.7 kt (69% reduction) for NO_X, 51.6 kt (32% reduction) for NMVOCs, 107.5 kt (5% reduction) for NH_3 and 11.2 kt (41% reduction) for $PM_{2.5}$.

9.2.1.4 Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013* (the Regulation or Effort Sharing Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

Following on from the recently published European Climate Law (EU, 2021), and as part of the EU's "*Fit for 55*" legislative package where the EU committed to a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 levels by 2020, the Effort Sharing Regulation (2018/842/EU) is proposed to be strengthened with increased ambition by the year 2030. The proposal for Ireland is to increase the GHG emission reduction target from 30% to 42% relative to 2005 levels whilst the ETS market will also have more stringent reductions from the currently proposed reduction of 43% by 2030 compared to 2005 to a 61% reduction by 2030 based on annual reductions of 4.2% compared to the previous annual reduction level of 2.2% per year

(EU, 2021). In terms of the current operation of the ETS, the European Commission reported that the ETS Carbon Market reported a fall of 9% in emissions in 2019 relative to 2018 levels to 1,385 Mtonnes (Million Tonnes) CO_{2eq}. In 2020 there was a significant drop to 1,224 Mtonnes CO_{2eq} due to the impact of COVID rising again to 1,308 Mtonnes CO_{2eq} in 2021 which is a 5.5% reduction compared to 2019 levels.

The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing, heavy industry and facilities which have greater than 20MW thermal input capacity (which is applicable to the Proposed Development). Under the ETS scheme, there are no country-specific targets; the scheme works on a "cap and trade" principle where a limit (the cap) is placed on the right to emit specified pollutants (GHGs) over a geographic area and companies can trade emission rights within that area. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture. In contrast to the ETS scheme, Ireland has a country-specific obligation under the Regulation of a 42% reduction in non-ETS GHG emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the 2015 Act). The purpose of the Act was to enable Ireland 'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050' (3.(1) of No. 46 of the 2015 Act). This is referred to in the 2015 Act as the 'national transition objective'. The key duty imposed on planning authorities by Section 15 of the 2015 Act (as amended) is outlined below.

1) A relevant body (eg, a planning authority) shall, in so far as practicable, perform its functions in a manner consistent with -
(a) the most recent approved climate action plan,
(b) the most recent approved national long term climate action strategy,
(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,
(d) the furtherance of the national climate objective, and
(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.

The impact of the Proposed Development has been assessed in relation to the above and is outlined within this Chapter.

The 2019 *Climate Action Plan* (CAP) (Government of Ireland, 2019), published in June 2019, outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The 2019 CAP set a built environment sector reduction target of 40 - 45% relative to 2030 pre-NDP (National Development Plan) projections.

In June 2020, the Government published the Programme for Government – Our Shared Future (Government of Ireland 2020). In relation to climate, there is a commitment to an average 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 (51% reduction over the decade) with an ultimate aim to achieve net zero emissions by 2050. Policy changes include the acceleration of the electrification of the transport system, including electric bikes, electric vehicles and

electric public transport, alongside a ban on new registrations of petrol and diesel cars from 2030. In addition, there is a policy to ensure an unprecedented model shift in all areas by a reorientation of investment to walking, cycling and public transport.

The Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) was published in July 2021 and amends the 2015 Climate Act. The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*'. The 2021 Climate Act will also '*provide for carbon budgets and a sectoral emissions ceiling to apply to different sectors of the economy*'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority. The 2021 Climate Act has set a target of a 51% reduction in the total amount of greenhouse gases over the course of the first two carbon periods ending 31 December 2030 relative to 2018 annual emissions. The 2021 Climate Act defines the carbon budget as 'the total amount of greenhouse gas emissions that are permitted during the budget period'

The Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) outlines a series of specific actions including:

- To make a strategy to be known as the 'National Long Term Climate Strategy' not less than once in every five-year period with the first to be published for the period 2021 to 2035 and with each subsequent Strategy covering the next three five-year carbon budgets and also include a longer term perspective of at least 30 years;
- To adopt a system of carbon budgets which will be determined as part of a grouping of three five-year periods calculated on an economy-wide basis, starting with the periods 2021 to 2025, 2026 to 2030, and 2031 to 2035;
- To introduce a requirement for Government to adopt "sectoral emission ceilings" for each relevant sector within the limits of each carbon budget;
- To request all local authorities to prepare climate action plans for the purpose of contributing to the national climate objective. These plans should contain mitigation and adaptation measures that the local authority intends to adopt;
- Increasing the power of the Advisory Council to recommend the appropriate climate budget and policies;
- Requiring the Minister to set out a roadmap of actions to include sector specific actions that are required to comply with the carbon budget and sectoral emissions ceiling for the period to which the plan relates; and
- Reporting progress with the CAP on an annual basis with progress including policies, mitigation measures and adaptation measures that have been adopted.

In terms of wider energy policy, as outlined in the EPA publication "*Ireland's Greenhouse Gas Projections 2021-2040*" (EPA, 2022) under the *With Additional Measures* scenario, emissions from the energy industries sector are projected to decrease by 48.9% to 4.5 Mt CO_{2eq} over the period 2020 to 2030 including the proposed increase in renewable energy generation to approximately 80% of electricity consumption:

- In this scenario it is estimated that renewable energy generation increases to approximately 80% of electricity consumption. This is mainly a result of further expansion in wind energy (comprising 5.0 GW offshore). Expansion of other renewables (e.g. solar photovoltaics) also occurs under this scenario.
- Under the With Additional Measures, one power station operates to the end of 2023 with 30% co-firing.
- In this scenario the Moneypoint power station is assumed to operate in the market up to end 2025 at which point it no longer generates electricity from coal.
- In terms of inter-connection, it is assumed that the Greenlink 500MW interconnector to the UK will come on stream in 2025 and the Celtic 700MW interconnector to France to come on stream in 2026 (Department of the Environment, Climate and Communications, November 2022).

The 2021 *Climate Action Plan* (CAP) (Government of Ireland, 2021) provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting us on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021. The plan outlines the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. CAP 2021 also detailed the required governance arrangements for implementation including carbon-proofing of policies and establishment of sectoral emission ceilings and carbon budgets. In relation to data centres, the *CAP 2021* provides that emissions from industry sectors covered by the ETS are subject to EU-wide rather than national targets set out under EU Effort Sharing Regulation 2018/842. Box 2.1 states:

> *"emissions from electricity generation and large industry in the ETS are subject to EU-wide targets which require that emissions from these sectors be reduced by 43% by 2030, relative to 2005 levels".*

As part of the preparation of a 'local authority climate action plan', each local authority shall consult and co-operate with an adjoining local authority in making a local authority climate action plan and co-ordinate the mitigation measures and adaptation measures to be adopted, where appropriate. Each local authority is also required to consider any significant effects the implementation of the local authority climate action plan may have on the adjoining local authority.

Individual county councils in Ireland have also published their own Climate Change Strategies which outline the specific climate objectives for that local authority and associated actions to achieve the objectives. The Fingal Climate Action Plan (FCC and Codema, 2019) outlines a number of goals and plans to prepare for and adapt to climate change. There are five key action areas within the FCC Climate Action Plan: energy and buildings, transport, flood resilience, nature-based solutions and resource management.

Climate Criteria For The Rating Of Impacts

The Institute of Environmental Management and Assessment (IEMA) has published a guidance note entitled "*Assessing Greenhouse Gas Emissions and Evaluating their Significance*" (IEMA, 2022). The IEMA guidance states that "*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*". Mitigation has taken a leading role within the Guidance compared to

the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings.

The assessment aims to quantify the difference in GHG emissions between the proposed project and the baseline scenario (the existing development (Do Nothing scenario) or alternative project/solution instead of the proposed project). This is done by calculating the difference in whole life net GHG emissions between the two options. The IEMA EIA guidance (IEMA, 2022) does not recommend a particular approach for this due to variations of situations but instead it sets out advice for the key common components necessary for undertaking a GHG emissions assessment as set out in steps 1 – 6 below. During the assessment IMEA recommend use of a reasonable worst-case scenario rather than an absolute worst-case scenario. The IMEA Guidance (IEMA, 2022) states that a GHG emissions assessment should incorporate the following steps into any climate assessment:

1. Set the scope and boundaries of the GHG assessment;
2. Develop the baseline;
3. Decide upon the emissions calculation methodologies;
4. Data collection;
5. Calculate/determine the GHG emissions inventory; and
6. Consider mitigation opportunities and repeat steps 4 & 5.

Activities that do not significantly change the result of the assessment can be excluded where expected emissions are less than 1% of total emissions, and where all such exclusions should be clearly stated and total a maximum of 5% of total emissions.

When considering the cumulative assessment, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other. The following sections 9.2.2.2 and 9.2.3.2 detail the specific appraisal methods utilised in order to complete the assessment in accordance with the IEMA Guidance (IEMA, 2022).

9.2.2 Construction Phase

As mentioned in Section 9.1 the Proposed Development is part of an overall masterplan development for the site. There are currently 3 no. permitted data centre buildings on site, Building A (ABP Reg. Ref.: PL06F.248544 / FCC Reg. Ref.: FW17A/0025) and Buildings B and C (FCC Reg. Ref.: FW19A/0087). Building A is constructed and fully operational, Building B and Building C are currently under construction. The Permitted Development (Building B and Building C) and Proposed Development (Buildings E, F and G) at the site will be constructed on a phased basis and it is unlikely that more than two data centre buildings would ever be under construction concurrently. Where two data centre buildings are under construction concurrently, due to the phased nature of the works, one of the buildings would be at the super-structure stage of construction which has a lower potential for fugitive dust emissions whilst the other would be in the earlier stages of construction which are more likely to give rise to fugitive dust. For the purpose of the qualitative air quality assessment of the construction phase, the combined impact of concurrent construction of two data centre buildings at any one time at the site has been assumed.

9.2.2.1 Air Quality

The current assessment thus focused firstly on identifying the existing baseline levels

of NO_2, PM_{10} and $PM_{2.5}$ in the region of the Proposed Development by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase of the development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the Proposed Development. The construction phase activities were reviewed with reference to the UK Institute of Air Quality Management (IAQM) guidance document entitled "*Guidance on the Assessment of Dust from Demolition and Construction*" (IAQM, 2014). The use of UK guidance is considered best practice in the absence of applicable Irish guidance. The IAQM guidance (2014) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. This construction phase of the Proposed Development has been assessed in the context of this methodology.

9.2.2.2 Climate

Ireland has annual GHG targets which are set at an EU level and need to be complied with in order to reduce the impact of climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013*, which has set a target of 30% reduction in non-ETS sector GHG emissions by 2030 relative to 2005 levels.

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established with reference to EPA data on annual GHG emissions (see Section 9.3.2). The impact of the Proposed Development on climate is determined in relation to this baseline.

The impact of the construction phase of the development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the Proposed Development. The construction stage activities such as land-clearance, earthworks, building construction works and vehicle and machinery exhaust emissions were reviewed and considered against the baseline of Ireland's National GHG emissions.

9.2.3 Operational Phase

9.2.3.1 Air Quality

Air dispersion modelling was carried out by AWN using the United States Environmental Protection Agency's regulated model AERMOD (Version 21112). AERMOD is recommended as an appropriate model for assessing the impact of air emissions from industrial facilities in the EPA Guidance document "Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)" (EPA, 2020).

The modelling of air emissions from the site was carried out to assess the concentrations of Nitrogen Dioxide (NO_2) beyond the site boundary and the consequent impact on human health.

The assessment was undertaken in order to quantify the impact of the Proposed Development (Building E, Building F and Building G), Permitted Developments (Building A, Building B and Building C) and the existing baseline level of pollutants on ambient air quality concentrations. The assessment also included NO_2 emissions from the licenced emission points at the IE licenced facilities of Bristol Myers Squibb (BMS)

(IE Licence No. P0552-03) and Alexion Pharma International (IE Licence No. P1030-01). BMS is directly adjacent to the east of the Proposed Development site and Alexion is located approximately 50m to the south-east of the Proposed Development. As both the BMS and Alexion facilities are within 1km of the Proposed Development and also have emissions of NO_2 there is the potential for cumulative impact in relation to air emissions therefore they have been included within the modelling assessment. In addition to the assessment of the Proposed Development and the existing Permitted Developments and neighbouring BMS and Alexion facilities, a further cumulative scenario has been modelled to assess the combined impact from the Proposed Development and the back-up diesel generators associated with a potential future data centre building to the north of Building G (see Section 9.8.2).

To obtain all the meteorological information required for use in the model, data collected during 2017 - 2021 from Dublin Airport has been incorporated into the modelling. The air dispersion modelling input data consisted of information on the physical environment, design details for all emission points on-site (generator emission points) and five full years of meteorological data. Using this input data, the model predicted ambient concentrations beyond the site boundary for each hour of the meteorological year. This study adopted an approach which will lead to an over-estimation of the actual levels that will arise (see *Process Emissions* below for further detail).

AERMOD is a "new-generation" steady-state Gaussian plume model used to assess pollutant concentrations associated with industrial sources (see Appendix 9.1 for further details). The model is an enhancement of the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources. Fundamentally, the model has made significant advances in simulating the dispersion process in the boundary layer. This will lead to a more accurate reflection of real-world processes and thus considerably enhance the reliability and accuracy of the model particularly under those scenarios which give rise to the highest ambient concentrations (see Appendix 9.1).

Due to the proximity to surrounding buildings, the PRIME Building Downwash Program (BPIP Prime) has been incorporated into the model to determine the influence (wake effects) of these buildings on dispersion in each direction considered.

The AERMOD model incorporated the following features:

A receptor grid and discrete receptors were identified at which concentrations would be modelled. Receptors were mapped with sufficient resolution to ensure all localised "hot-spots" were identified without adding unduly to processing time. The receptor grids was based on a Cartesian grid with the site at the centre. The outer grid measured 10 x 10 km with the site at the centre and with concentrations calculated at 200m intervals. The inner grid measured 4 x 4 km with the site at the centre and with concentrations calculated at 50m intervals. Boundary receptor locations were also placed along the boundary of the site, at 25m intervals, giving a total of 9,424 calculation points for the model. The impact of the back-up diesel generators was also measured at nearby residential receptors which were added to the model as discrete receptors.

All on-site buildings and significant process structures were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling.

Hourly-sequenced meteorological information has been used in the model covering the years 2017 – 2021 from Dublin Airport as shown in Figure 9.1. AERMOD incorporates a meteorological pre-processor AERMET which allows AERMOD to account for changes in the plume behaviour with height using information on the surface characteristics of the site. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convective boundary layer (CBL) height, stable boundary layer (SBL) height, and surface heat flux (see Appendix 9.2).

Terrain has been mapped out in the model as using SRTM (Shuttle Radar Topography Mission) data with 30m resolution. All terrain features have been mapped in detail into the model using the terrain pre-processor AERMAP which is incorporated into the AERMOD model and was used to map the physical environment over the receptor grid.

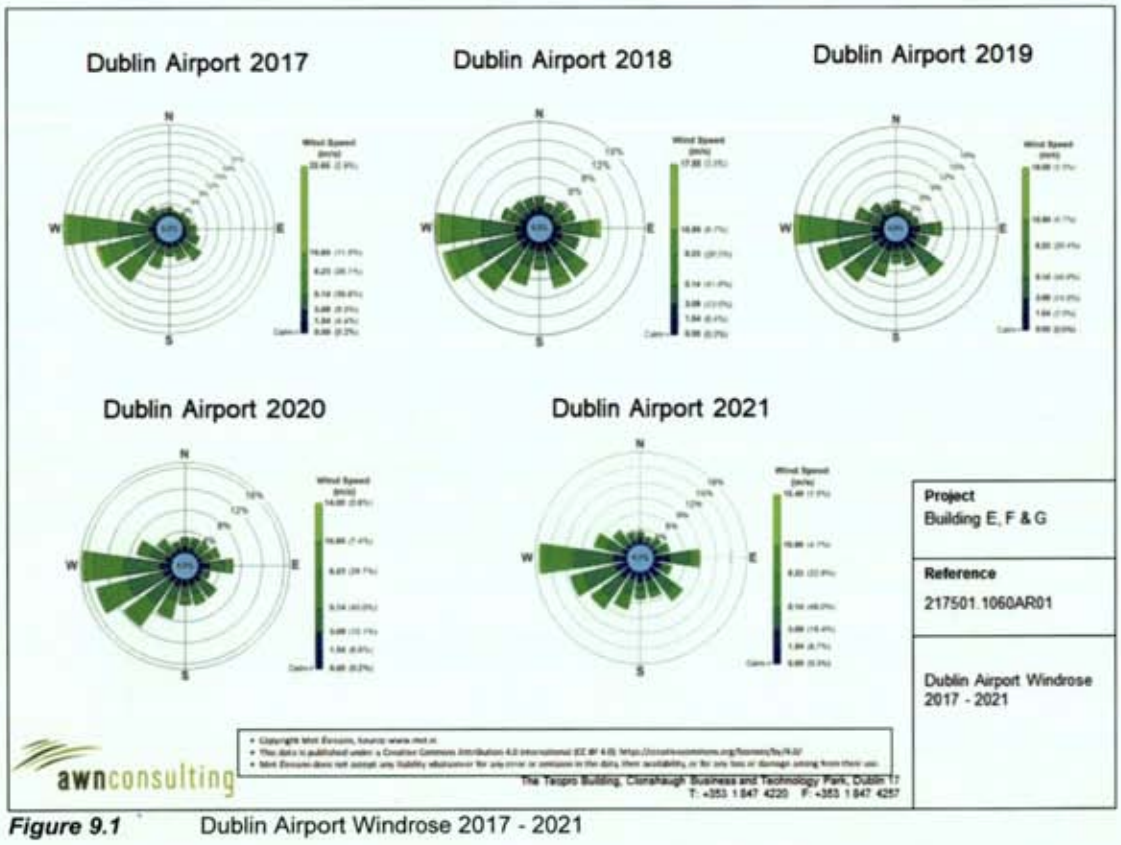

Figure 9.1 Dublin Airport Windrose 2017 - 2021

Process Emissions

In relation to the Proposed Development, Building F and Building G will each have 18 back-up generators with associated stacks which will have a minimum height of 25m above ground level. Each Building F and Building G will also have one house generator at a stack height of 4.6m. Building E will have one back-up generator and associated 16m stack. The Permitted Development (Building A, Building B and Building C) will each have 22 back-up generators with a minimum stack height of 20m above ground level with Building B and Building C also having 1 no. house generator each with an associated 4.6m stack. In total, the air dispersion modelling has assumed that there will be 107 back-up diesel generators at the site upon completion of the Proposed Development including the Permitted Developments. Four existing emission points in the neighbouring facility at BMS and four existing emission points in the nearby Alexion facility were also included in the air dispersion model.

For the purpose of this assessment, two of the back-up generators in Buildings F and G have been modelled as "catcher" generators in addition to two catchers each in Buildings A, B and C to provide redundancy for the other back-up generators should one fail i.e. 97 of the 107 back-up generators are assumed to be running simultaneously in the event of a power failure to the site.

The scenario modelled for this assessment includes the following types of testing of the back-up generators:

- batch testing once per week of all 107 back-up generators on site at 25% load for a maximum of 30 minutes each, one generator at a time, sequentially;
- maintenance testing four times per year of all 107 back-up generators on site at 90% load, for one full hour, one generator at a time, during every three months (assumed to be January, April, July and October for the purpose of this assessment); and
- all testing is assumed to only occur between 8am and 5pm, Monday to Friday.

The modelling has considered testing of the back-up generators once per week as a conservative approach, however, in reality, testing will occur every two weeks at a very low load. Thus, the approach used in this study will lead to an over-estimation of the actual levels that will arise.

USEPA Guidance suggests that for emergency operations, an average hourly emission rate should be used rather than the maximum hourly rate (USEPA, 2011). For modelling purposes only, a figure of 72 hours in total per year of operation has been applied to the Proposed Development. As a result, the maximum hourly emission rates from the back-up generators associated with Buildings E, F and G were reduced by a factor of (72/8760) to give an average hourly emission rate (in line with USEPA protocol) and the generators were modelled over a period of one full year.

A second methodology for modelling back-up generators has been published by the UK Environment Agency. The consultation document is entitled "Diesel Generator Short-Term NO_2 Impact Assessment" (UK EA, 2016). The methodology is based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value (18 exceedances are allowable per year before the air standard is deemed to have been exceeded). The assessment assumes a hypergeometric distribution to assess the likelihood of exceedance hours coinciding with the operational hours of the back-up generators. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined. The guidance suggests that the 95th percentile confidence level should be used to indicate if an exceedance is

likely. More recent guidance (UK EA, 2019) has recommended this probability should be multiplied by a factor of 2.5 and therefore, the 98th percentile confidence level should be used to indicate if an exceedance is likely. The guidance suggests that the assessment should be conducted at the nearest residential receptor or at locations where people are likely to be exposed and that there should be no running time restrictions on these generators when providing power on site during an emergency.

Both the methodology advised in the USEPA guidance as well as the approach described in the UK EA guidance have been applied in this study to ensure a robust assessment of predicted air quality impacts from the back-up generators. The methodology for converting NO_X to NO_2 was based on the ozone limiting method (OLM) approach based on an initial NO_2/NO_X ratio of 0.1 and a background ozone level of 55 $\mu g/m^3$ based on a review of EPA data for similar Zone A locations[1].

As outlined in Section 2.2.6.6, the Operator has recently signed a supply agreement for renewable diesel (also referred to as hydrotreated vegetable oil or HVO). Subject to availability, it is expected that fuel for the proposed development will be renewable diesel. Renewable diesel is considered a 'drop-in' replacement fuel and can be blended with fossil diesel at any ratio up to, and including, 100%. Generator vendors have advised that their standard generator emissions datasheets will not be updated and as such we have modelled Air Quality using fossil fuel (diesel) below. Renewable diesel is considered to have significantly lower emissions by the Greenhouse Gas Protocol, as plants used as feedstocks for bio-based fuels absorb CO_2 as they grow. The absorption of CO_2 by these plants offsets the CO_2 produced during combustion. By way of example, fossil fuel derived diesel has total lifecycle emissions of approximately 94 gCO_2e/MJ while renewable diesel using waste cooking oil as a feedstock can be as low as 5.6 gCO_2e/MJ. Thus, the GHG emissions associated with the running of the backup generators will be significantly lower than generators using fossil fuel derived diesel.

The modelling was undertaken to assess the impact to ambient air quality from the following three emergency operations scenarios. The generators that will be installed for the Proposed Development (Buildings E, F and G) will be procured from a small pool of 2-3 vendors. The process emission data used in the air dispersion model is representative of the range of emission data for these generator options and thus the air dispersion modelling undertaken is representative of the generators that will be installed.

- **Do Nothing Scenario:** This comprises the Permitted Development (Building A, Building B and Building C) and the existing eight emissions points at the neighbouring BMS and Alexion facilities and involved the emergency operation of 60 of the 66 diesel generators (the remaining six generators serving as "catcher" generators) for Buildings A, B and C in addition to a house generator in both Building B and Building C. The scenario also included weekly testing and load-banking four times per year of all existing generators associated with Buildings A, B and C. The process emissions used for Buildings A, B and C for the Do Nothing Scenario are outlined in Table 9.2;

- **Proposed Development Scenario:** This comprises the emission points described in the "Do Nothing" Scenario above as well as emission points associated with the Proposed Development (Buildings E, F and G) and involved the emergency operation of 97 of the 107 diesel generators (the remaining ten generators serving as "catcher" generators for Buildings A, B,

[1] Zone A is defined as Dublin and its environs under Directive 1996/62/EC (as amended), monitoring stations established by the local authorities and EPA are available to view on the EPA website www.airquality.ie

C,, F and G) which also includes a house generator in Buildings B, C, F and G. The scenario also included weekly testing and load-banking twice per year of all 107 generators. The process emissions used for the Proposed Development Scenario are outlined in Table 9.2; and

- **Cumulative Impact Scenario:** The cumulative impact scenario assessed the combined impact of the Proposed Development as outlined above, including emissions associated with the BMS and Alexion IE licenced facilities, as well as the emergency operation of 16 back-up diesel generators with two catcher generators associated with an indicative future data centre building to the north of the Building G (see Section 9.8.2).

The back-up generators will be registered with the EPA as required in line with recent legislation in relation to the Medium Combustion Plant Directive (2015/2193). However, the generators are exempt from complying with the emission limit values set out in the Directive, as they will not operate for more than 500 hours per annum (see Chapter 1, Section 1.5).

Stack Reference	Height Above Ground Level (m)	Exit Diameter (m)	Cross-Sectional Area (m^2)	Temp (K)	Volume Flow (Nm3/hr at 15% Ref. O_2)	Exit Velocity (m/sec actual)	NO_x	
							Concentration (mg/Nm^3 at 15% Ref. O_2)	Mass Emission (g/s)
Emergency Operation and Load-banking of Back-up Diesel Generators in Buildings A, B and C (90% load)	20.0	0.5	0.20	739.2	20,383	43.4	776	0.033 Note 1 / 4.04 Note 2
Testing of Diesel Generators (25% load) in Buildings A, B and C	20.0	0.5	0.20	655.2	8,300	17.9	600	0.692 Note 3
Emergency Operation and Load-banking of Back-up Diesel Generators in Buildings E, F and G (90% load)	25.0 m in Building F & G 16m in Building E	0.6	0.28	713.3	21,115	35.7	790	0.038 Note 1 / 4.63 Note 2
Testing of Diesel Generators (25% load) in Buildings E, F and G	25.0 m in Building F & G 16m in Building E	0.6	0.28	651.7	6,642	13.4	520	0.978 Note 3

Note 1 Reduced emission rates based on USEPA protocol (assuming 72 hours / annum) used to model emissions during emergency operation of generators (90% load)

Note 2 Maximum emission rates for diesel generators (based on 90% load) used to model emissions during emergency operation of generators for UK EA assessment methodology and for load-banking for USEPA assessment methodology

Note 3 Emission rates used to model emissions during scheduled testing at 25% load conducted once per week for 30 minutes.

Table 9.2 Summary of Process Emission Information for all Buildings associated with the Permitted and Proposed Development

9.2.3.2 Climate & Transboundary Pollution

The back-up diesel generators modelled for the purpose of this assessment will only be used in the event of a power failure at the site apart from the scheduled maintenance and testing activities as previously outlined in this chapter. During normal operations at the facility, the electricity will be supplied from the national grid so there will be no direct emissions of CO_2 or transboundary pollutants from the site.

When assessing significance, the 2010 IEMA Principles Series on Climate Change Mitigation & EIA (IEMA, 2010) defines three overarching principles:

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect;
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g. human health, biodiversity, water, land use, air quality); and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit; as such any GHG emissions or reductions from a project might be considered to be significant. The environmental limit is the national global GHG emission budget that defines a level of dangerous climate change, and any GHG emission that contributes to exceedance of that budget or threatens efforts to stay within it can be considered as significant.

The 2020 Guidance (IEMA, 2022) document builds on those principles with three points:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors (i.e. Ireland's National GHG targets). In relation to climate, there is no project specific assessment criteria, but the project will be assessed against the recommended IEMA (IEMA, 2022) significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

- Major or moderate adverse impact (significant): A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the

net zero[2] trajectory by 2050 or sectoral based transition to net zero targets, results in a significant adverse effect. It is down to the consultant completing the assessment to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects. A project's impact can shift from significant adverse to nonsignificant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero. Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect. This is particularly true where policy lags behind the necessary levels of GHG emission reductions for a science based 1.5°C compatible trajectory towards net zero.

- Minor adverse impact (not significant): A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral[3] (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.

- Negligible Impact (not significant): A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.

- Beneficial Impact (significant): A project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is significant. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.

The impact of the operational phase of the Proposed Development on climate was determined by an assessment of the indirect CO_2 emissions associated with the electricity supplied from the national grid. The impacts have been considered in relation to the above guidance (IEMA, 2022). The details and results of the assessment are provided in section 9.7.2.3.

[2] Net Zero: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.*" Net zero is achieved where emissions are first educed in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

[3] Carbon Neutral: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required.*"

9.3 RECEIVING ENVIRONMENT

9.3.1 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality in Ireland 2021" (EPA 2022) details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC) (and amended under Directive 2008/50/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes as outlined within the EPA document titled 'Air Quality in Ireland 2021' (EPA 2022). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D. In terms of air monitoring, the Proposed Development is within Zone A as explained with the EPA document titled 'Air Quality Monitoring in Ireland 2021' (EPA, 2022).

In 2020 the EPA reported that Ireland was compliant with EU legal air quality limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions (EPA, 2021). The EPA report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have been included in the baseline section for representative purposes only and previous long-term data has been used to determine the baseline air quality in the region of the site.

9.3.1.1 NO_2

With regard to NO_2, continuous monitoring data from the EPA (EPA 2022), at suburban Zone A background locations in Rathmines, Dun Laoghaire, Swords and Ballyfermot show that levels of NO_2 are below both the annual and 1-hour limit values (see Table 9.3), with annual average levels ranging from 11 - 22 µg/m^3 over the period –2017 - 2021 (see Table 9.3). The station at Swords is approximately 6 km north of the facility and is the closest monitoring station to the Proposed Development and therefore provides a suitable indication of background NO_2 concentrations in the area of the Proposed Development. Annual average results at the Swords site range from 11 – 16 µg/m^3 over the five year period, with an average of 14.0 µg/m^3 (EPA, 2022). Based on these results, an estimate of the background NO_2 concentration in the region of the Proposed Development is 15 µg/m^3.

For the air dispersion modelling assessment (Section 9.7.2.1) the modelled result (process concentration) is combined with the background pollutant concentration and then assessed against the ambient air quality standards outlined in Table 9.1. Both annual average and hourly concentrations of NO_2 are assessed. In relation to the annual average background, the ambient background concentration of 15 µg/m^3 was added directly to the process concentration with the short-term peaks (hourly) assumed to have an ambient background concentration of twice the annual mean background concentration (30 µg/m^3) (see Section 9.7.2.1).

Station	Station Classification Council Directive 96/62/EC	Averaging Period	Year				
			2017	2018	2019	2020	2021
Rathmines	Urban Background	Annual Mean NO_2 ($\mu g/m^3$)	17	20	22	13	14
		99.8th%ile 1-hr NO_2 ($\mu g/m^3$)	86	87	102	81	69
Ballyfermot	Suburban Background	Annual Mean NO_2 ($\mu g/m^3$)	17	17	20	12	13
		99.8th%ile 1-hr NO_2 ($\mu g/m^3$)	112	101	101	83	73
Dun Laoghaire	Suburban Background	Annual Mean NO_2 ($\mu g/m^3$)	17	19	15	14	16
		99.8th%ile 1-hr NO_2 ($\mu g/m^3$)	101	91	91	78	73
Swords	Suburban Background	Annual Mean NO_2 ($\mu g/m^3$)	14	16	15	11	11
		99.8th%ile 1-hr NO_2 ($\mu g/m^3$)	79	85	80	65	63

Source: EPA (2021) 'Air Quality in Ireland 2021'
Note 1 Data for 2020 included for representative purposes only, not used in determining background concentrations.
Table 9.3 Trends In Suburban Dublin (Zone A) Air Quality - Nitrogen Dioxide ($\mu g/m^3$)

9.3.1.2 PM_{10}

Continuous PM_{10} monitoring carried out at the suburban background locations of Ballyfermot, Dun Laoghaire and Tallaght showed annual mean concentrations ranging from 10 – 16 $\mu g/m^3$ over the period 2017 – 2021, with a maximum of 7 exceedances of the daily limit value of 50 $\mu g/m^3$ (35 exceedances are permitted per year in accordance with the *Air Quality Standards Regulations 2011* outlined in section 9.2.1.1 of this EIAR) (see Table 9.4). PM_{10} results from the urban background location in the Phoenix Park, which is 5km south-east of the facility, show similarly low levels over the period of 2017 - 2021 with concentrations ranging from 9 – 11 $\mu g/m^3$. Based on these results, an appropriate estimate of the background PM_{10} concentration in the region of the Proposed Development is 14 $\mu g/m^3$.

Station	Station Classification Council Directive 96/62/EC	Averaging Period	Year				
			2017	2018	2019	2020	2021
Ballyfermot	Suburban Background	Annual Mean PM_{10} (µg/m³)	12	16	14	12	12
		24-hr Mean > 50 µg/m³ (days)	1	0	7	2	0
Dún Laoghaire	Suburban Background	Annual Mean PM_{10} (µg/m³)	12	13	12	12	11
		24-hr Mean > 50 µg/m³ (days)	2	0	2	0	0
Tallaght	Suburban Background	Annual Mean PM_{10} (µg/m³)	12	15	12	10	10
		24-hr Mean > 50 µg/m³ (days)	2	1	3	0	0
Phoenix Park	Urban Background	Annual Mean PM_{10} (µg/m³)	9	11	11	10	10
		24-hr Mean > 50 µg/m³ (days)	1	0	2	0	0

Source: EPA (2021) 'Air Quality Monitoring Report 2020'

Table 9.4 Trends In Suburban Dublin (Zone A) Air Quality – PM_{10} (µg/m³)

9.3.1.3 $PM_{2.5}$

Continuous $PM_{2.5}$ monitoring carried out at the Zone A location of Rathmines, which is 12km south-east of the facility, showed an average concentration ranging from 9 - 10 µg/m³ over the period 2017 – 2021. Based on this information, the ratio of $PM_{2.5}$ to PM_{10} is estimated to be in the region of 0.60 with a representative background concentration of 10 µg/m³ estimated for the region of the Proposed Development.

9.3.2 Climate Baseline

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details provisional emissions up to 2020 (EPA, 2022). The data published in 2020 states that Ireland exceeded its 2020 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1. Ireland's annual limit for 2020 is 37.65 Mt CO_{2eq}. Ireland's final 2020 greenhouse gas ESD emissions are 44.40 Mt CO_{2eq}, 6.75 Mt CO_{2eq} more than the annual limit for 2020. Agriculture is the largest contributor in 2020 at 37.1% of the total, with the transport sector accounting for 17.8% of emissions of CO_2.

The EPA 2021 GHG Emissions Projections Report for 2021 – 2040 (EPA, 2021b) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the Climate Action Plan published in 2021. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. In the agricultural sector under the *"additional measures scenario"* emissions are projected to decrease to approximately 17.8 Mt CO_{2eq} by 2030 which is a 20.3% reduction over the period 2020-2030 based on a range of measures including nitrogen use efficiency, use of protected urea products and low emission slurry spreading. Overall, over the period 2021 to 2030 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Regulations (Regulation (EU) 2018/842) 2030 targets by approximately 52.3MtCO_2eq under the "*With Existing Measures*" scenario. However, the projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full

implementation of the Climate Action Plan and the use of the flexibilities available (EPA, 2021b).

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

9.4.1 Construction Phase

The Proposed Development involves the construction of three new data centre buildings (referred to herein as Buildings E, F and G) along with associated structures and emergency generators, parking and vehicular routes, landscaping, and associated development on a site located at Cruiserath Road, Dublin 15. A full description of the development can be found in Chapter 2 – Description of the Proposed Development. The key civil engineering works which will have a potential impact on air quality and climate during construction are summarised below:

(i) During construction, an amount of soil will be generated as part of the site preparation works and during excavation for installation of foundations, drainage services and ancillary infrastructure;

(ii) Following completion of the building shell, commissioning of the mechanical and electrical equipment is undertaken;

(iii) Landscaping will be undertaken. Spoil generated during site preparation will be re-used where possible;

(iv) Temporary storage of construction materials and fuels; and

(v) Construction traffic accessing the site will emit air pollutants and greenhouse gases during transport.

As outlined in Section 9.6, dust mitigation measures will be implemented on site during the construction phase. The measures outlined in Section 9.6.1 have been incorporated into the Outline Construction Environmental Management Plan (OCEMP) prepared in relation to the Proposed Development. The dust mitigation measures will ensure no dust nuisance occurs at nearby sensitive receptors, specifically the residential properties within housing estates to the west of the R121 and the 2 no. national schools along Powerstown Road.

9.4.2 Operational Phase

The key works which will have a potential impact on air quality and climate during operation of the Proposed Development are summarised below:

(i) The scheduled testing of the back-up diesel generators in the data storage facilities will release air pollutant emissions (primarily NO_x emissions);

(ii) The infrequent emergency operation of the back-up diesel generators for the data centres in the event of a power outage would release air pollutant emissions (primarily NO_x emissions);

(iii) Road traffic accessing the site will emit air pollutants and greenhouse gases. However, the operational phase of the Proposed Development is not expected to contribute a significant volume of additional traffic on the local road network (see Chapter 13). Therefore, no local air quality assessment of the traffic

impact is required for this development; and

(iv) The indirect impact of emissions from electricity to operate the data centres will have an impact on climate. These have been assessed in relation to Ireland's national emission ceiling limits for CO_2, NO_X, SO_2 and NMVOCs.

9.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

9.5.1 Construction Phase

9.5.1.1 Air Quality

The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions as a result of excavation works, infilling and landscaping activities and storage of soil in stockpiles. This leads to the potential for nuisance dust. As per the IAQM guidance (2014) while construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m due to the larger particles, which make up the majority of emissions from construction works, falling out of suspension in the air (IAQM, 2014). The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.

Fuels will be stored in sealed containers and emissions to air are likely to be minimal. Therefore, there is unlikely to be an impact to air quality as the result of the temporary storage of fuels for the construction phase.

Initial commissioning activities will involve testing of the back-up generators on site in a similar manner to the operational phase testing, i.e. the first testing sequence will be commissioning of the standby generators. The operational modelling has considered testing of the generators on a weekly and quarterly basis and this does not result in a significant impact to air quality (see Section 9.7.2.1). Therefore, it is predicted that the initial commissioning tests will result in an ***imperceptible*** impact to air quality in the ***short-term***.

It is important to note that the potential impacts associated with the construction phase of the Proposed Development are short-term in nature. When the dust minimisation measures detailed in the mitigation section (see Section 9.6) of this chapter are implemented, fugitive emissions of dust from the site will not be significant as they will be mitigated in so far as is possible and will pose no nuisance at nearby receptors.

9.5.1.2 Climate

Construction traffic would be expected to be the dominant source of greenhouse gas emissions as a result of the Proposed Development. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development. The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate.

The Proposed Development will be constructed on a phased basis with Building E being constructed first, followed by Building F and finally Building G. The construction phase for the entire development is estimated to take 5 years approximately (see

Chapter 2 for further detail). Construction works on one building will be nearing completion prior to works beginning on the next building. Due to the duration and nature of the construction activities, CO_2 and N_2O emissions from construction vehicles and machinery will have a ***short-term*** and ***imperceptible*** impact on climate.

9.5.2 Operational Phase

9.5.2.1 Air Quality

The potential impact to air quality during the operational phase of the Proposed Development is a breach of the ambient air quality standards as a result of air emissions from the back-up diesel generators. However, as outlined in Section 9.6, an iterative stack height determination was undertaken as part of the air dispersion modelling study to ensure that an adequate release height was selected for all emission points to aid dispersion of the plume and ensure compliance with the ambient air quality limit values at all locations beyond the site boundary.

9.5.2.2 Climate

The vulnerability of the Proposed Development to future climate change must be assessed as part of this EIA Report. Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. A detailed flood risk assessment has been undertaken as part of this planning application and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the impact will be imperceptible.

As the Proposed Development is over 20 MW, a greenhouse gas emission permit will be required for the facility which will be regulated under the EU-wide Emission Trading Scheme (ETS). Electricity providers form part of the ETS and thus greenhouse gas emissions from the provision of electricity to the site are not included when determining compliance with the targeted 42% reduction in the non-ETS sector i.e. electricity associated greenhouse gas emissions will not count towards the Effort Sharing Regulation target. Thus, any necessary increase in electricity generation due to data centre demand will have no impact on Ireland's obligation to meet the EU Effort Sharing Regulations. On an EU-wide basis, the ETS market in 2019 was approximately 1,390 million tonnes CO_2eq.

In addition, as outlined in the *Regulation (EU) 2018/842*, any new electricity provider (including the Proposed Development) will be treated as a "new entrant" under Phase IV of the ETS (i.e. an electricity generator or site obtaining a GHG emissions permit for the first time after 30th June 2018). The new electricity provider will be required to purchase allocations in the same manner as existing players in the market using the European Energy Exchange. EU leaders have also decided that during Phase IV (2021-2030) 90% of the revenue from the auctions will be allocated to the Member States on the basis of their share of verified emissions with 10% allocated to the least wealthy EU member states. The revised EU ETS Directive has enshrined in law the requirement that at least 50% of the auctioning revenues or the equivalent in financial value should be used for climate and energy related purposes.

In terms of the operation of the Proposed Development, there are several important factors which should be taken into account. Firstly, in the wider context, studies have shown that some data centres such as Proposed Building E, F and G are at least 88% more efficient than on-premises servers and the associated GHG savings associated

have not been accounted for in the current analysis[5].

Secondly, as outlined in the 2021 Climate Action Plan (Government of Ireland, 2021), the carbon intensity of electricity is predicted to decrease from 346 gCO_2/kWh in 2021 to less than 100 gCO_2/kWh in 2030 as a result of the increase in renewables to near 80% of the electricity market by 2030. Overall, all data centres in Ireland are estimated to account for 1.85% of Ireland's total carbon emissions in 2020 and it is predicted that data centres in Ireland will peak at 2.2% of total GHG emissions in 2025 and will fall or level off after this date[6].

The first carbon budget programme proposed by the Climate Change Advisory Council, approved by Government and adopted by both Houses of the Oireachtas comprises three successive 5-year carbon budgets. The total emissions allowed under each budget is set out below in Table 9.5, as well as the average annual reduction for each 5-year period.

Period	Mt CO2eq	Emission Reduction Target
2021-2025	295 Mt CO_{2eq}	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_{2eq}	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_{2eq}	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 9.5 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

The CAP 2021 provides that the economy-wide carbon budgets will be supplemented by sectoral emissions ceilings, setting the maximum amount of GHG emissions that are permitted in a given sector of the economy during each five-year carbon budget. The sectorial emission ceilings for 2030 were published in July 2022 and are shown in Table 9.6. Electricity has a 75% reduction required and emissions ceiling of 3 $MtCO_2e$.

Sector	Reduction Required	2018 Emissions ($MtCO_2e$)	2030 Emission Ceiling ($MtCO_2e$)
Electricity	75%	10.5	3
Transport	50%	12	6
Buildings (Commercial and Public)	45%	2	1
Buildings (Residential)	40%	7	4
Industry	35%	7	4
Agriculture	25%	23	17.25
Other**	50%	2	1

Table 9.6 Sectoral Emission Ceilings for 2030 (Department of the Taoiseach 2022)

9.5.3 Do Nothing Scenario

Under the Do Nothing Scenario no construction works will take place and the previously identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur.
In the absence of the Proposed Development the Permitted Developments (Building A, Building B and Building C) will still result in air emissions as a result of the back-up

[5] https://blog.aboutamazon.eu/aws/amazon-announces-new-project-in-ireland-as-part-of-commitment-to-be-100-powered-by-renewable-energy-by-2025
[6] Host In Ireland (May 2021) Ireland's Data Hosting industry 2021 Q1 Update

generators. An air dispersion modelling assessment of emissions associated with Buildings A, B and C in addition to the IE licenced facilities of BMS and Alexion has been conducted and is detailed in Section 9.7.2.1. The impact of the Do Nothing Scenario is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

9.6 REMEDIAL AND MITIGATION MEASURES

9.6.1 Construction Phase

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors such as the residential properties to the west of the R121 and the 2 no. schools along Powerstown Road. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA based on the following publications:

- 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2016);
- 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996);
- 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002);
- 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003);
- 'Fugitive Dust Technical Information Document for the Best Available Control Measures' (USEPA, 1997); and
- 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).

9.6.1.1 Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies as outlined below.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 for the windrose for Dublin Airport). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions in relation to dust generation, such as periods of high winds and prolonged dry periods, by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales)

as these are periods where the potential for significant dust emissions are highest. A review of long-term meteorological data for Dublin Airport meteorological station (the closest representative monitoring station to the Proposed Development) indicates that the prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year due to 'wet-day' conditions where over 0.2mm of rainfall occurs. Dublin Airport data for the period 1980 – 2010 indicated that on average 191 days were 'wet' (Met Eireann, 2022) and thus dust suppression will occur naturally the majority of the time. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures outlined below and in Section 9.6.1.2 – 9.6.1.5 shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent will monitor the contractors' performance to ensure that the proposed mitigation measures are implemented, and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board will also include head/regional office contact details;
- Community engagement shall be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- The procedures put in place will be reviewed at regular intervals and monitoring conducted and recorded by the principal contractor. It is recommend that reviews are conducted on a monthly basis as a minimum.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and those activities with significant dust generation will be identified after which additional mitigation will be implemented to rectify the problem. Specific dust control measures to be employed are described below.

9.6.1.2 Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

9.6.1.3 Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust; and
- During periods of very high winds (gales), activities likely to generate significant dust emissions shall be postponed until the gale has subsided.

9.6.1.4 Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions;

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK Office of Deputy Prime Minister, 2002); and
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

9.6.1.5 Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;

- At the main site traffic exits, a wheel wash facility shall be installed. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

9.6.1.6 Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

9.6.2 Operational Phase

The stack heights of the back-up diesel generators for the Proposed Development have been designed in an iterative fashion to ensure that an adequate height was selected to aid dispersion of the NO_2 emissions from the generators and achieve compliance with the EU ambient air quality standards at all off-site locations (including background concentrations). No additional air quality mitigation measures are proposed for the operational phase of the development.

In relation to climate, AWS is committed to running the data centres in the most environmentally friendly way possible with a target date of 2025 to power global infrastructure using 100% renewable energy (see Chapter 2). In addition, AWS focuses on energy efficiency and continuous innovation in their data centres and their scale allows AWS to achieve higher resource utilisation and energy efficiency than the typical on-premises data centres.

In addition, as outlined in Section 9.2.3 of this Chapter, the Operator has recently signed a supply agreement for renewable diesel (also referred to as hydrotreated vegetable oil or HVO). Subject to availability, it is expected that fuel for the proposed development will be renewable diesel. Renewable diesel is considered to have significantly lower emissions[7] by the Greenhouse Gas Protocol, as plants used as feedstocks for bio-based fuels absorb CO_2 as they grow. The absorption of CO_2 by these plants offsets the CO_2 produced during combustion. By way of example, fossil fuel derived diesel has total lifecycle emissions of approximately 94 gCO_2e/MJ while renewable diesel using waste cooking oil as a feedstock can be as low as 5.6 gCO_2e/MJ. Thus, the GHG emissions associated with the running of the backup generators will be significantly lower than generators using fossil fuel derived diesel.

[7] https://www.eia.gov/energyexplained/biofuels/biodiesel-and-the-environment.php

9.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

9.7.1 Construction Phase

9.7.1.1 Air Quality

Dust and Particulate Matter

When the dust mitigation measures detailed in the mitigation section (section 9.6.1) of this report are implemented, fugitive emissions of dust and particulate matter from the site will be ***neutral***, ***short-term*** and ***not significant*** in nature, posing no nuisance at nearby receptors.

Impacts on Human Health

Best practice mitigation measures (Section 9.6.1) are proposed for the construction phase of the Proposed Development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the Proposed Development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the Proposed Development is likely to be ***neutral, short-term*** and ***imperceptible*** with respect to human health.

9.7.1.2 Climate

The Institute of Air Quality Management document '*Guidance on the Assessment of Dust from Demolition and Construction*' (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the potential impact on climate change and transboundary pollution from the Proposed Development is deemed to be ***short-term, negative*** and ***not significant*** in relation to Ireland's obligations under the EU 2030 target.

9.7.2 Operational Phase

9.7.2.1 Air Quality

Do Nothing Scenario

USEPA Methodology

The NO_2 modelling results at the maximum location at and beyond the site boundary are detailed in Table 9.7 based on the operation of the back-up diesel generations for 72 hours per year using the USEPA methodology (USEPA, 2011) as well as considering scheduled weekly testing and quarterly load-banking of the back-up generators for the permitted Buildings A, B and C in addition to a house generator in Buildings B and C. The Do Nothing Scenario also included emissions from eight existing emission points at the neighbouring BMS and Alexion facilities.

The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 60% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 75% of the annual limit value at the maximum off-site receptor.

The operational phase impact of the Do Nothing Scenario is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Pollutant / Year	Background Concentration (µg/m³)	Averaging Period	Process Contribution NO_2 (µg/m³)	Predicted Environmental Concentration NO_2 (µg/m³)	Limit Value (µg/m³)
NO_2 / 2017	30	99.8th%ile of 1-hr means	82.9	112.9	200
	15	Annual Mean	15.0	30.0	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	82.2	112.2	200
	15	Annual Mean	13.1	28.1	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	86.7	116.7	200
	15	Annual Mean	14.0	29.0	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	82.5	112.5	200
	15	Annual Mean	13.3	28.3	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	89.0	119.0	200
	15	Annual Mean	13.0	28.0	40

Table 9.7 NO_2 Dispersion Model Results – Do Nothing Scenario

UK Environment Agency Methodology

The methodology, based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value assuming a hypergeometric distribution, has been undertaken at the maximum residential receptor for the Do Nothing Scenario. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 9.8. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the back-up diesel generators. The results indicate that in the maximum year, the emergency generators for the permitted Building A, B and C can operate for up to 389 hours per year before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). However, the UK guidance recommends that there should be no running time restrictions placed on back-up generators which provide power on site only during an emergency power outage.

Pollutant / Meteorological Year	Hours of operation (Hours) (98th%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98th%ile)[Note 1]
NO_2 / 2017	558	0.02
NO_2 / 2018	488	
NO_2 / 2019	447	
NO_2 / 2020	389	
NO_2 / 2021	412	

Note 1 Guidance Outlined In UK EA publication "Diesel Generator Short-term NO_2 Impact Assessment" (EA, 2016)

Table 9.8 Hypergeometric Statistical Results at Maximum Residential Receptor – NO_2, Do Nothing Scenario

Proposed Development Scenario

USEPA Methodology

The NO_2 modelling results at the maximum location at and beyond the site boundary are detailed in Table 9.9 based on the operation of 97 of the 107 no. back-up diesel generations for 72 hours per year using the USEPA methodology outlined within the guidance document titled 'Additional Clarification Regarding Application of Appendix W Modelling Guidance for the 1-Hour National Ambient Air Quality Standard' (USEPA, 2011) as well as considering scheduled weekly testing and quarterly load-banking of all back-up generators from the permitted Buildings A, B and C and proposed Buildings E, F and G in addition to a house generator in Buildings B, C, F and G. The Proposed Development Scenario also included emissions from eight existing emission points at the neighbouring BMS and Alexion facilities.

The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from the site lead to an ambient NO_2 concentration (including background) which is 62% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 82% of the annual limit value at the maximum off-site receptor. Concentrations decrease with distance from the site boundary. The geographical variations in the 1-hour mean (99.8th percentile) and annual mean NO_2 ground level concentrations for the Proposed Development Scenario are illustrated as concentration contours in Figures 9.2 and 9.3.

The operational phase impact of the Proposed Development is considered ***long-term***, ***localised***, ***negative*** and ***slight***.

Pollutant / Year	Background Concentration ($\mu g/m^3$)	Averaging Period	Process Contribution NO_2 ($\mu g/m^3$)	Predicted Environmental Concentration NO_2 ($\mu g/m^3$)	Limit Value ($\mu g/m^3$)
NO_2 / 2017	30	99.8th%ile of 1-hr means	87.4	117.4	200
	15	Annual Mean	17.8	32.8	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	90.6	120.6	200
	15	Annual Mean	16.5	31.5	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	90.6	120.6	200
	15	Annual Mean	16.5	31.5	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	87.7	117.7	200
	15	Annual Mean	16.1	31.1	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	94.7	124.7	200
	15	Annual Mean	15.5	30.5	40

Table 9.9 NO_2 Dispersion Model Results – Proposed Development Scenario

Figure 9.2 Proposed Development Scenario – Predicted NO_2 99.8th Percentile 1-Hour Concentrations

Figure 9.3 Proposed Development Scenario – Predicted NO_2 Annual Mean Concentrations

UK Environment Agency Methodology

The methodology, based on considering the statistical likelihood of an exceedance of the NO_2 hourly limit value assuming a hypergeometric distribution, has been undertaken at the maximum residential receptor for the Proposed Development Scenario. The cumulative hypergeometric distribution of 19 and more hours per year is computed and the probability of an exceedance determined as outlined in Table 9.10. The results have been compared to the 98th percentile confidence level to indicate if an exceedance is likely at various operational hours for the back-up diesel generators. The results indicate that in the maximum year, the emergency generators for the permitted Building A, B and C and the proposed Buildings F and G can operate for up to 68 hours per year before there is a likelihood of an exceedance of the ambient air quality standard (at a 98th percentile confidence level). Figure 9.4 shows the statistical distribution predicted for the 98th percentile (based on 88 hours of operation per year). However, the UK guidance recommends that there should be no running time restrictions placed on back-up generators which provide power on site only during an emergency power outage.

Pollutant / Meteorological Year	Hours of operation (Hours) (98th%ile) Allowed Prior To Exceedance Of Limit Value	UK Guidance – Probability Value = 0.02 (98th%ile)Note 1
NO_2 / 2017	176	0.02
NO_2 / 2018	68	
NO_2 / 2019	72	
NO_2 / 2020	138	
NO_2 / 2021	125	

Note 1 Guidance Outlined In UK EA publication "Diesel Generator Short-term NO_2 Impact Assessment" (EA, 2016)

Table 9.10 Hypergeometric Statistical Results at Maximum Residential Receptor – NO_2, Proposed Development Scenario

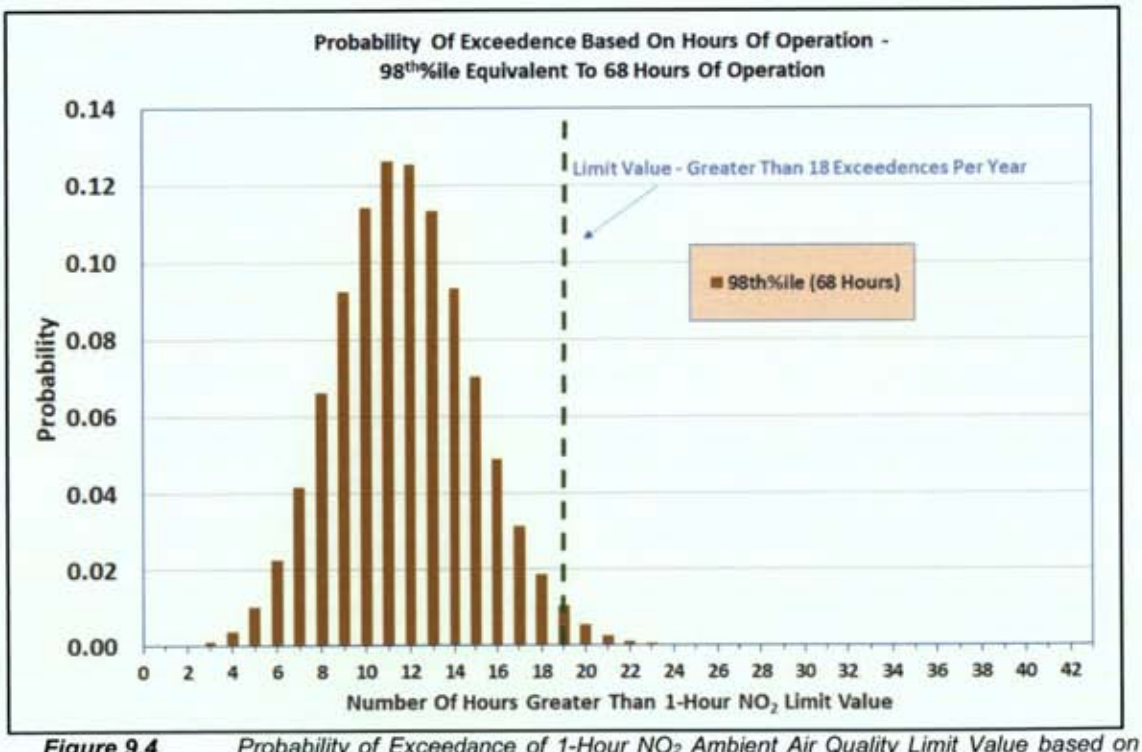

Figure 9.4 *Probability of Exceedance of 1-Hour NO_2 Ambient Air Quality Limit Value based on Hours of Operation for Emergency Generators for Proposed Development*

9.7.2.2 Summary of Modelling Assessment

The modelling assessment has found that ambient NO_2 concentrations as a result of the Do Nothing Scenario, the Proposed Development Scenario and the Cumulative Impact Scenario (see Section 9.8.2) are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. The impacts to air quality from operation of the Proposed Development are therefore deemed ***long-term*** and ***slight*** in terms of significance and ***negative*** in terms of quality.

9.7.2.3 Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. A detailed flood risk assessment (see Chapter 7 and Appendix 7.2) has been undertaken as part of this planning application and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. Therefore, the impact will be imperceptible.

The indirect CO_2 emissions from electricity to operate the facility will not be significant in relation to Ireland's national annual CO_2 emissions. The Sustainable Energy Authority of Ireland (SEAI, 2020) has outlined on its website the CO_2 emission factor for electricity generated in Ireland for each of the last three years (2019 – 2021). The average CO_2 emission factor based on these three years was 315.7 gCO_2/kWh. This average CO_2 emission factor is based on the national power generating portfolio. On the basis that the Proposed Development has an estimated peak operational demand of 73.1MW of power this equates to 640GWh annually based on the assumption of the national fuel mix. This translates to approximately 202,139 tonnes of CO_2eq per year. The Proposed Development in conjunction with the Permitted Developments and future indicative development, has an estimated peak operational demand of 219.7MW per year in total which translates to 1,925 GWh annually. This equates to approximately 607,523 tonnes of CO_2eq per year.

Based on the target set out in the 2021 Climate Action Plan that 80% of electricity generation will be from renewables by 2030, the CO_2 emission factor for electricity generated in Ireland by 2030 will reduce to 100 gCO_2/kWh. This will lead to a reduction in GHG emissions from the Proposed Development by 68% to 64,036 tonnes of CO_2eq per year in 2030. The Proposed Development in conjunction with the Permitted Developments and future indicative development, will also reduce by 68% leading to approximately 192,457 tonnes of CO_2eq per year in 2030.

In addition, the use of renewable diesel will lead to a significant reduction in GHG emissions[8] from the backup diesel generators which will be equivalent to a reduction of total lifecycle emissions of at least 90%. In terms of GHG emissions this will be equivalent to a saving of approximately 3,000 tonnes of CO_2eq per year for the Proposed Development and a saving of approximately 9,000 tonnes of CO_2eq per year for the Proposed Development in conjunction with the Permitted Developments and future indicative development.

As the Proposed Development is over 20 MW, a greenhouse gas emission permit will be required for the facility which will be regulated under the EU-wide Emission Trading Scheme (ETS). Electricity providers form part of the ETS and thus greenhouse gas emissions from these electricity generators are not included when determining compliance with the targeted 42% reduction in the non-ETS sector i.e. electricity associated greenhouse gas emissions will not count towards the Effort Sharing

[8] https://www.eia.gov/energyexplained/biofuels/biodiesel-and-the-environment.php

Decision target. Thus, any necessary increase in electricity generation due to data centre demand will have no impact on Ireland's obligation to meet the EU Effort Sharing Decision. On an EU-wide basis, where the ETS market in 2021 was approximately 1,308 million tonnes CO_2eq, the impact of the emissions associated with the Proposed Development will be less than 0.015% of the total EU-wide ETS market which is imperceptible. The Proposed Development in conjunction with the Permitted Developments and future indicative development, will be no more than 0.046% of the total EU-wide ETS market which is imperceptible.

AWS is committed to building a sustainable business for its customers and the planet. In 2019, Amazon co-founded The Climate Pledge, a commitment to reach net zero carbon emissions by 2040, 10 years ahead of the Paris Agreement. As part of that commitment, the company is on a path to powering its operations by 100% renewable energy by 2025, five years ahead of its original 2030 target.

Amazon is continuing to scale its renewable energy investments with a current total of 379 renewable energy projects around the world, marking significant progress on its path to powering 100% of its operations with renewable energy by 2025 - before the proposed Data Centre F & G are due to come into operation. Once fully operational, Amazon's current global renewable energy portfolio will generate 50,000 gigawatt hours (GWh) of clean energy, which is the equivalent amount of electricity needed to power 13.4 million European homes each year.

Amazon has committed to offtake 100% of the power from renewable wind projects in Cork, Donegal, and Galway. In total, these three wind projects are projected to add 229 megawatts of renewable energy to the Irish grid, reducing carbon emissions by 366,000 tonnes of CO_2 each year, and producing enough renewable energy to power 185,000 Irish homes, per annum. These three wind projects will make Amazon the largest single corporate buyer of renewable energy in the country.

It is also supporting the new district heating scheme in Tallaght, South Dublin, by providing heat from a nearby data centre. The system will initially heat 47,000 m^2 of public sector buildings as well as 3,000m^2 of commercial space and 135 affordable rental apartments. This is projected to save 1,500 tonnes of carbon per annum during the first phase, the equivalent of a 60 per cent reduction in carbon emissions.

The Proposed Development and the actions of AWS through The Climate Pledge fully aligns with the Government Statement as they can *"demonstrate the additionality of their renewable energy use in Ireland"* and further afield.

Thus, given that the use of electricity to power the facility will achieve net zero by 2050 and the commitment to offset all interim fossil fuel derived GHG emissions by the purchase of Corporate Power Purchase Agreements (CPPAs) the predicted impact to climate is deemed to be ***indirect***, ***long-term, negative*** and ***slight***.

9.7.2.4 Regional Air Quality

The National Emissions Ceiling Directive 2016/2284/EU (NECD) which repealed European Commission Directive 2001/81/EC will apply the 2010 National Emission Ceiling Directive limits (Directive 2001/81/EC) until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3 and $PM_{2.5}$ as detailed in Section 9.2.1.3.

Assuming that 73.1 MW is generated using the national fuel mix for the Proposed Development, the NO_X emissions associated with this electricity over the course of one year (i.e. 640.4 GWh based on 73.1MW for 8,760 hours per annum) will equate to 84

tonnes per annum which is 0.12% of the National Emission Ceiling limit for Ireland from 2020 onwards. Similarly, SO_2 emissions associated this electricity over the course of one year (640 GWh) will equate to 47 tonnes per annum which is 0.19% of the National Emission Ceiling limit for Ireland from 2020. Additionally, NMVOC emissions associated this electricity over the course of one year (640 GWh) will equate to 5 tonnes per annum which is 0.01% of the National Emission Ceiling limit for Ireland from 2020.

The Proposed Development in conjunction with the Permitted Developments and future indicative development, has an estimated peak operational demand of 219.7MW per year in total which translates to 1,925 GWh annually. The NO_X emissions associated with this electricity over the course of one year (i.e. 1,925 GWh based on 219.7MW for 8,760 hours per annum) will equate to 253 tonnes per annum which is 0.37% of the National Emission Ceiling limit for Ireland from 2020 onwards. Similarly, SO_2 emissions associated this electricity over the course of one year (1,925 GWh) will equate to 142 tonnes per annum which is 0.56% of the National Emission Ceiling limit for Ireland from 2020. Additionally, NMVOC emissions associated this electricity over the course of one year (1,925 GWh) will equate to 14 tonnes per annum which is 0.03% of the National Emission Ceiling limit for Ireland from 2020.

Thus, the NO_X, SO_2 and NMVOC indirect emissions associated with the operation of the Proposed Development are ***indirect***, ***long-term, negative*** and ***slight*** with regards to regional air quality.

As discussed in Chapter 2 and Seciotn ***9.7.2.3*** of this EIA Report, the Operator has a commitment to reach net zero carbon emissions by 2040, 10 years ahead of the Paris Agreement. As part of that commitment, the company is on a path to powering its operations by 100% renewable energy by 2025, five years ahead of its original 2030 target. Amazon is continuing to scale its renewable energy investments with a current total of 379 renewable energy projects around the world, marking significant progress on its path to powering 100% of its operations with renewable energy by 2025 - before the proposed Data Centre F & G are due to come into operation. Once fully operational, Amazon's current global renewable energy portfolio will generate 50,000 gigawatt hours (GWh) of clean energy, which is the equivalent amount of electricity needed to power 13.4 million European homes each year.

Amazon has committed to offtake 100% of the power from renewable wind projects in Cork, Donegal, and Galway. In total, these three wind projects are projected to add 229 megawatts of renewable energy to the Irish grid, reducing carbon emissions by 366,000 tonnes of CO_2 each year, and producing enough renewable energy to power 185,000 Irish homes, per annum. These three wind projects will make Amazon the largest single corporate buyer of renewable energy in the country.

9.7.2.5 Human Health

Air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, emissions from the site, assuming scheduled testing as well as emergency operation of the back-up generators, are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health. In relation to the spatial extent of air quality impacts from the site, ambient concentrations will decrease significantly with distance from the site boundary. Further details of the potential impacts on human health associated with the Proposed Development are discussed in Chapter 5 of this EIA Report.

9.8 CUMULATIVE IMPACTS

9.8.1 Construction Phase

9.8.1.1 Air Quality

According to the IAQM guidance (2014), should the construction phase of the Proposed Development coincide with the construction phase of any other large scale Permitted Developments within 350m of the site then there is the potential for cumulative construction dust emissions impacting nearby receptors. A review of recently Permitted Developments was conducted as part of this assessment (See Chapter 3) and any large scale developments with the potential for overlapping construction phases were identified, specifically the Permitted Developments on the wider site (Building B and Building C) and indicative future development located to the north of the Proposed Building G and Kilshane grid connection project (see Chapter 3 and Chapter 16).

Based on the phased approach employed for construction at the site (as per Chapter 2), and the implementation of dust management measures as outlined in the OCEMP and Section 9.6.1, there is minimal potential for cumulative impact on air quality from simultaneous construction of the nearby Permitted Developments, the proposed Kilshane grid connection project and the indicative future development with the Proposed Development.

Best practice mitigation measures (as per Section 9.6.1) will be implemented for the construction phase of the Proposed Development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the Proposed Development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values through the suppression of dust emissions. The EU ambient air quality limit values are based on the protection of human health. Therefore, the impact of construction of the Proposed Development will be ***neutral, short-term*** and ***imperceptible*** with respect to air quality and human health.

9.8.1.2 Climate

The IEMA guidance (2022) states that when considering the cumulative assessment, all global cumulative GHG sources are relevant to the effect on climate change. As a result, the effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed. This is due to the fact that there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other. Cumulative effects of the Proposed Development and Permitted Developments on site (Building B and Building C) in addition to the potential indicative future development on the wider site have been considered as part of this assessment.

Construction traffic is the primary source of GHG emissions during the construction phase. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during construction of the Proposed Development. The Institute of Air Quality Management document 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. There is the potential for the construction phase of the Proposed Development to coincide with the construction of the permitted Buildings B and C and potential future indicative development. However, as the Proposed Development will be constructed on a phased basis over an approximate 5 year period (see Chapter 2) the scale of the construction works will be lesser than if the entire

development were to be constructed simultaneously. In addition, the development of the wider site will also follow a phased approach to construction. It can be concluded that due to the duration and nature of the construction activities, CO_2 and N_2O emissions from construction vehicles and machinery will have a ***short-term, negative*** and ***not significant*** cumulative impact on climate.

9.8.2 Operational Phase

9.8.2.1 Air Quality

Cumulative impacts to air quality during the operational phase of the Proposed Development may occur due to NO_2 emissions from the operation of the back-up generators in addition to NO_2 emissions from existing and Permitted Developments in the vicinity of the Proposed Development site. In terms of the potential for overlap of emission plumes the impact is largely confined to the immediate vicinity of the site and therefore, developments beyond 1 km of the Proposed Development boundary have not been included within the cumulative assessment. This is because there is minimal potential for overlap of emission plumes at increased distances. A review of relevant existing and Permitted Developments was conducted in order to inform the operational phase cumulative air quality assessment (Permitted Developments are identified within Chapter 3). The following developments were included within the cumulative assessment as per Section 9.2.3.1 – the IE licenced sites of BMS and Alexion as they are both within 1 km of the Proposed Development and both have licenced emissions of NO_2, the Permitted Developments on the wider site (Building A, B and C) and an indicative future development on the wider site to the north of Building G. No other developments of relevance were identified for inclusion in the cumulative modelling assessment. Emissions and proposed minimum stack heights for the 18 no. back-up diesel generators associated with the potential future data centre building were assumed to be the same as those for Buildings F and G for the purpose of the cumulative assessment.

The NO_2 modelling results at the maximum location at and beyond the site boundary are detailed in Table 9.11 based on the operation of the back-up diesel generators for 72 hours per year using the USEPA methodology (USEPA, 2011). In addition to this the scheduled weekly testing, and quarterly load-banking, of all back-up generators from Buildings A, B, C, E, F and G, emergency operations and scheduled testing of 18 back-up diesel generators associated with the potential future data centre building have also been considered in addition to each house generator associated with Building B, C, F and G. The results indicate that the ambient ground level concentrations are within the relevant air quality standards for NO_2. For the maximum year modelled, emissions from all back-up generators lead to an ambient NO_2 concentration (including background) which is 63% of the maximum ambient 1-hour limit value (measured as a 99.8th percentile) and 83% of the annual limit value at the maximum off-site receptor.

In conclusion the results of the cumulative impact scenario are in compliance with the relevant ambient air quality limit values at all locations at or beyond the site boundary. This results in a ***long-term, slight, negative*** impact to air quality.

Pollutant / Year	Background (µg/m³)	Averaging Period	Process Contribution NO_2 (µg/m³)	Predicted Environmental Concentration NO_2 (µg/m³)	Limit Value (µg/m³)
NO_2 / 2017	30	99.8th%ile of 1-hr means	87.9	117.9	200
	15	Annual Mean	18.2	33.2	40
NO_2 / 2018	30	99.8th%ile of 1-hr means	86.6	116.6	200
	15	Annual Mean	15.8	30.8	40
NO_2 / 2019	30	99.8th%ile of 1-hr means	90.6	120.6	200
	15	Annual Mean	16.9	31.9	40
NO_2 / 2020	30	99.8th%ile of 1-hr means	87.7	117.7	200
	15	Annual Mean	16.5	31.5	40
NO_2 / 2021	30	99.8th%ile of 1-hr means	96.2	126.2	200
	15	Annual Mean	16.0	31.0	40

Table 9.11 NO_2 Dispersion Model Results – Cumulative Impact Scenario

9.8.2.2 Climate

As outlined in Section 9.7.2.3, cumulative indirect electricity usage for the overall site including the Proposed Development, Permitted Development and indicative future development would be equivalent to 607,523 tonnes of CO_2eq per year. As the Proposed Development is over 20 MW, a greenhouse gas emission permit will be required for the facility which will be regulated under the EU-wide Emission Trading Scheme (ETS). Electricity providers form part of the ETS and thus greenhouse gas emissions from these electricity generators are not included when determining compliance with the targeted 42% reduction in the non-ETS sector i.e. electricity associated greenhouse gas emissions will not count towards the Effort Sharing Decision target. Thus, any necessary increase in electricity generation due to data centre demand will have no impact on Ireland's obligation to meet the EU Effort Sharing Decision. On an EU-wide basis, where the ETS market in 2019 was approximately 1,308 million tonnes CO_2eq, the impact of the emissions associated with the Proposed Development in conjunction with the Permitted Developments and future indicative development, will be no more than 0.046% of the total EU-wide ETS market which is imperceptible.

In addition, the use of renewable diesel will lead to a saving of approximately 9,000 tonnes of CO_2eq per year for the Proposed Development in conjunction with the Permitted Developments and future indicative development.

Thus, given that the use of electricity to power the facility will achieve net zero by 2050 and the commitment to offset all interim fossil fuel derived GHG emissions by the purchase of CPPAs the predicted cumulative impact to climate is deemed to be ***indirect***, ***long-term, negative*** and ***slight***.

As per Section 9.7.2.4 the Proposed Development in conjunction with the Permitted Developments and future indicative development, has an estimated peak operational demand of 219.7MW per year in total which translates to 1,925 GWh (gigawatt hours) annually. The nitrogen oxide (NO_X) emissions associated with this electricity over the course of one year (i.e. 1,925 GWh based on 219.7MW for 8,760 hours per annum) will equate to 253 tonnes per annum which is 0.39% of the National Emission Ceiling limit for Ireland from 2020 onwards. Similarly, SO_2 emissions associated this electricity over the course of one year (1,925 GWh) will equate to 142 tonnes per annum which is 0.34% of the National Emission Ceiling limit for Ireland from 2020. Additionally, NMVOC emissions associated with this electricity over the course of one year (1,925 GWh) will equate to 14 tonnes per annum which is 0.03% of the National Emission Ceiling limit for Ireland from 2020. The indirect NO_X, SO_2 and NMVOC emissions are all below 1% of the relevant National Emission Ceiling limits when considering the cumulative impact of the Proposed Development.

Thus, the cumulative NO_X, SO_2 and NMVOC indirect emissions associated with the operation of the Proposed Development, Permitted Developments and indicative future development are ***indirect***, ***long-term, negative*** and ***slight*** with regards to regional air quality.

As discussed in Chapter 2 and Section 9.7.2.3 of this EIA Report, the Operator has a commitment to reach net zero carbon emissions by 2040, 10 years ahead of the Paris Agreement. As part of that commitment, the company is on a path to powering its operations by 100% renewable energy by 2025, five years ahead of its original 2030 target. Amazon is continuing to scale its renewable energy investments with a current total of 379 renewable energy projects around the world, marking significant progress on its path to powering 100% of its operations with renewable energy by 2025 - before the proposed Data Centre F & G are due to come into operation. Once fully operational, Amazon's current global renewable energy portfolio will generate 50,000 gigawatt hours (GWh) of clean energy, which is the equivalent amount of electricity needed to power 13.4 million European homes each year.

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9.9 RESIDUAL IMPACTS

Once the mitigation measures outlined in Section 9.6 are implemented, the residual impacts on air quality or climate from the construction of the Proposed Development will be ***short-term*** and ***imperceptible*** and for the operational phases of the Proposed Development will be ***long-term, negative*** and ranging from ***imperceptible*** to ***slight***.

The cumulative impact assessment is addressed Section 9.8 and also in Chapter 16 of this EIA Report.

Interactions are addressed in Chapter 17 of this EIA Report.

9.10 REFERENCES

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- USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures
- USEPA (1986) Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated)

APPENDIX 9.1

DESCRIPTION OF THE AERMOD MODEL

PREPARED BY AWN CONSULTING LTD.

The AERMOD dispersion model has been recently developed, in part, by the U.S. Environmental Protection Agency (USEPA, 2017). The model is a steady-state Gaussian model used to assess pollutant concentrations associated with industrial sources. The model is an enhancement on the Industrial Source Complex-Short Term 3 (ISCST3) model which has been widely used for emissions from industrial sources. The 2005 Guidelines on Air Quality Models has promulgated AERMOD as the preferred model for a refined analysis from industrial sources, in all terrains.

Improvements over the ISCST3 model include the treatment of the vertical distribution of concentration within the plume. ISCST3 assumes a Gaussian distribution in both the horizontal and vertical direction under all weather conditions. AERMOD, however, treats the vertical distribution as non-Gaussian under convective (unstable) conditions while maintaining a Gaussian distribution in both the horizontal and vertical direction during stable conditions. This treatment reflects the fact that the plume is skewed upwards under convective conditions due to the greater intensity of turbulence above the plume than below. The result is a more accurate portrayal of actual conditions using the AERMOD model. AERMOD also enhances the turbulence of night-time urban boundary layers thus simulating the influence of the urban heat island.

In contrast to ISCST3, AERMOD is widely applicable in all types of terrain. Differentiation of the simple versus complex terrain is unnecessary with AERMOD. In complex terrain, AERMOD employs the dividing-streamline concept in a simplified simulation of the effects of plume-terrain interactions. In the dividing-streamline concept, flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. Extensive validation studies have found that AERMOD performs better than ISCST3 for many applications and as well or better than CTDMPLUS for several complex terrain data sets (USEPA, 1999).

AERMOD has made substantial improvements in the area of plume growth rates in comparison to ISCST3 (USEPA 2021). ISCST3 approximates turbulence using six Pasquill-Gifford-Turner Stability Classes and bases the resulting dispersion curves upon surface release experiments. This treatment, however, cannot explicitly account for turbulence in the formulation. AERMOD is based on the more realistic modern planetary boundary layer (PBL) theory which allows turbulence to vary with height. This use of turbulence-based plume growth with height leads to a substantial advancement over the ISCST3 treatment.

Improvements have also been made in relation to mixing height (USEPA 2021). The treatment of mixing height by ISCST3 is based on a single morning upper air sounding each day. AERMOD, however, calculates mixing height on an hourly basis based on the morning upper air sounding and the surface energy balance, accounting for the solar radiation, cloud cover, reflectivity of the ground and the latent heat due to evaporation from the ground cover. This more advanced formulation provides a more realistic sequence of the diurnal mixing height changes.

AERMOD also contains improved algorithms for dealing with low wind speed (near calm) conditions. As a result, AERMOD can produce model estimates for conditions when the wind speed may be less than 1 m/s, but still greater than the instrument threshold.

APPENDIX 9.2

DESCRIPTION OF AERMET

PREPARED BY AWN CONSULTING LTD.

AERMOD incorporates a meteorological pre-processor AERMET. AERMET allows AERMOD to account for changes in the plume behaviour with height. AERMET calculates hourly boundary layer parameters for use by AERMOD, including friction velocity, Monin-Obukhov length, convective velocity scale, convective (CBL) and stable boundary layer (SBL) height and surface heat flux. AERMOD uses this information to calculate concentrations in a manner that accounts for changes in dispersion rate with height, allows for a non-Gaussian plume in convective conditions, and accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological preprocessor requires the input of surface characteristics, including surface roughness (z0), Bowen Ratio and albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. A morning sounding from a representative upper air station, latitude, longitude, time zone, and wind speed threshold are also required.

Two files are produced by AERMET for input to the AERMOD dispersion model. The surface file contains observed and calculated surface variables, one record per hour. The profile file contains the observations made at each level of a meteorological tower, if available, or the one-level observations taken from other representative data, one record level per hour.

From the surface characteristics (i.e. surface roughness, albedo and amount of moisture available (Bowen Ratio)) AERMET calculates several boundary layer parameters that are important in the evolution of the boundary layer, which, in turn, influences the dispersion of pollutants. These parameters include the surface friction velocity, which is a measure of the vertical transport of horizontal momentum; the sensible heat flux, which is the vertical transport of heat to/from the surface; the Monin-Obukhov length which is a stability parameter relating the surface friction velocity to the sensible heat flux; the daytime mixed layer height; the nocturnal surface layer height and the convective velocity scale which combines the daytime mixed layer height and the sensible heat flux. These parameters all depend on the underlying surface.

The values of albedo, Bowen Ratio and surface roughness depend on land-use type (e.g. urban, cultivated land etc.) and vary with seasons and wind direction. The assessment of appropriate land-use types was carried out in line with USEPA recommendations.

Surface roughness

Surface roughness length is the height above the ground at which the wind speed goes to zero. Surface roughness length is defined by the individual elements on the landscape such as trees and buildings. In order to determine surface roughness length, the USEPA recommends that a representative length be defined for each sector, based on an upwind area-weighted average of the land use within the sector, by using the eight land use categories outlined by the USEPA. The inverse-distance weighted surface roughness length derived from the land use classification within a radius of 1km from Dublin Airport Meteorological Station is shown in Table A9.1.

Sector	Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
340-100	100% Urban	1.000	1.000	1.000	1.000
100-340	100% Grassland	0.050	0.100	0.010	0.010

Note 1 Winter defined as periods when surfaces covered permanently by snow whereas autumn is defined as periods when freezing conditions are common, deciduous trees are leafless and no snow is present (Iqbal (1983)). Thus for the current location autumn more accurately defines "winter" conditions in Ireland.

Table A9.1 Surface Roughness based on an inverse distance weighted average of the land use within a 1km radius of Dublin Airport Meteorological Station.

Albedo

Noon-time albedo is the fraction of the incoming solar radiation that is reflected from the ground when the sun is directly overhead. Albedo is used in calculating the hourly net heat balance at the surface for calculating hourly values of Monin-Obuklov length. A 10 km x 10 km square area is drawn around the meteorological station to determine the albedo based on a simple average for the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10km from Dublin Airport Meteorological Station is shown in Table A9.2.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
2% Water, 49% Urban, 31% Grassland, 19% Cultivated Land	0.152	0.173	0.185	0.185

Note 1 For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A9.2 Albedo based on a simple average of the land use within a 10km × 10km grid centred on Dublin Airport Meteorological Station.

Bowen Ratio

The Bowen ratio is a measure of the amount of moisture at the surface of the earth. The presence of moisture affects the heat balance resulting from evaporative cooling which, in turn, affects the Monin-Obukhov length which is used in the formulation of the boundary layer. A 10 km x 10 km square area is drawn around the meteorological station to determine the Bowen Ratio based on geometric mean of the land use types within the area independent of both distance from the station and the near-field sector. The classification within 10 km from Dublin Airport Meteorological Station is shown in Table A9.3.

Area Weighted Land Use Classification	Spring	Summer	Autumn	Winter[Note 1]
2% Water, 49% Urban, 31% Grassland, 19% Cultivated Land	0.628	1.23	1.36	1.36

Note 1 For the current location autumn more accurately defines "winter" conditions in Ireland.

Table A9.3 Bowen Ratio based on a geometric mean of the land use within a 10km × 10km grid centred on Dublin Airport Meteorological Station.

10.0 NOISE & VIBRATION

10.1 INTRODUCTION

As detailed in Chapter 1 Introduction, this EIA Report has been prepared to accompany an application for the development of three data centres and associated ancillary development on lands at Cruiserath Road, Dublin 15. The Proposed Development is to the north of a Permitted Development (Building A) and to the west of permitted Buildings B and C. The subject site is illustrated in Figure 10.1 below.

The nearest residential locations are located to the west of development lands on the opposite side of a section of the R121. This includes, amongst others the Curragh Hall and Ballentree estates. The Carlton Hotel is located to the north of the site and the eastern boundary of the site is shared with existing industrial lands and operations. To the south of the site is another section of the R121 with industrial, agricultural lands and a cemetery beyond.

Figure 10.1. *Site Location and Context (Image from noise model)*

The Proposed Development of the three data centres and associated elements will include cooling and ventilation plant and stand-by generators.

10.2 METHODOLOGY

10.2.1 Proposed Approach

This Chapter has been prepared with reference to the following guidance documents:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (2022), and;
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).

Reference has also been made to the following documents, which are specific to noise and vibration:

- Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016);
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 – Noise (2014);
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration (2014);
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration (1993);
- BS 6472: Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz) (1992);
- ISO 9613: *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.* (1996);
- BS 4142: 2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound (2019);
- Design Manual for Roads and Bridges LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2, Highways England (2020);
- ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels (2017), and;
- Transport Infrastructure Ireland Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2014).

The following methodology has been adopted for this assessment:

- Review appropriate guidance, typical local authority planning conditions, etc. in order to identify appropriate noise criteria for the site operations;
- Carry out noise monitoring at a number of locations (e.g. in the vicinity of nearest sensitive properties/boundaries) to identify existing levels of noise in the vicinity of the development;
- Development of a detailed 3D noise model to consider the Proposed Development; and
- Comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

Appendix 10.1 of this document presents a glossary of the acoustic terminology used throughout this document. In the first instance it is considered appropriate to review some basic fundamentals of acoustics.

10.2.2 Fundamentals of Acoustics

In order to provide a broader understanding of some of the technical discussion in this report, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.

A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

The audible range of sounds expressed in terms of Sound Pressure Levels is 0dB (for the threshold of hearing) to 120dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3dB.

The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPL's measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 10.2.

The 'A' subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

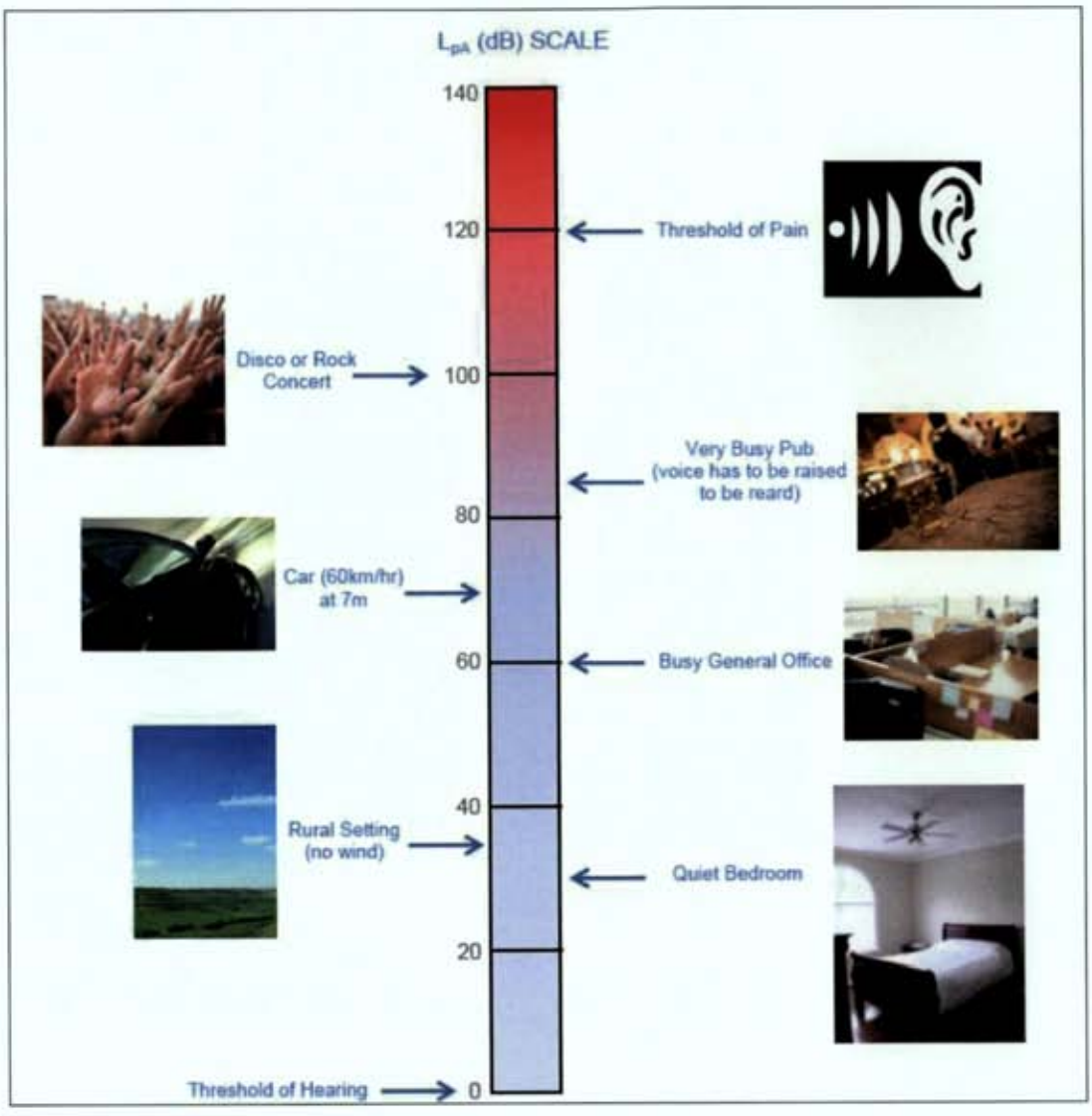

Figure 10.2. *dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016))*

10.2.3 Significance of Impacts

The significance of noise and vibration impacts has been assessed in accordance with the EPA Guidelines EIA Reports (2022); see Tables 10.2 to 10.4 below. As these guidelines do not quantify the impacts in decibel terms, reference has been made to the '*Guidelines for Environmental Noise Impact Assessment*' produced by the Institute of Environmental Management in 2014.

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

Table 10.1 *Quality of Potential Effects*

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

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

Table 10.2 *Significance of Effects*

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

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

Table 10.3 *Duration of Effects*

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

10.2.4 Construction Phase Guidance

Criteria for Rating Noise Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities or An Bord Pleanála normally control construction activities by imposing

limits on the hours of operation and/or applying noise limits for construction noise at noise-sensitive locations.

In the absence of specific noise limits, criteria relating to permissible construction noise levels for a development of this scale are taken from in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise Annex E Section E.3.2.*

The approach adopted in *BS 5228-1* 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.

The *BS 5228-1* document sets out guidance on permissible noise levels relative to the existing noise environment. Table 10.4 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by *BS 5228-1*. These are construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

Table 10.4 *Example Threshold of Significant Effect at Dwellings*

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [Note A]	Category B [Note B]	Category C [Note C]
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends [Note D]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate periods (i.e. daytime, evening and night time) the ambient noise level is determined and rounded to the nearest 5dB. Baseline monitoring carried out at the nearest noise sensitive locations and considered in this assessment indicate that Category A, as detailed in Table 10.5 is appropriate in this instance.

Table 10.5 *Rounded Baseline Noise Levels and Associated Categories*

Period	Baseline Noise Category	Construction Noise Threshold Value $L_{Aeq,1hr}$ (dB)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	A	65
Evening (19:00 to 23:00hrs)	A	55
Night time (23:00 to 07:00hrs)	A	45

See Section 10.5.1 for the assessment in relation to the Proposed Development. If the construction noise level exceeds the appropriate category value, then a potential significant effect is deemed to occur.

This assessment process determines if a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, overall acceptable levels of construction noise are set out in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[1] The acceptable noise levels should not be exceeded at noise sensitive locations during the construction phase of the Proposed Development. Table 10.6 sets out these levels.

Table 10.6 *Maximum Permissible Noise Levels at the Facade of Dwellings during Construction*

Days and Times	Noise Levels (dB re. $2x10^{-5}$ Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 23:00hrs	60*	65*
Saturdays 07:00 to 13:00hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

Based on the above the following construction noise criteria are proposed for the site:

65dB $L_{Aeq,1hr}$ at a noise sensitive location
75dB $L_{Aeq,1hr}$ at a commercial property

In exceptional circumstances there may be a requirement that certain construction works are carried out during night time periods. Construction activity at these times, will be undertaken with the explicit permission of the relevant local authority.

Criteria for Rating Vibration Impacts

There are two aspects to the issue of vibration that are addressed in the standards and guidelines: the risk of cosmetic or structural damage to buildings; and human perception of vibration. In the case of this development, vibration levels used for the purposes of evaluating building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are referenced here in relation to cosmetic or structural damage to buildings:

- British Standard BS 5228-2 *Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration* (BSI 2014); and
- British Standard BS 7385-2 *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration* (BSI 1993)

BS 5228-2 and BS 7385-2 define the following thresholds for cosmetic damage to residential or light commercial buildings: PPV should be below 15 mm/s at 4 Hz to avoid cosmetic damage. This increases to 20 mm/s at 15 Hz and to 50 mm/s at 40 Hz and above. At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded. This is summarised in Table 10.7 below.

[1] *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes March 2014,* , Transport Infrastructure Ireland

Table 10.7 *Allowable Vibration during Construction Phase*

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note 1: Values referred to are at the base of the building.

Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

Furthermore, BS 5228-2 and BS 7385-2 state that minor structural damage can occur at vibration magnitudes greater than twice those in Table 10.7 and major structural damage can occur at vibration magnitudes greater than four times those in Table 10.7.

BS 5228-2 also provides guidance relating to the human response to vibration. Guidance is again provided in terms of PPV in mm/s since this parameter is routinely measured when monitoring the structural effects of vibration. The potential human response at different vibration levels, as set out in BS 5228-2, is summarised in Table 10.8.

Table 10.8 *Guidance on human response to vibration levels.*

Vibration level Note A) B) C) (mm/s)	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

Construction Phase Traffic

Vehicular movement to and from the construction site for the Proposed Development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are

referenced Design Manual for Roads and Bridges (DMRB) (Highways England 2020) and the EPA Guidelines (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB document.

Table 10.9 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents.

Table 10.9 *Classification of magnitude of traffic noise changes in the short-term*

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant
3 – 4.9	Perceptible	Moderate	Slight, Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

10.2.5 Operational Phase – Noise Guidance

The relevant local authority, Fingal County Council (FCC), does not have any standard noise conditions listed in the Dublin Agglomeration Environmental Noise Action Plan December 2018-July 2023 – Volume 3 – Fingal County Council.

However, within section 3.8 IPPC Licensing of that document, the following comment is made regarding sites which require IPC/IED Licencing:

> *Certain activities that are required to be licensed may be subject to controls relating to noise emissions. The relevant guidance is set out in the EPA document, 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)' (2012 and updated in 2016). The updated Noise Guidance Note (NG4) is intended to assist licensed sites with the assessment of their potential and actual noise impact on the local environment. It recommends a "Best Available Technique" approach to the assessment and mitigation of noise pollution.*

An Industrials Emissions Directive ("IED") licence application (EPA ref: P1182-01) has recently been submitted to the Environmental Protection Agency principally relating to the operation of diesel-powered emergency generators at the Permitted Development at the Proposed Development Site. This IED licence will be amended to include the Proposed Development on grant of planning permission. As such, the EPA NG4 document has been considered in this environmental noise assessment.

EPA – NG4

An assessment of noise under the EPA NG4 guidance requires a noise survey of baseline conditions and then derives appropriate criteria for noise due to the operation of the site. The criteria apply at the façades of the noise-sensitive locations.

The first part of selecting the noise criteria is to carry out a 'quiet area' screening on the location of the site. To be considered a 'quiet area', the following three criteria are tested:

1. The site must be located **at least 3km from an urban area with a population of more than 1,000 people**: in this instance the site is on the edge of the Dublin agglomeration and this criterion is not met.
2. The site must be **at least 3 km away from any local industry**: there are a number of existing sites within 3km therefore this criterion is not met.

3. The site must be **at least 5km away from any National Primary Route**: the N3 road is approximately 1.5 km southwest of the site and the N2 road is approximately 2.5 km from the site therefore this criterion is not met.

In this instance, none of the above criteria are met and therefore the site is not considered to be in a 'quiet area'.

Having confirmed that the site is not in a 'quiet area', the next part of the derivation of Noise criteria according to NG4 is to test whether the site meets the criteria for an 'area of low background noise'.

For a noise-sensitive location in the vicinity of the site to considered an 'area of low background noise', the noise levels measured at that location during the environmental noise survey need to satisfy all three the following criteria:

- Arithmetic Average of L_{A90} During Daytime Period ≤40 dB L_{A90}, and;
- Arithmetic Average of L_{A90} During Evening Period ≤35 dB L_{A90}, and;
- Arithmetic Average of L_{A90} During Night-time Period ≤30 dB L_{A90}.

Finally, depending on whether each location is considered an 'area of low background noise', Table 10.10 below outlines the noise emission limit criteria detailed in the NG4 document.

Scenario	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night Noise Criterion, dB L_{Aeq} (23:00 to 07:00hrs)
Areas of Low Background Noise	45 dB	40 dB	35 dB
All Other Areas	55 dB	50 dB	45 dB

Table 10.10 *NG4 Approach for Determining Appropriate Noise Criteria*

The noise levels measured during the baseline noise surveys are presented in section 10.3.2 and 10.3.3 of this chapter. In all cases, noise levels exceed the criteria for areas of low background noise.

As the Proposed Development would continuously (i.e. on a '24/7' basis), the night-time noise criterion is critical to the assessment. As these nearest noise-sensitive locations are not identified as areas of lo background noise as per the NG4 guidance, a 45 dB $L_{Aeq,T}$ night time criterion applies. Note if plant noise were designed to this level, plant noise would be clearly audible and the dominant background source of noise at a number of noise sensitive locations in the vicinity of the development.

Other Guidance – BS 4142 2014

BS 4142:2014: *Methods for rating and assessing industrial and commercial sound* is the industry standard method for analysing building services plant sound emissions to residential receptors. BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. It should also be noted that the EPA NG4 document indicates that the BS 4142 assessment methodology should be used in the assessment of complaints associated with a sites' operations. As an IED licence will be sought for the site, the guidance contained therein needs to be given due regard.

For an appropriate BS 4142 assessment it is necessary to compare the measured external background sound level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where sound emissions are found to be tonal, impulsive, intermittent or to have other sound characteristics that are readily distinctive against the residual acoustic environment, BS 4142 advises that penalties be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal sound characteristics outlined in BS 4142 recommends the application of a 2dB penalty for a tone which is just perceptible at the receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible. In relation to intermittency, BS 4142 recommends that *If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.* The following definitions as discussed in BS 4142 as summarised below:

"*ambient sound level, $L_{Aeq,T}$*"	equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at any given time, usually from many sources near and far, at the assessment location over a given time interval, T.
"*residual sound level, $L_{Aeq,T}$*"	equivalent continuous A-weighted sound pressure level of the residual sound (i.e. ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound) at the assessment location over a given time interval, T.
"*specific sound level, $L_{Aeq,T}$*"	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
"*rating level, $L_{Ar,T}$*"	specific sound level plus any adjustment for the characteristic features of the sound.
"*background sound level, $L_{A90,T}$*"	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

In order to establish an *initial estimate* of impact, BS 4142 states the following:

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following.

a. *Typically, the greater this difference, the greater the magnitude of the impact.*
b. *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
c. *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

d. *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The assessment methodology described above (i.e. comparison of rated sound level to background sound level) is quoted in BS 4142 as representing a methodology to '*obtain an initial estimate*' of impact. It is important to note that BS 4142 also comments that '*Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration*'. BS 4142 provides a list of potential pertinent factors that can influence the '*initial estimate*'. The plant noise assessment conducted in the following sections has been carried out with consideration of the guidance contained in BS 4142 as summarised above.

BREAAM

The Building Research Establishment Environmental Assessment Method or *BREEAM* is the leading and most widely used environmental assessment method for buildings. It sets the standard for best practice in sustainable design and has become the de facto measure used to describe a building's environmental performance.

Consideration has also been given to the content of '*Pol 8 – Noise Attenuation*' of the BREEAM: Industrial: 2008 assessment manual. The aim of this section of the BREEAM guidance is stated as follows:

"To reduce the likelihood of noise from the new development affecting nearby noise sensitive buildings."

The document states that *"Where the rating level of the specific noise source(s) from the new development / site/building is +5dB during the day and +3dB at night compared to the background noise level, the* [BREEAM] *credit can be awarded".*

As part of the survey work undertaken to inform this assessment, the average night time background noise level identified in the vicinity of the nearby noise sensitive locations, are as outlined in Table 10.11[2].

Table 10.11 *Target Design Criteria*

Location	Expected Background Noise Level dB L_{AF90} Night Time [Note A]	Suggested Criterion dB $L_{Aeq,15min}$
A	35	38
B	39	42
C	35	38
D	38	41
Average		40

Note A - During periods where people are preparing to sleep

[2] It is also to be noted that the noise criteria applied for this stage of the development are based on noise data and assessment obtained before Building A was operational and therefore addresses any concern of 'background creep'. Background creep is defined as an increase in the background noise levels due to constant addition of new noise sources in the environment.

Based on the review it is proposed that the design criterion of 40dB $L_{Aeq,15min}$ be adopted for the nearby residential properties to the west of the Proposed Development. Considering the typical Fingal County Council night time limit of 45dB(A) it is considered that the adopted goal represents a robust design criterion.

Previous Planning Permissions on this site

Reference is also made to noise conditions from two planning permissions for the other data centres on the site, namely FW17A.0025 Condition 11(v) and FW/19A/0087 Condition 16(v), each of which state the following:

> *v) During the Operational Phase noise emissions from the site shall be broadband in nature and free from audible tonal characteristics. In relation to site operations the following free field noise limits shall not be exceeded: - Day to Day Operation (Noise Sensitive & Schools) – 40dB $L_{Aeq,15min}$ - Day to Day Operation (Commercial) – 55dB $L_{Aeq,15min}$ - Emergency Operation (Noise Sensitive & Schools) – 55dB $L_{Aeq,15min}$*

Assessment of Significance

The 'Guidelines for Environmental Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in order to categorise the potential effect of changes in the ambient noise levels during the operational phases of the Proposed Development.

The guidelines state that for any assessment, the potential significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 10.12 below is based on an example scale within the IEMA guidelines. The corresponding significance of effect from in the EPA's EIA Report Guidelines (2022) is also presented.

Table 10.12 *Noise Effect Scale*

Noise Level Change dB(A)	Subjective Response	Impact Guidelines for Noise Impact Assessment Significance (Institute of Acoustics)	Effect Guidelines on the Information to be contained in EIARs (EPA)
0	No change	None	Imperceptible
0.1 – 2.9	Barely perceptible	Minor	Not Significant
3.0 – 4.9	Noticeable	Moderate	Slight, Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial	Significant
10.0 or more	More than a doubling or halving of loudness	Major	Profound

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise

represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels and have been used to assess the impact of operational noise.

Commercial Properties

A number of commercial / industrial properties are located in the vicinity of the site. In terms of noise emissions from the site it is considered that an appropriate noise criterion at these locations is 55dB $L_{Aeq,15min}$, which corresponds to the noise criterion for daytime periods in NG4.

Emergency Operation

In order to provide continuity of service a number of stand-by generators are integral to of the current proposal. These generators will only operate in a situation where there is a failure in the electricity supply from the national grid and will be tested routinely. Routine testing will be conducted during regular weekday daytime periods only. Section 4.4.1 of the Environmental Protection Agency (EPA) document "*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities*" (NG4 - 2016) contains the following comments in relation to emergency plant items:

> *'In some instances, …sites will have certain items of emergency equipment (e.g. standby generators) that will only operate in urgent situations (e.g. grid power failure). Depending upon the context, it may be deemed permissible for such items of equipment to give rise to exceedances in the noise criteria/limits during limited testing and emergency operation only. If such equipment is in regular use for any purposes other than intermittent testing, it is subject to the standard limit values for the site'.*

As generators will only run if there is a loss of power to the site, or for scheduled testing during daytime periods, the noise criterion of 55dB $L_{Aeq,T}$ on these emergency units is proposed. Generators will be designed and mitigated in order to achieve this design goal at nearby residential noise sensitive locations.

Recommended Criteria

Following review of relevant guidance, the following noise criteria are proposed for the Proposed Development:

Day to Day Operation (Noise Sensitive) – 40dB $L_{Aeq,15min}$
Day to Day Operation (Commercial) – 55dB $L_{Aeq,15min}$
Emergency Operation (Noise Sensitive) – 55dB $L_{Aeq,15min}$

Note plant noise emissions are to be designed such that they are not tonal and do not have impulsive characteristics at the nearest noise sensitive locations. The criteria proposed here are compatible with the current planning permission mentioned above.

Note that the above conditions are in line with the planning condition in relation to noise applied to permitted Buildings A, B and C. For clarity, it is stated that the design intent adopted is that the criteria above apply to Building E, F and G and any future development on the lands to the north as discussed in relation to the indicative future

development of an additional data centre. This is the same approach that was adopted as part of the original application submitted and approved in relation to Building A on the site.

10.2.6 Operational Phase – Vibration Guidance

Guidance as to an acceptable magnitude of vibration during the operational phase of the development is taken from British Standard *BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz).* The Standard contains recommendations that continuous vibration in residential buildings should not exceed nominally 0.3mm/s by daytime and 0.2mm/s by night-time.

It should be noted that the Proposed Development will not give rise to any significant levels of vibration off site and therefore the associated impact is not significant.

10.2.7 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise.*

Prediction calculations for building services noise, car park activity and vehicle movements on site have been conducted generally in accordance with ISO 9613 (1996): *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.*

Changes in road traffic noise on the local road network have been considered using prediction guidance contained within *Calculation of Road Traffic Noise (CRTN)* issued by the Department of Transport in 1988.

10.3 RECEIVING ENVIRONMENT

A series of noise surveys have been undertaken as part of the planning application prepared for the Proposed Development. Full details of the noise monitoring campaign are presented in Appendix 10.2 and Appendix 10.3.

10.3.1 Survey & Review Locations

Figure 10.3 illustrates the noise sensitive locations in the vicinity of the Proposed Development site. These are the closest sensitive representative receptors to the site.

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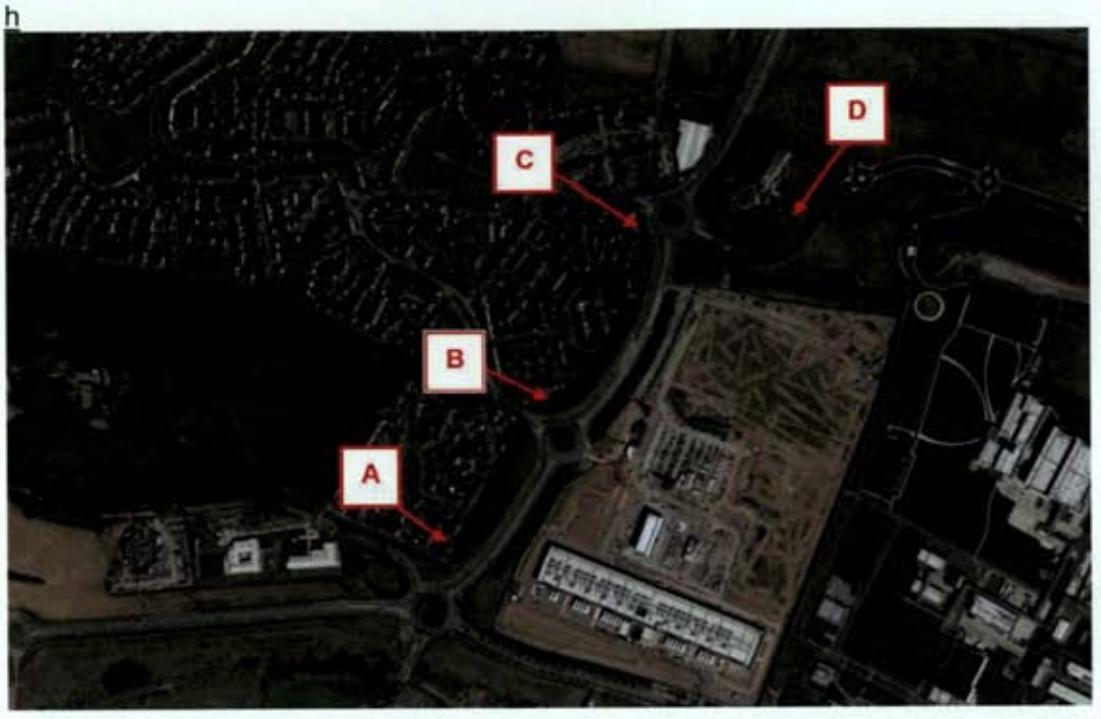

Figure 10.3 *Noise Survey Locations*

The noise survey locations are described below:

Location	Description	Photo
A	Location A (private estate) is located off Curragh Hall Gate at the kerbside as indicated on to the right and on Figure 10.3	

Location	Description	Photo
B	Location B (private estate) is located in the vicinity of a private house in the Ballentree estate facing the site as indicated right and on Figure 10.3	
C	Location C (private estate) is located in the vicinity of a private house within the Willow estate facing the site as indicated to the right and on Figure 10.3.	
D	Representative of a hotel located to the north of the site at a distance of some 160m from the nearest proposed structure on the site.	

10.3.2 Noise Levels from the 2016 Survey

In November 2016, a baseline noise survey was carried out by Enfonic. This was prior to the construction of Building A, i.e. the first of the data centre buildings on site. Full details are included in Appendix 10.2; a summary of the findings is presented in Table 10.13.

Road traffic noise, both distant and local was noted as the most significant source of noise and typically dictated ambient noise levels (i.e. $L_{Aeq,T}$) at the nearest noise sensitive locations to the site during daytime and night-time periods.

Aircraft activities associated with Dublin Airport along with plant noise and other typical noise sources expected in an suburban environment (e.g. pedestrian activity, dogs barking, etc.) were also noted as sources of noise.

Background noise levels (e.g. $L_{A90,T}$) at the various locations were typically dictated by distant road traffic noise and to a lesser extent localized mechanical plant noise (e.g. in the vicinity of the hotel). These levels fell as would be expected into the early hours the morning when the volume of traffic on the local and wider road network reduced Table 10.13 reviews the typical ambient and background noise levels at the sample locations discussed above:

Table 10.13. *Review of Typical Noise Levels*

Location	Period	Ambient dB $L_{Aeq,T}$	Background dB $L_{A90,T}$
A	Day	56 – 58	44 – 48
	Night	40 – 43	33 – 35
B	Day	57 – 58	45 – 52
	Night	42 – 47	34 – 39
C	Day	59 – 60	46 – 48
	Night	41 – 44	35
D	Day	54 – 59	45 – 49
	Night	43	38

These typical noise levels will be considered when discussing appropriate noise criteria in relation to the development.

10.3.3 Noise Levels of 2022 Survey

A updated noise survey was carried out in July 2022 . Full details are included in Appendix 10.3; a summary of the findings is presented here.

Building A was operational during this noise survey. Similarly, road traffic noise typically dictated ambient noise levels (i.e. $L_{Aeq,T}$) at the nearest noise sensitive locations to the site during daytime and night-time periods.

Aircraft activities associated with Dublin Airport along with plant noise and other typical noise sources expected in an suburban environment (e.g. pedestrian activity, dogs barking, etc.) were also noted as sources of noise.

Background noise levels (e.g. $L_{A90,T}$) at the various locations were typically dictated by distant road traffic noise and to a lesser extent mechanical plant noise. Table 10.14 reviews the typical ambient and background noise levels at the sample locations discussed above:

Table 10.14. *Review of Typical Noise Levels*

Location	Period	Ambient dB $L_{Aeq,T}$	Background dB $L_{A90,T}$
A	Day	57 – 59	49
	Night	46 – 49	38 – 41
B	Day	56 – 61	49 – 51
	Night	44 – 51	39 – 37
C	Day	57 – 63	48 – 50
	Night	46 – 47	41 – 43
D	Day	59 – 61	49 – 52
	Night	48 – 54	43 – 46

These typical noise levels will be considered when discussing appropriate noise criteria in relation to the development.

10.4 CHARACTERISTICS OF THE DEVELOPMENT

The Proposed Development will involve the construction of each of the proposed data centres and associated ancillary development. The buildings will be constructed on a phased basis with Building E constructed first, followed by Building F and then G.

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages:

- construction phase, and;
- operational phase.

The construction phase will involve extensive excavation, rock breaking, general site preparation over the development site and the erection of new buildings over a phased construction period. An assessment will also be presented in the following sections in relation to noise from construction traffic on local roads.

The primary sources of outward noise in the operational context are deemed long term and will involve:

- building services noise;
- emergency site operations, and;
- additional vehicular traffic on public roads.

These issues are discussed in detailed in the following sections.

10.5 POTENTIAL IMPACTS OF THE DEVELOPMENT

10.5.1 Construction Phase

It is predicted that the construction programme will create typical construction activity related noise on site. During the construction phase of the Proposed Development, a variety of items of plant will be in use, such as rock breakers, excavators, lifting equipment, dumper trucks, compressors and generators. It is anticipated that the construction of the Proposed Development will be completed during normal

construction hours i.e. 7am to 7pm Monday to Friday with a half day working on Saturday (8am-2pm).
However, it may be necessary, that the appointed contractors will need to carry out certain operations outside these hours, e.g. for concrete pours. Such occurrences will be notified to the local authority, where required and generally kept to a minimum. Where they do occur, contractors will ensure they take place over as short a timeframe as possible and as such are unlikely to cause excessive disturbance. In addition, permission from Fingal County Council would normally be required for such out-of-hours construction works. As a result, noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces. Due to the distances of the order of 150 m from sensitive locations to site works however, there is little likelihood of structural or even cosmetic damage to existing neighbouring dwellings as a result of vibration.

Based on the outline construction programme as per the CEMP submitted with this application, indicative construction noise levels have been calculated according to BS5228-1. Table 10.15 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

Standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this chapter.

Table 10.15. *Typical Noise Levels associated with Construction Plant Items*

Phase	Item of Plant (BS 5228-1 Ref.)	Construction Noise Level at 10m Distance (dB $L_{Aeq,1hr}$)
1 – Site Preparation	Pneumatic Breaker (C5.6)	95
	Rock Breaker (C9.12)	85
	Wheeled Loader Lorry (C2 28)	74
	Tracked Semi-Mobile Crusher (C9.14)	90
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
2 – Foundations	Large Rotary Bored Piling Rig – Cast In-Situ (C3.14)	83
	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (C3 19)	75
	Poker Vibrator (C4 33)	78
3 – Steel Erection	Tower Crane (C4.48)	76
	Sarens SCG 120 Crane	86
	Articulated lorry (C11.10)	77
4 – General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
5 – Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

A number of noise sensitive locations have been considered in relation to the Proposed Development as illustrated in Figure 10.4. The selected locations represent closest noise-sensitive locations around the site in a range of directions. Table 10.16 presents the predicted construction noise levels in the vicinity of the Proposed Development. Note for the purposes of this assessment it has been assumed that construction works are concentrated within the eastern boundary of the site in order to present a representation of a worst case impact of the development of Buildings F, G and E.

Table 10.16 *Review of Potential Daytime Construction Noise Impact*

Location	Construction Phase				
	Site Preparation	Foundations	Steel Erection	General Construction	Landscaping
R01	59	52	55	47	47
R02	60	53	56	48	48
R03	62	55	57	49	50
R04	62	55	57	50	50
R05	64	57	59	51	52
R06	62	55	57	50	50
R07	65	58	59	52	54
R08	63	56	58	52	51
R09	62	56	57	51	51
R10	60	54	55	49	48
R11	59	53	54	48	48
R12	59	53	53	47	47
R13	62	56	56	49	51
R14	44	37	39	31	32
R15	44	38	40	32	33

Figure 10.4 *Representative Noise Sensitive Locations*

There are no items of plant that would be expected to give rise to noise levels that would be considered out of the ordinary or in exceedance of the levels outlined in Table 10.6 or give rise to a significant impact through the process outlined in Table 10.16. The impact on the noise environment due to construction activities will be transient in nature and mitigation measures will be implemented to minimise the impact of construction activities on the noise environment.

Figures 10.5 to 10.9 present indicative contours for the various construction phases identified here. As a worst case scenario, these indicative contours assume all buildings are constructed at the same time; however, it is likely that the buildings will be constructed in a phased manner.

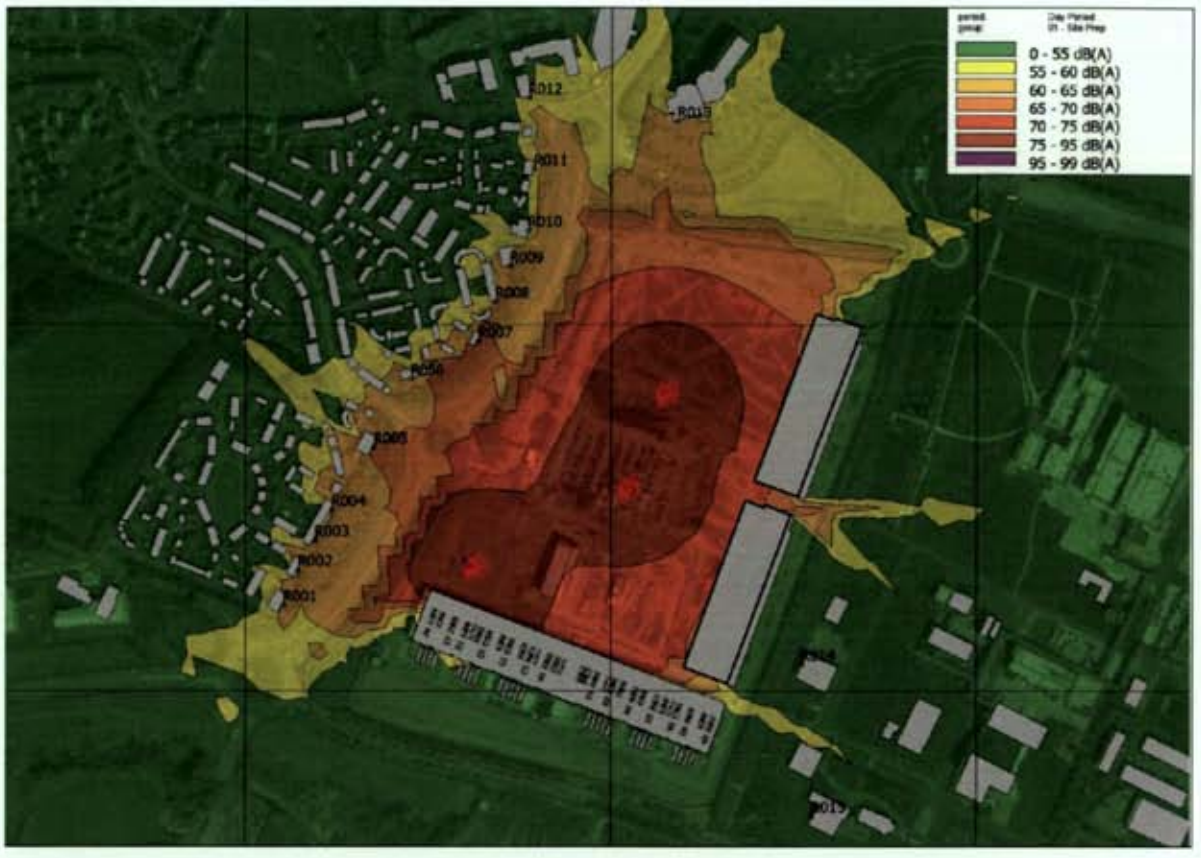

Figure 10.5 *Construction Noise Contour – Site Preparation*

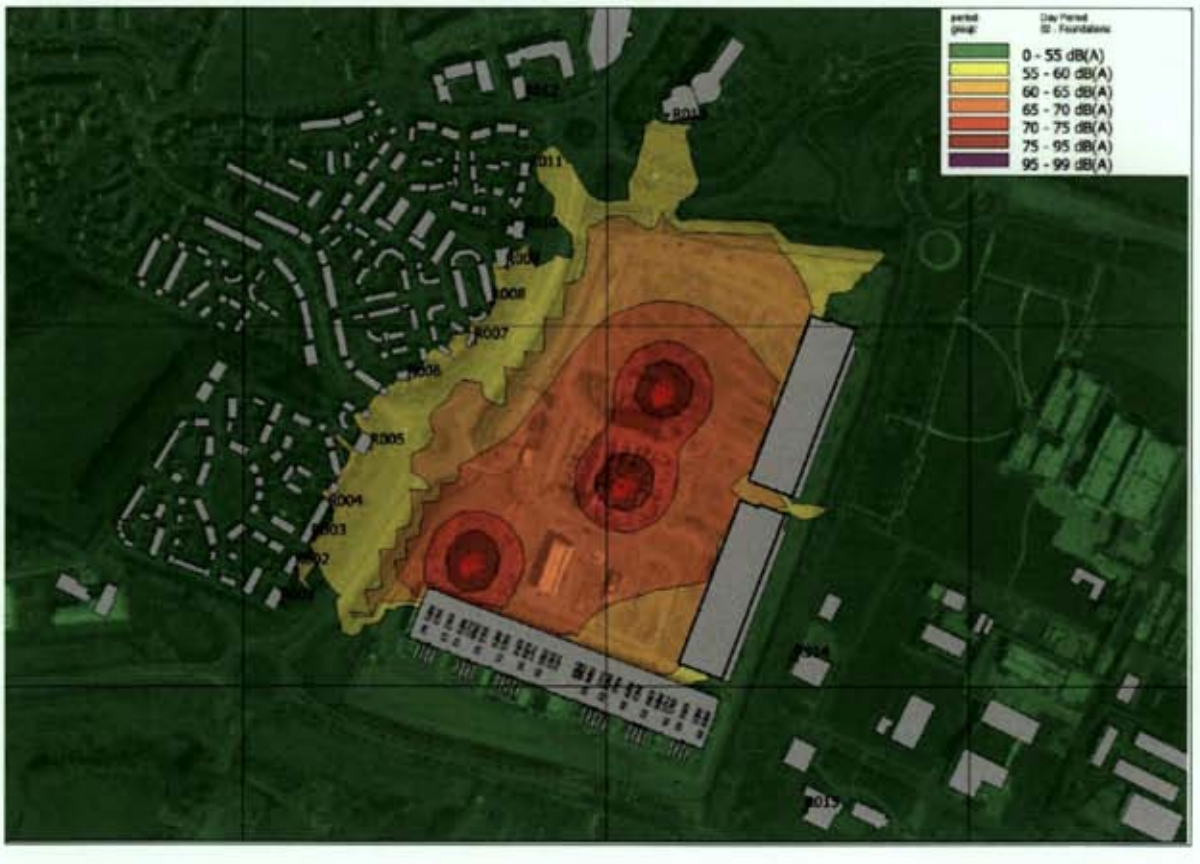

Figure 10.6 *Construction Noise Contour – Foundations*

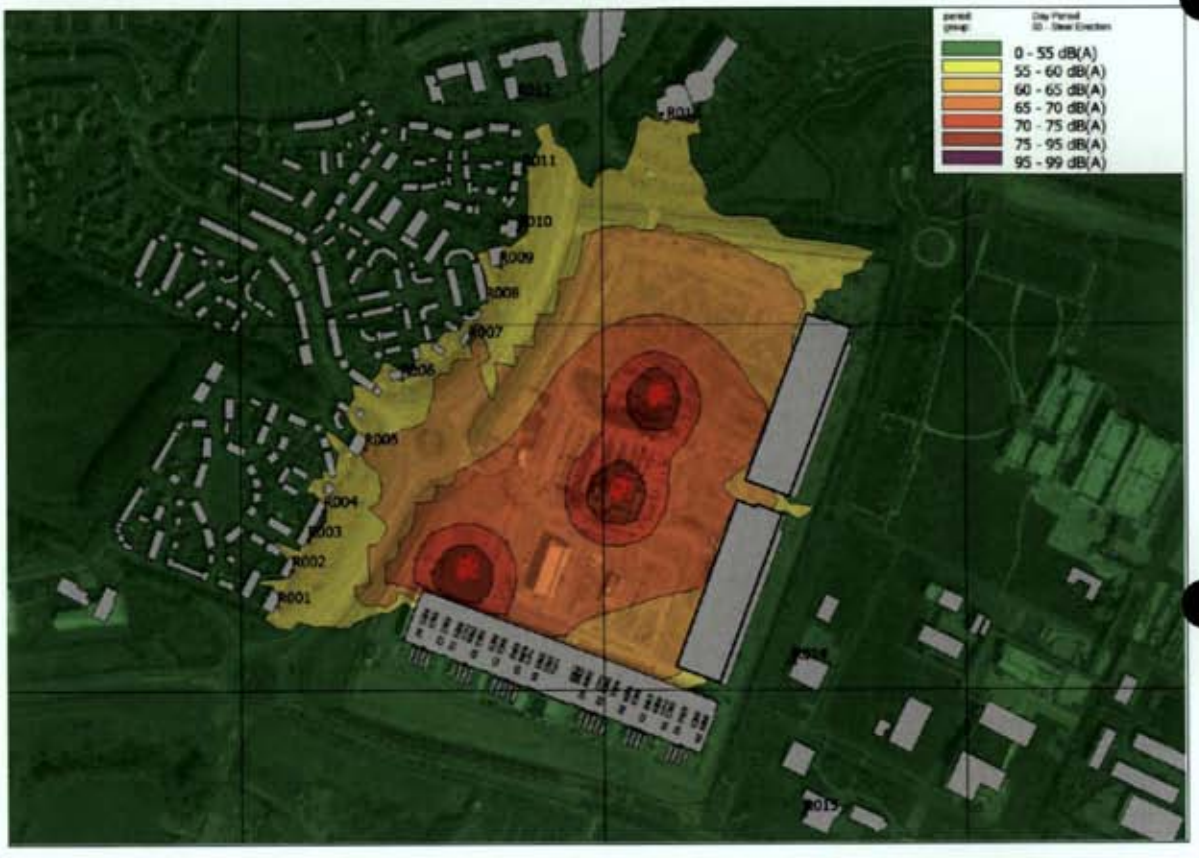

Figure 10.7 *Construction Noise Contour – Steel Erection*

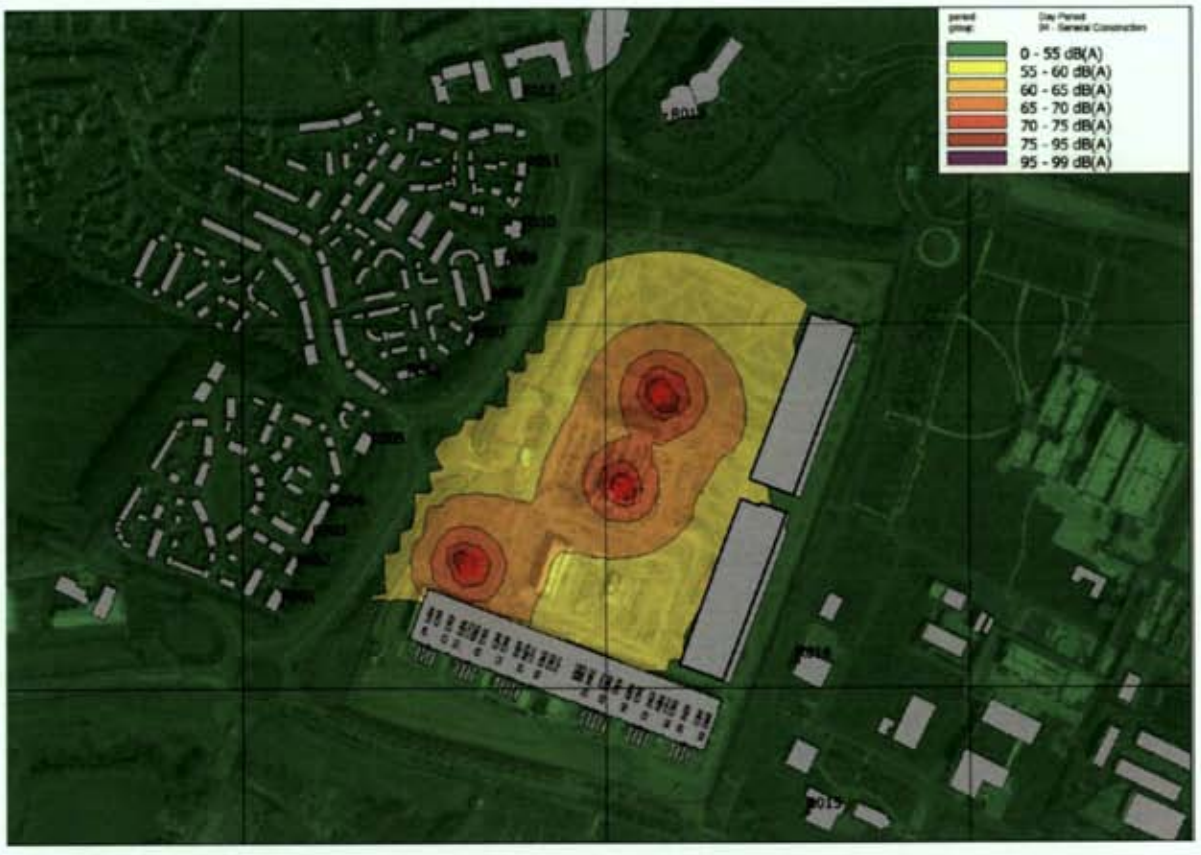

Figure 10.8 *Construction Noise Contour – General Construction*

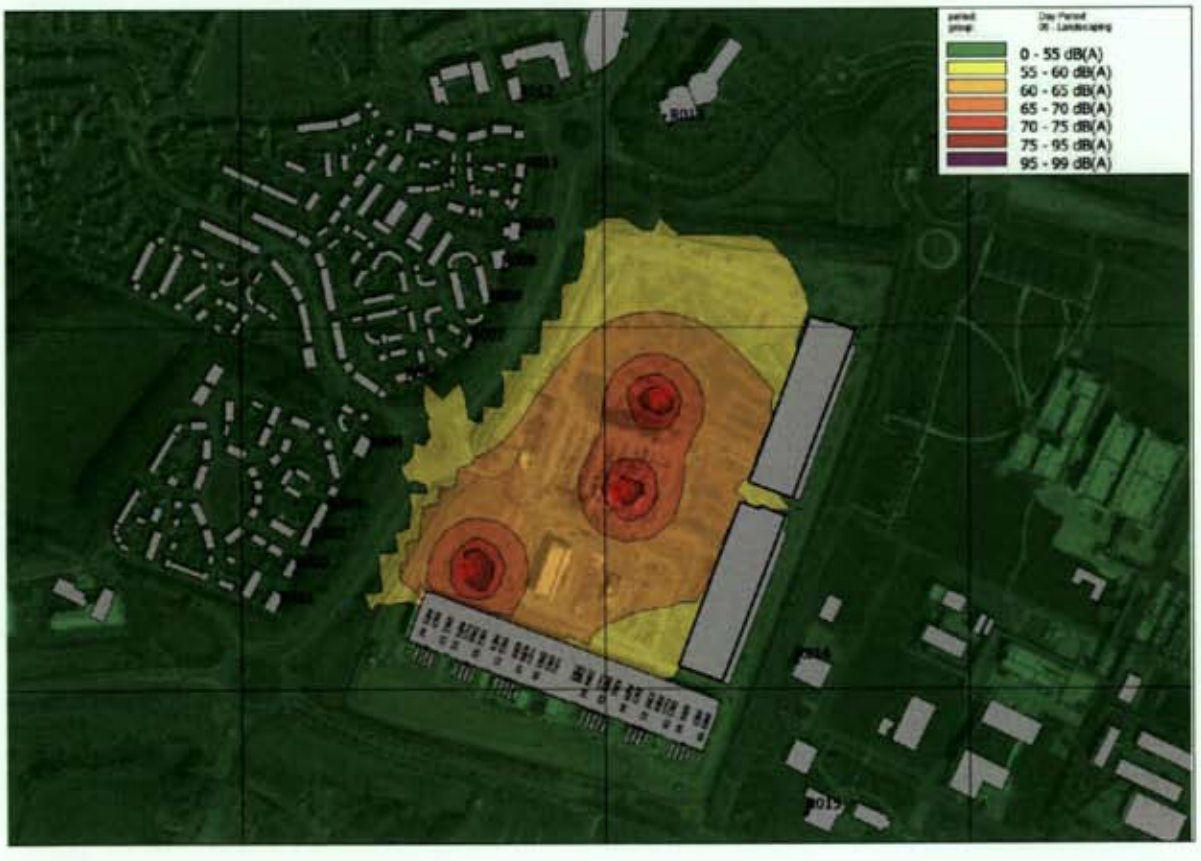

Figure 10.9 *Construction Noise Contour – Landscaping*

It is anticipated that the construction of the facility will be completed during normal construction hours i.e. 07:00 to 19:00hrs Monday to Friday. However, it is possible that the contractor may wish to carry out certain operations outside these hours i.e. Saturday working or evening hours during long summer days etc. Such occurrences will be kept to a minimum and take place over a short timeframe and as such are unlikely to cause excessive disturbance. Construction activity at these times, will be undertaken with the explicit permission of Fingal County Council.

Construction Traffic

This section has been prepared in order to assess likely noise effects associated with construction traffic using the local road network. Information presented at **Chapter 13**, regarding vehicle types and predicted traffic volumes, have been used to inform this assessment.

The likely noise effects of HGV movements are assessed through consideration of the cumulative noise level associated with a series of individual events. The noise level associated with an event of short duration, such as a vehicle drive-by, may be expressed in terms of its Sound Exposure Level (SEL; L_{Ax}). The SEL can be used to calculate the contribution of an event or series of events to the overall noise level in a given period. The appropriate formula, based on basic acoustic principles, is as follows:

$$L_{Aeq,T} = L_{Ax} + 10\log_{10}(N) - 10\log_{10}(T)\ dB$$

Where:

$L_{Aeq,T}$	is the equivalent continuous sound level over the time period T (s);
L_{Ax}	is the "A-weighted" Sound Exposure Level of the event under consideration (dB);
N	is the number of events over the course of time period T.

The mean value of Sound Exposure Level for a light vehicle is of the order of 72 dB L_{Ax} at a distance of 5m and that for a HGV movement is of the order of 85dB L_{Ax} also at 5m from the vehicle. This figure is based on a series of measurements conducted under controlled conditions.

Based on Chapter 13, Table 13.11, the peak hourly number of light vehicles is 88, and the peak number of HGV movements is 24. Predicted noise levels at 5m distance from the vehicle path are therefore, based on the above calculation, 64dB $L_{Aeq,1hr}$, which is within the construction noise criteria of 65dB $L_{Aeq,1hr}$. The associated effect is as follows:

Quality	*Significance*	*Duration*
Negative	Not significant	Short-Term

It terms of vibration, due to the distance of activities from the Proposed Development to the nearest sensitive locations and by controlling vibration levels to those detailed in Table 10.7, the associated effect as follows:

Quality	*Significance*	*Duration*
Neutral	Imperceptible	Short-Term

10.5.2 Operational Phase

The primary sources of outward noise from the Proposed Development in the operational context are deemed long term and will involve:

- building services noise;
- emergency site operations; and
- additional vehicular traffic on public roads.

These issues are assessed in detailed in the following sections. See Appendix 10.4 for details of the noise modelling undertaken for this assessment and associated input information.

Building Services Noise / Emergency Site Operation

Five scenarios have been developed to consider the noise impact of the proposed operations. These are as follows:

- Scenario A: Permitted Buildings A, B & C and Buildings E, F and G (Proposed Development) – Day to Day;
- Scenario B: Permitted Buildings A, B & C and Buildings E, F and G (Proposed Development) – Emergency Operations;
- Scenario C: Permitted Buildings A, B & C and Buildings E, F and G (Proposed Development) – Generator Testing;
- Scenario D: Permitted Buildings A, B & C and Buildings E, F and G development (Proposed Development) plus future indicative building – Day to Day;
- Scenario E: Permitted Buildings A, B & C and Buildings E, F and G development (Proposed Development) plus future indicative building – Emergency Operations;

Figure 10.4 highlights the nearest noise sensitive locations where predictions have been carried out. Noise contours are also presented for the stated scenarios in order to demonstrate the noise impact of the Proposed Development over a wider area in Figures 10.10, 10.11 and 10.12.

Scenario A would be considered to be the most representative of the day to day operation. Scenario B is representative of emergency situation when a power outage or issue with supply from the national grid has occurred and is therefore required to keep the data centres operation on electricity from the emergency generators. It should be noted that such an event is an extremely rare occurrence.

Scenario C considers the impact associated with the occasional testing of emergency generators. Only one generator unit will be tested at any one time. The predicted noise level for Scenario C presented here assume that the closest generator to existing noise sensitive locations is being tested..

In relation to Scenario D and E these consider day to day and emergency operations associated with the indicative masterplan development of the site. Detailed results for this aspect of the assessment are presented in Appendix 10.5 of this document. All cumulative noise levels remain within the criteria.

The results of the iterations of the noise model are presented and are compared to the relevant noise criteria as adopted for this assessment in Table 10.17. Note all plant

will be selected such that no tonal noise emissions are evident at noise sensitive locations.

It should be noted that the testing of generators shall take place only between 09.00 and 17.00hrs.

Table 10.17 *Comparison of Predicted Noise Levels vs. Adopted Noise Criteria*

Location	Scenario A			Scenario B			Scenario C		
	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies ?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies ?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies ?
R01	36	40	✓	54	55	✓	48	55	✓
R02	36		✓	53		✓	49		✓
R03	38		✓	52		✓	50		✓
R04	39		✓	51		✓	50		✓
R05	39		✓	53		✓	52		✓
R06	40		✓	52		✓	52		✓
R07	40		✓	51		✓	52		✓
R08	39		✓	53		✓	51		✓
R09	40		✓	54		✓	49		✓
R10	38		✓	54		✓	48		✓
R11	37		✓	53		✓	47		✓
R12	35		✓	52		✓	45		✓
R13	37		✓	53		✓	48		✓
R14	47	55	✓	50	N/A	✓	49	N/A	✓
R15	36		✓	54		✓	43		✓

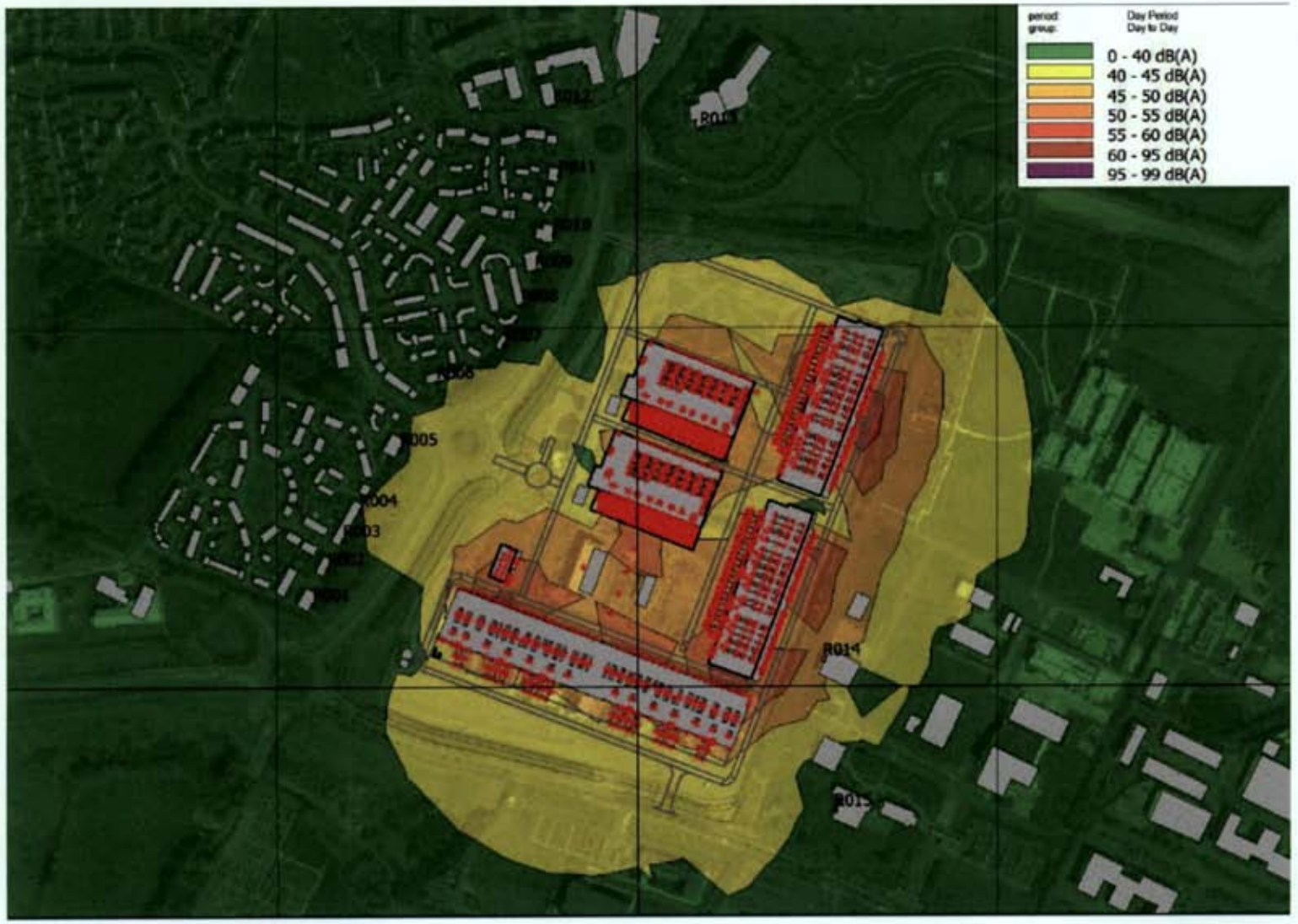

Figure 10.10 *Scenario A - Permitted Buildings A, B & C and Buildings E, F and G – Day to Day Noise Contour*

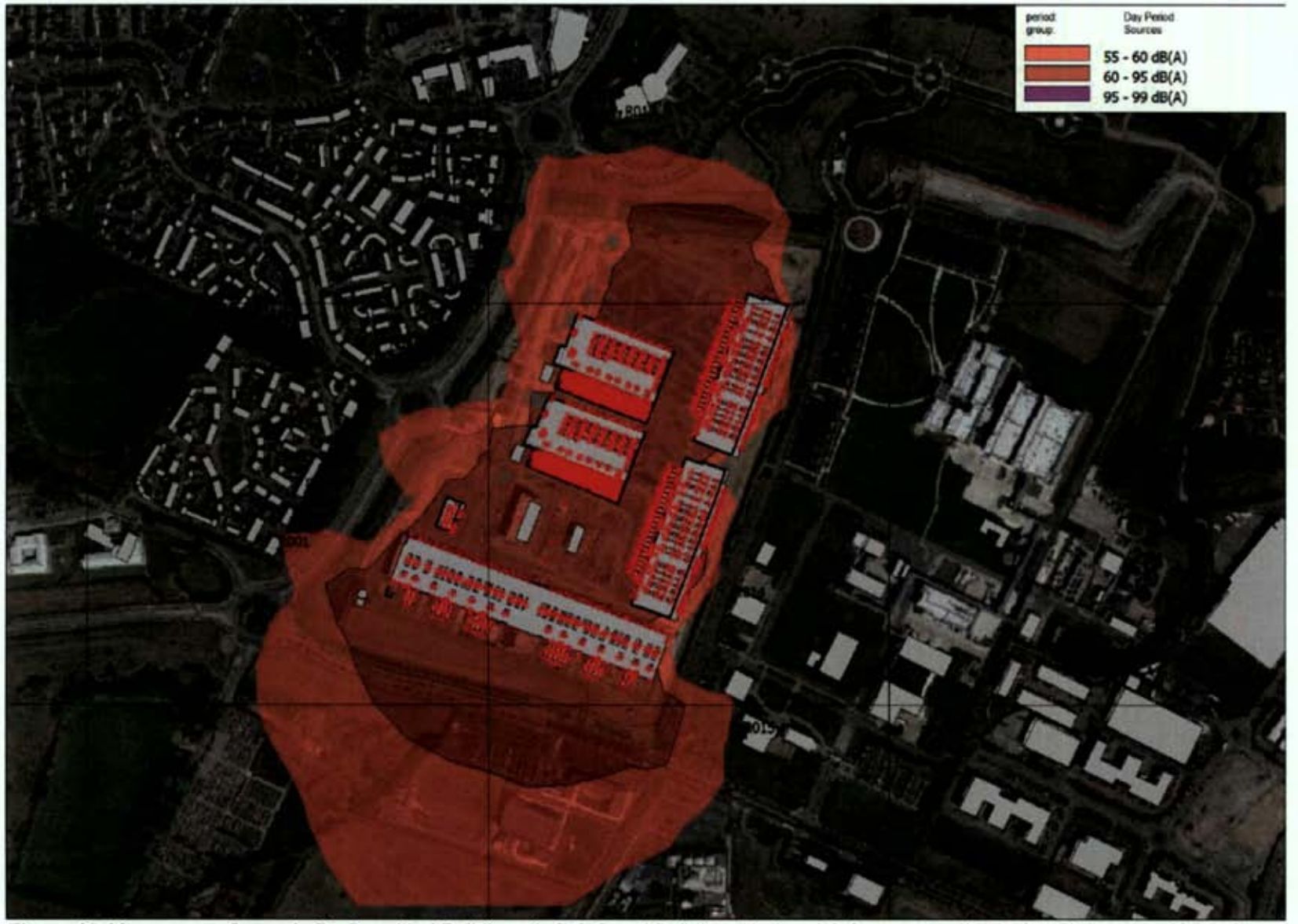

Figure 10.11. *Scenario B - Permitted Buildings A, B & C and Buildings E, F and G (current application) – Emergency Noise Contour*

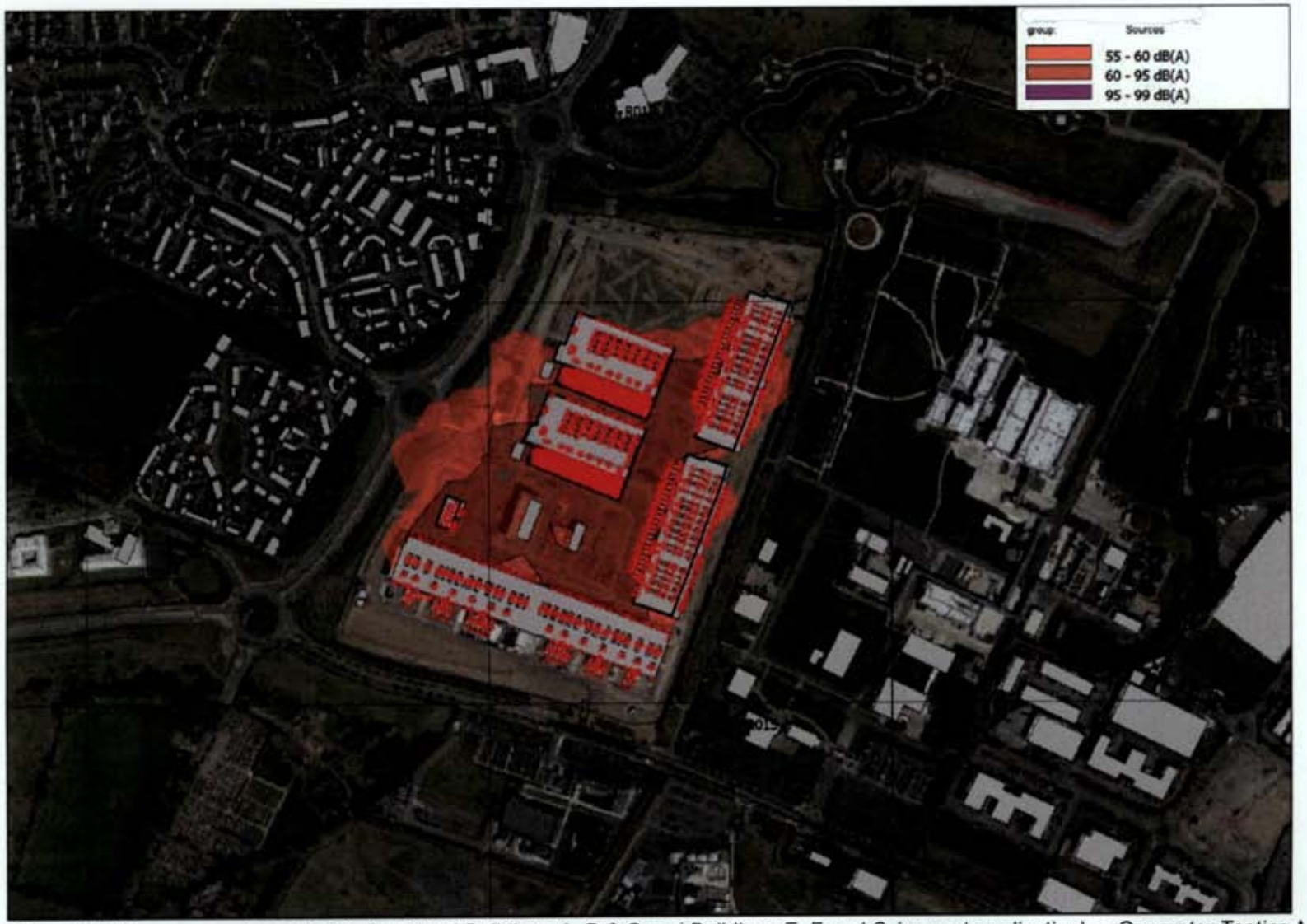

Figure 10.12. *Scenario C - Permitted Buildings A, B & C and Buildings E, F and G (current application) – Generator Testing Noise Contour*

Scenario A All locations are within the relevant adopted daytime and evening limits by a significant margin. All locations comply with the adopted criterion of 40dB $L_{Aeq,T}$ in relation to day to day operations. Figure 10.10 presents a noise contour for Scenario A.

Scenario B All locations are within the relevant adopted emergency operation limit of 55 dB $L_{Aeq,T}$ in the rare event that a power loss to the site occurs. Figure 10.11 presents a noise contour for Scenario B.

Scenario C All locations are within the relevant adopted daytime limits of 55 dB $L_{Aeq,T}$ by a significant margin during periods when a single generator is undergoing routine testing. Figure 10.12 presents a noise contour for Scenario C.

Summary

Scenario A is representative of the typical day to day operations envisioned for the site. Review of the predicted noise levels and associated noise contours confirms that the site specific levels comply with the noise criterion adopted for this assessment and are compliant with those typically espoused by Fingal County Council and applied to the Building A Permitted Development.

Scenario B is representative of emergency situations such as a power outage on the national grid. Review of the predicted noise levels and associated noise contours confirm that the site specific levels comply with the noise criterion that has been adopted for these situations following review of relevant guidance.

Scenario C is representative of the intermittent testing of generator units. Review of the predicted noise levels and associated noise contours confirm that the site specific levels comply with the relevant daytime noise criterion relevant to these proposed activities.

Review of Increases in Noise Level

Table 10.18 presents the predicted changes in noise level associated with the development at the nearest noise sensitive locations to the site.

Table 10.18 *Review of Predicted Changes in Existing Noise Levels*

Loc.	Scenario A – Typical Operation Daytime				
	Predicted dB $L_{Aeq,T}$	Background Level dB $L_{A90,T}$	Cumulative Noise Level (dB(A))	Change in Noise Level (dB)	EPA Glossary of Effects
R01	36	44	44.6	0.6	Imperceptible
R02	36	45	45.5	0.5	Imperceptible
R03	38	45	45.8	0.8	Imperceptible
R04	39	45	46.0	1.0	Not Significant
R05	39	45	46.0	1.0	Not Significant
R06	40	45	46.2	1.2	Not Significant
R07	40	45	46.2	1.2	Not Significant
R08	39	45	46.0	1.0	Not Significant
R09	40	46	47.0	1.0	Not Significant
R10	38	46	46.6	0.6	Imperceptible
R11	37	46	46.5	0.5	Imperceptible
R12	35	46	46.3	0.3	Imperceptible
R13	37	45	45.6	0.6	Imperceptible
Loc.	**Scenario A – Typical Operation Night Time**				
	Predicted dB $L_{Aeq,T}$	**Background Level dB $L_{A90,T}$**	**Cumulative Noise Level (dB(A))**	**Change in Noise Level (dB)**	**EPA Glossary of Effects**
R01	36	35	38.5	3.5	Slight
R02	36	39	40.8	1.8	Not Significant
R03	38	39	41.5	2.5	Not Significant
R04	39	39	42.0	3.0	Slight
R05	39	39	42.0	3.0	Slight
R06	40	39	42.5	3.5	Slight
R07	40	39	42.5	3.5	Slight
R08	39	39	42.0	3.0	Slight
R09	40	35	41.2	6.2	Moderate
R10	38	35	39.8	4.8	Slight
R11	37	35	39.1	4.1	Slight
R12	35	35	38.0	3.0	Slight
R13	37	38	40.5	2.5	Not Significant

Review of the predicted increases in noise level at the nearest noise sensitive locations conclude that the associated impact is 'imperceptible' or 'not significant' at all locations for Scenario A – Typical Operation during daytime periods. A 'not significant' or 'slight impact' is noted for all locations during night time periods with the exception of Location R09 where a moderate impact is predicted. It is however noted that the predictions presented here assume that day to day plant is operating at full/high duty which is a conservative assumption. In all likelihood the actual noise levels on the ground will be lower than those presented here. In essence the existing soundscapes that are encountered at the nearest noise sensitive locations are predicted to remain unchanged in terms of ambient noise levels with the development of the datacentre building introducing a low level of plant noise.

Additional Vehicular Traffic on Public Roads

In terms of the additional traffic on local roads that will be generated as a result of this development, the following comment is presented. With reference to Chapter 13, Section 13.5.2, the Proposed Development will not add a significant amount of additional traffic to the surrounding road network during operation. Considering that in order to increase traffic noise levels at nearby noise-sensitive locations by 1dB, traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to the Proposed Development will not result in a significant noise impact.

Summary of Operational Effects

In terms of noise associated with day to day activities the associated effect is stated to be as follows:

Quality	*Significance*	*Duration*
Negative	Slight to Moderate	Long Term

There are no source of vibration associated with the day to day operation of the development that will give rise to impacts at nearby noise sensitive locations. In terms of these the operational phase of the development the associated effect is stated to be

Quality	*Significance*	*Duration*
Neutral	Imperceptible	Long Term

10.6 REMEDIAL AND MITIGATION MEASURES

In order to sufficiently mitigate the likely noise impact, a schedule of noise control measures has been formulated for both construction and operational phases associated with the Proposed Development.

10.6.1 Construction Phase

With regard to construction activities, reference will be made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be applied during the construction of the Proposed Development. Specific examples of such measures are:

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration;
- Monitoring levels of noise and/or vibration during critical periods and at sensitive locations; and
- All site access roads will be kept even so as to mitigate the potential for vibration from lorries.

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

- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of barriers as necessary around items such as generators or high duty compressors; and
- Situate any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

It is recommended that during any rock breaking or similar vibration-generating works, vibration from construction activities to off-site residences be limited to the values set out in Table 10.7 through monitoring of vibration at the site boundary or at noise-sensitive locations. It should be noted that these limits in Table 10.7 are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%, as stated in BS5228.

Note - Appendix 10.6 presents an indicative construction noise and vibration management plan that will be considered in terms of the day to day operation of the site. This will focus on opening up and maintaining lines of communication with the local community to address issues in relation to noise and/or vibration and to advise the community of periods where specific activities take place (e.g. rock breaking) that have an increased potential noise and vibration generation.

10.6.2 Operational Phase

Building Services Noise / Emergency Site Operation

Noise from external plant will be minimised by purchasing low noise generating equipment and incorporating appropriately specified in-line acoustic attenuators or 'silencers' for stacks and exhausts where necessary. With due consideration as part of the detailed design process, this approach will result in the site operating well within the constraints of the best practice guidance noise limits that have been adopted as part of this detailed assessment.

Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

10.7 PREDICTED IMPACTS OF THE DEVELOPMENT

This section summarises the likely noise and vibration impact associated with the Proposed Development, taking into account the mitigation measures.

10.7.1 Construction Phase

During the construction phase of Proposed Development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e. as per Table 10.5, 10.6 and Section 10.2.4), along with implementation of appropriate noise and vibration control measures (as summarised in Section 10.6.1), will ensure that noise and vibration impact is kept to a minimum. Also it is reiterated that any construction noise effects will be ***slight, negative*** and ***short term*** in nature. Also, it is considered that as the project progresses from initial ground works that construction noise and vibration effects will be greatly reduced from slight to ***not significant***.

10.7.2 Operational Phase

Building Services Noise / Emergency Site Operation

Proprietary noise and vibration control measures have been employed including plant selection and acoustic screening, in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise effect is ***negative, slight to moderate*** and ***long-term***.

Additional Vehicular Traffic on Public Roads

Any change in noise levels associated with vehicles at road junctions in the vicinity of the Proposed Development is expected to be ***imperceptible***. The resultant noise effect is ***neutral, imperceptible*** and ***long term.***

10.8 RESIDUAL EFFECTS

The construction noise assessment has shown that in accordance with the 'significance' thresholds presented in the *British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise* there is not a significant impact at noise-sensitive locations in terms of ambient noise levels subject to appropriate management of the issues on the site.

The robust operational noise assessment of fixed plant associated with the proposed plant has shown that in accordance with the scale in the EPA EIA Report Guidelines 2022 there will be an ***slight*** to ***moderate, negative, long term*** effect at the closest residences identified on Figure 10.3. That aside, the predicted change in background noise level due to current application is the order of 1.0dB during daytime periods between 2 to 6dB during night time periods as shown in Table 10.18, while remaining within the criteria, as shown in Table 10.17. Ambient noise levels are and will continue to be dictated by road traffic noise in the area while a low level of plant noise is expected to be audible during lulls in other sources (e.g. distant traffic noise).

It is reiterated that the predictions presented here assume that day to day plant is operating at full/high duty which is a conservative assumption. In all likelihood the actual noise levels on the ground will be lower than those presented here.

In terms of the nearest commercial property a ***moderate, negative, long term*** effect is predicted however the character of the noise environment in the vicinity of this location will not be altered.

The operational noise assessment of vehicle movements associated with the site has shown that in accordance with the scale in the EPA EIA Report Guidelines 2022 there will be an imperceptible impact off site noise sensitive locations considering existing traffic volumes on the local road network. See Chapter 13 Traffic and Transportation for the traffic impact assessment.

The cumulative impact future indicative masterplan is addressed in Appendix 10.5. Cumulative impacts are also addressed in Chapter 16 of this EIA Report.

Interactions are addressed in Chapter 17 of this EIA Report.

10.9 REFERENCES

- Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (January 2016).
- EPA Guidelines on Information to be contained in Environmental Impact Statements (2002).
- Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016);
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 – Noise (2014);
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration (2014);
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration (1993);
- BS 6472: Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz) (1992);
- ISO 9613: Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation. (1996);
- BS 4142: 2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound (2019);
- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014);
- Design Manual for Roads and Bridges LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2, Highways England (2020);
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels (2017);
- Transport Infrastructure Ireland Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2014).

APPENDIX 10.1 – GLOSSARY OF ACOUSTIC TERMINOLOGY

ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
broadband	Sounds that contain energy distributed across a wide range of frequencies.
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 µPa).
dB L_{pA}	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
impulsive noise	A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous slow time weighted maximum sound level measured during the sample period (usually referred to in relation to construction noise levels).
$L_{Ar,T}$	The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

L_{AT}(DW)	equivalent continuous downwind sound pressure level.
L_{fT}(DW)	equivalent continuous downwind octave-band sound pressure level.
L_{day}	L_{day} is the average noise level during the day time period of 07:00hrs to 19:00hrs
L_{night}	L_{night} is the average noise level during the night-time period of 23:00hrs to 07:00hrs.
low frequency noise	LFN - noise which is dominated by frequency components towards the lower end of the frequency spectrum.
noise	Any sound, that has the potential to cause disturbance, discomfort or psychological stress to a person exposed to it, or any sound that could cause actual physiological harm to a person exposed to it, or physical damage to any structure exposed to it, is known as noise.
noise sensitive location	NSL – Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
octave band	A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.
rating level	See $L_{Ar,T}$.
sound power level	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m^2 where: $$Lw = 10Log\frac{P}{P_0}\ \text{dB}$$ Where: p is the rms value of sound power in pascals; and P_0 is 1 pW.
sound pressure level	The sound pressure level at a point is defined as: $$Lp = 20Log\frac{P}{P_0}\ \text{dB}$$
specific noise level	A component of the ambient noise which can be specifically identified by acoustical means and may be associated with a specific source. In BS 4142, there is a more precise definition as follows: 'the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval ($L_{Aeq,T}$)'.

tonal	Sounds which cover a range of only a few Hz which contains a clearly audible tone i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.
$^1/_3$ octave analysis	Frequency analysis of sound such that the frequency spectrum is subdivided into bands of one–third of an octave each.

APPENDIX 10.2 – BASELINE NOISE MONITORING SURVEY (2016)

TECHNICAL NOTE

Client: AWN
Date: 17/11/2016
Re: Attended noise survey, Cruiserath, Co. Dublin

1. SCOPE

AWN appointed Enfonic to carry out attended day and night time measurements at four Noise Sensitive Locations (NSLs) near lands at Cruiserath, Co. Dublin. The purpose of the monitoring was to establish a baseline noise level for the area.

2. METHODOLOGY

A night-time attended environmental noise survey was conducted on Thursday, November 10, 2016 between 23:50 and 02:40. During the night-time each of the four locations was measured twice (on a cyclical basis) for $L_{Aeq,\ 15\ mins}$ (broadband, 1/3 Octaves and spectral statistics).

The daytime noise survey was conducted on Monday, November 14, 2016 between 07:50 to 11:45. During the daytime each of the four locations was measured three times (on a cyclical basis) for $L_{Aeq,\ 15\ mins}$ (broadband, 1/3 Octaves and spectral statistics).

A Bruel & Kjaer Type 2250 Sound Level Meter was calibrated before use and verified afterwards – no calibration drift was observed. Details of the equipment used is contained in Appendix A. Measurements were made in accordance with ISO 1996-2:2007 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels.*

The night-time weather conditions were dry and calm, with a temperature of 2°C, low southerly winds of 2m/s and approximately 10% cloud cover. The daytime weather conditions were dry and calm, with a temperature of 13°C, southerly westerly winds of 5m/s and approximately 90% cloud cover.

Location A: Near 30 Curragh Hall Crescent. DD: 53.414633, -6.386789.

Location B: Ballentree Grove Estate DD: 53.416612, -6.384479.

Location C: Night-time –Willow Estate DD: 53.418315, -6.382647

Daytime – Proxy location 20m north of night-time location due to construction works being carried out at original location. DD: 53.418771, -6.382538

Tecpro House, IDA Business & Technology Park, Clonshaugh, Dublin 17, Ireland
E info@enfonic.com W www.enfonic.com T 01 877 5088
Directors: G. Duffy, S. Duffy Registered in Ireland No. 568524

TECHNICAL NOTE

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noise & vibration solutions

Location D: Carlton Hotel car park DD: 53.419001, -6.379770.

3. RESULTS

Tables 1-4 outline the measured baseline night-time and day-time $L_{Aeq,15min}$ for each of the four locations. The main noise sources for each 15 minute period were noted for all measurements.

As shown in Table 1 below, the night-time noise contributors at Location A was continuous distant road traffic with intermittent traffic on the R121. During the daytime the main noise contributors were from the R121 with intermittent local traffic, bird noises and aircraft flying over every 4 minutes.

Table 1: Night-time and daytime noise monitoring results from Location A

Project Name	Start Time	$L_{Aeq,15mins}$ (dB)	L_{AFmax} (dB)	L_{AFmin} (dB)	$L_{AF10.0}$ (dB)	$L_{AF90.0}$ (dB)	Notes
A – N1	10/11/2016 23:51	42.8	53.1	32.8	46.7	35.3	1, 2
A – N2	11/11/2016 01:23	39.8	55.2	30.7	43.0	33.0	1, 2
A- D1	15/11/2016 07:52	56.1	74.1	45.9	59.0	48.8	1, 3, 4
A- D2	15/11/2016 09:14	58.1	75.0	44.7	59.2	47.8	1, 3, 4
A- D3	15/11/2016 10:30	56.1	71.1	40.9	60.0	44.4	1, 3, 4

Notes:

1 Road traffic noise from R121
2 Distant road traffic noise
3 Local estate traffic
4 Aircraft flyover
5 Crows cawing intermittently
6 Birdsong
7 Dogs barking
8 Mechanical services
9 People passing by talking
10 House alarm
11 Intermittent angle grinder
12 Intermittent drilling

Table 2: Night-time and daytime noise monitoring results from Location B

Project Name	Start Time	$L_{Aeq,15mins}$ (dB)	L_{AFmax} (dB)	L_{AFmin} (dB)	$L_{AF10.0}$ (dB)	$L_{AF90.0}$ (dB)	Notes
B – N1	11/11/2016 00:15	47.1	59.0	34.7	50.6	39.2	1, 2
B – N2	11/11/2016 01:44	41.5	56.3	31.8	45.0	34.3	1, 2, 7, 8
B- D1	15/11/2016 08:10	57.1	71.3	48.0	59.0	51.7	1, 4, 9, 10
B- D2	15/11/2016 09:32	57.7	71.8	43.1	59.3	47.3	1, 4, 6 9
B- D3	15/11/2016 10:50	58.1	75.8	40.5	59.4	45.0	1, 4, 6, 9

Tecpro House, IDA Business & Technology Park, Clonshaugh, Dublin 17, Ireland
E info@enfonic.com W www.enfonic.com T 01 877 5088
Directors: G. Duffy, S. Duffy Registered in Ireland No. 368524

Notes:

1 Road traffic noise from R121
2 Distant road traffic noise
3 Local estate traffic
4 Aircraft flyover
5 Crows cawing intermittently
6 Birdsong
7 Dogs barking
8 Mechanical services
9 People passing by talking
10 House alarm

As shown in Table 2 on the previous page, at Location B the night-time noise contributors were continuous distant road traffic with intermittent traffic on the R121. During the B-N2 measurement, mechanical services from the retail park were audible, approximately 200m to the north east of the monitoring location. During the day time the main noise contributors were from the R121 with intermittent aircraft flyover and bird noises.

As shown in Table 3 below, the night-time noise contributors at Location C was continuous distant road traffic with intermittent traffic on the R121. When the road traffic noise was minimal the mechanical services from the nearby retail park (100m north of monitoring location) and the hotel (100m to north east of monitoring location). During the day time the main noise contributors were from the R121 with intermittent local traffic and aircraft flying over every 4 minutes. There was audible intermittent angle grinding and drilling from the original night-time location during the measurement C-D2 and C-D3.

Table 3: Night-time and daytime noise monitoring results from Location C

Project Name	Start Time	$L_{Aeq,\ 15mins}$ (dB)	L_{AFmax} (dB)	L_{AFmin} (dB)	$L_{AF10.0}$ (dB)	$L_{AF90.0}$ (dB)	Notes
C – N1	11/11/2016 00:38	44.1	59.4	32.9	46.6	35.1	1, 2, 4, 8
C – N2	11/11/2016 02:06	41.1	58.2	32.1	43.0	34.7	1, 2, 8
C- D1	15/11/2016 08:31	59.0	72.6	50.3	60.3	53.0	1, 3, 4
C- D2	15/11/2016 09:51	59.0	72.1	43.2	62.0	48.1	1, 3, 4, 6, 11
C- D3	15/11/2016 11:08	60.1	76.8	38.8	62.6	45.6	1, 3, 4, 12

Notes:

1 Road traffic noise from R121
2 Distant road traffic noise
3 Local estate traffic
4 Aircraft flyover
5 Crows cawing intermittently
6 Birdsong
7 Dogs barking
8 Mechanical services
9 People passing by talking
10 House alarm
11 Intermittent angle grinder
12 Intermittent drilling

TECHNICAL NOTE

As shown in Table 4 below, the main night-time noise contributors at Location D were continuous distant road traffic with intermittent traffic on the R121. The mechanical services from the roof of the hotel were continuously audible. During the day time the main noise contributors were from the R121 with intermittent aircraft flyover, bird noises, buses parked in idle 50m south of the car park and construction noise from site.

Table 4: Night-time and daytime noise monitoring results from Location D

Project Name	Start Time	$L_{Aeq,\ 15mins}$ (dB)	L_{AFmax} (dB)	L_{AFmin} (dB)	$L_{AF10.0}$ (dB)	$L_{AF90.0}$ (dB)	Notes
D – N1	11/11/2016 01:01	43.1	54.6	35.8	45.9	38.2	1, 2, 3, 8
D – N2	11/11/2016 02:25	43.4	56.0	36.6	46.6	38.2	1, 2, 3, 8
D- D1	15/11/2016 08:50	54.2	70.9	46.0	56.1	49.0	1, 4, 3, 8
D- D2	15/11/2016 10:10	56.9	73.6	42.5	56.5	45.7	1, 4, 6, 13
D- D3	15/11/2016 11:27	58.5	78.2	41.6	58.9	44.5	1, 4, 6, 12

Notes:

1 Road traffic noise from R121
2 Distant road traffic noise
3 Local estate traffic
4 Aircraft flyover
5 Crows cawing intermittently
6 Birdsong
7 Dogs barking
8 Mechanical services
9 People passing by talking
10 House alarm
11 Intermittent angle grinder
12 Intermittent drilling
13 Buses parked in idle

4. CONCLUSIONS

The main noise contribution at night was from the R121 (intermittently) and from distant road traffic in the area. Location C and D also had audible mechanical services noise from the retail park and hotel. During the daytime the R121 was the main noise contributor with intermittent aircraft flying over every 4 minutes.

END
For and on behalf of Enfonic Ltd

Aoife Kelly

Aoife Kelly, PhD
Acoustic Engineer

Tecpro House, IDA Business & Technology Park, Clonshaugh, Dublin 17, Ireland
E info@enfonic.com W www.enfonic.com T 01 877 5088

APPENDIX 10.3 – BASELINE NOISE MONITORING SURVEY (2022)

Baseline Noise Survey Locations

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

The noise measurement locations were selected to represent the noise environment at the NSLs surrounding the Proposed Development.

The monitoring locations are discussed below and shown in Figure 1:

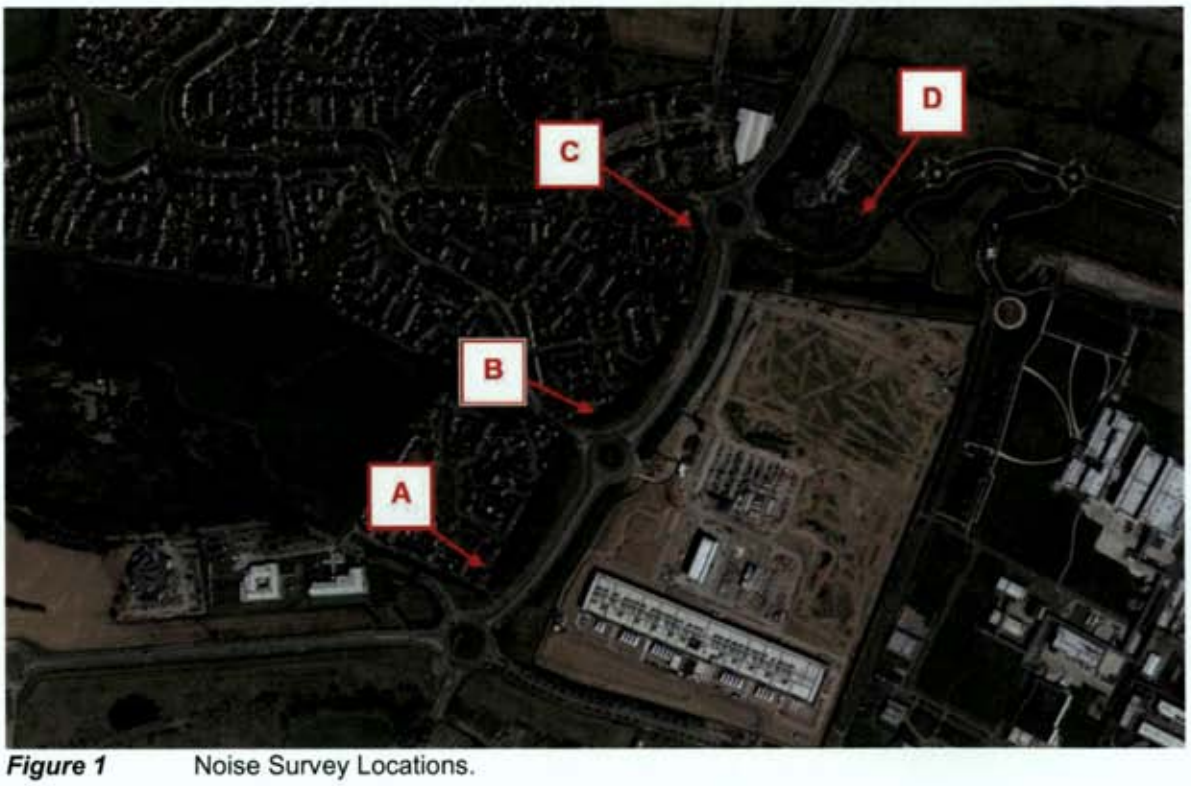

Figure 1 Noise Survey Locations.

Location	Description	Photo
A	Location A (private estate) is located off Curragh Hall Gate at the kerbside as indicated on to the right and on Figure 10.3	
B	Location B (private estate) is located in the vicinity of a private house in the Ballentree estate facing the site as indicated right and on Figure 10.3	

C Location C (private estate) is located in the vicinity of a private house within the Willow estate facing the site as indicated to the right and on Figure 10.3.

D Representative of a hotel located to the north of the site at a distance of some 160m from the nearest proposed structure on the site.

Survey Periods

Attended noise measurements were conducted from 10:11 hrs on 6 July to 01:31 hrs on 7 July 2022.

The weather during the survey period was mainly dry with varying cloud cover. Wind speeds were light to moderate; however, they were not considered to have had a detrimental effect on the noise measurements.

Personnel and Instrumentation

AWN Consulting installed and collected the equipment. Measurements were performed using the following instrumentation:

Survey	Equipment Model	Serial Number	Calibration date
Noise (Attended)	Rion NL-42	3028635	March 2021

Table 1 Noise Monitoring Equipment Details

Noise Measurement Parameters

The noise survey results are presented in terms of the following parameters.

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix for the noise parameters denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

The survey results for the daytime attended monitoring are given in Table 2.

Location	Start Time (hrs)	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		$L_{Aeq,15min}$	L_{A90}
A	10:40	57	49
	10:51	58	49
	11:07	59	49
B	11:15	56	49
	11:33	61	50
	11:50	61	51
C	12:15	63	49
	12:38	59	50
	12:53	58	48
D	13:17	59	49
	13:32	61	51
	13:48	61	52

Table 2 Summary of Attended Results - Daytime

At Location A, noise levels were in the range 57 to 59 dB $L_{Aeq,15min}$ and of the order of 49 dB $L_{A90,15min}$. Road traffic on the R121 was the dominant source of noise; birdsong and a degree of wind noise in foliage were also audible. Aircraft fly-overs were audible at intervals of approximately 5 mins.

At Location B, noise levels were in the range 56 to 61 dB $L_{Aeq,15min}$ and in the range 49 to 51 dB $L_{A90,15min}$. Road traffic on the R121 was the dominant source of noise; birdsong and a degree of wind noise in foliage were also audible. Aircraft fly-overs were audible at intervals of approximately 5 mins.

At AT2, Noise levels were in the range 54 to 61 dB $L_{Aeq,15min}$ and 50 to 52 dB $L_{A90,15min}$. Traffic and construction activity were the dominant noise sources.

At AT3, Noise levels were in the range 52 to 56 dB $L_{Aeq,15min}$ and 49 to 51 dB $L_{A90,15min}$. Traffic and construction activity at a location to the east were the dominant noise sources.

The survey results for the evening time attended monitoring are given in Table 13.

Location	Start Time (hrs)	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		$L_{Aeq,15min}$	L_{A90}
A	19:29	55	48
	19:45	55	48
	20:00	54	45

Location	Start Time (hrs)	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		$L_{Aeq,15min}$	L_{A90}
B	20:22	54	50
	20:38	82	50
	20:53	58	50
C	21:16	52	46
	21:31	59	48
	21:54	58	49
D	22:15	51	45
	22:30	57	49
	22:45	54	45

Table 3 Summary of Attended Results - Evening Time

During the evening periods, the noise levels at the noise survey locations ranged from 46 to 58 dB L_{Aeq} and 41 to 46 dB L_{A90}. Although reduced, traffic was the dominant noise source, along with Luas movements at location AT1.

The survey results for the night-time attended monitoring are given in Table 14.

Location	Start Time (hrs)	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		$L_{Aeq,15min}$	L_{A90}
A	01:15	49	38
	01:31	46	41
B	00:40	44	37
	00:55	51	39
C	23:30	48	43
	00:20	46	41
D	23:00	54	44
	23:16	52	46

Table 4 Summary of Attended Results – Night-time

During the night-time time periods, the noise levels at the noise survey locations ranged from 46 to 55 dB L_{Aeq} and 41 to 47 dB L_{A90}. Distant was the dominant noise source, along a degree of mechanical plant noise from the nearby commercial buildings at location AT3.

APPENDIX 10.4 – NOISE MODELLING DETAILS & ASSUMPTIONS

Noise Model

A 3D computer-based prediction model has been prepared in order to quantify the noise level associated with the proposed building. This section discusses the methodology behind the noise modelling process.

DGMR iNoise

Proprietary noise calculation software has been used for the purposes of this modelling exercise. The selected software, DGMR iNoise, calculates noise levels in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996.*

DGMR iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. iNoise calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A weighted sound power levels (LWA);
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

Brief Description of ISO9613-2: 1996

ISO9613-2:1996 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT}(DW)$, for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately 1ms-1 and 5ms-1, measured at a height of 3m to 11m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground based temperature inversion, such as commonly occurs on clear calm nights.

The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{fT}(DW) = LW + Dc - A \qquad \textbf{Eqn. A}$$

Where:
$L_{fT}(DW)$ is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to $2x10^{-5}Pa$;
L_W is the octave band sound power of the point source;
D_c is the directivity correction for the point source;
A is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The estimated accuracy associated with this methodology is shown in Table 1 below:

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

Table 1 Estimated Accuracy for Broadband Noise of $L_{AT}(DW)$

* h is the mean height of the source and receiver. † d is the mean distance between the source and receiver.
N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Input Data and Assumptions

The noise model has been constructed using data from various source as follows:

Site Layout The general site layout has been obtained from the drawings forwarded by HJL Architects.

Local Area The location of noise sensitive locations has been obtained from a combination of site drawings provided by the project architects and others obtained from Ordinance Survey Ireland (OSI).

Heights The heights of buildings on site have been obtained from site drawings forwarded by HJL Architects. Off-site buildings have been assumed to be 8m high with the exception of industrial buildings where a default height of 15m has been assumed.

Contours Site ground contours/heights have been obtained from site drawings forwarded by HJL Architects where available.

The final critical aspect of the noise model development is the inclusion of the various plant noise sources. Details are presented in the following section.

Source Sound Power Data

The noise modelling competed indicates the following limits in relation to various items of plant associated with the overall site development. Plant items will be selected in order to achieve the stated noise levels and or appropriate attenuation will be incorporated into the design of the plant/building in order that the plant noise emission levels are achieved on site (including any system regenerated noise).

Source	L_{wA} - Octave Band Centre Frequency								dB (A)
	63	125	250	500	1k	2k	4k	8k	
Roof Fan Central Area Note A	58	67	80	82	78	74	71	64	85
Roof Fan Remainder of roof Note A	56	65	67	68	68	68	60	55	75
DH CR ER Supply (Roof) Note B	65	75	76	71	63	60	53	48	72
Electrical Room CRAH Note C	55	68	66	69	60	66	66	57	75
AHU Louvre (per unit) Note D	55	58	69	68	62	63	65	61	74
Generator Exhaust Note E	54	63	74	73	66	67	71	66	79
Generator Intake Note E	88	90	82	83	83	80	78	76	94
Generator Rear Note E	88	90	82	83	83	80	78	76	94
Generator Stack Note F	84	77	77	73	69	74	71	71	86
Generator Sides & Roof Note E	82	93	92	94	94	93	88	75	101
Pumps Note G	38	48	55	65	64	65	61	52	70
110kvA Transformer (x 4)	54	66	69	74	72	68	63	53	78

Table 2 L_{wA} levels Utilised in Noise Model – Building A

Note A *It is assumed the relevant Lw associated with the roof fan(s) is 85dB(A) as* detailed in supplied data sheets (i.e. Dannan Data "Data Hall EX Fan" BUILDING A Building A Site Noise Sources spreadsheet). Provision of atmosphere side attenuation to reduce the exhaust L_{wA} level of 75dB as detailed in Table 1 is required and has been assumed for all fans with the exception for 14 no units in the central area of the roof, where a unattenuated sound power level of 85 dB(A) applied.

Note B It is assumed the relevant L_w associated with the roof fan(s) is 72dB(A) as detailed in supplied data sheets (i.e. Dannan Data for *Fresh Air Inlet Connection* "Electrical Room CRAH" Building A Site Noise Sources spreadsheet).

Note C It is assumed the relevant L_w associated with electrical room extract fan(s) is 91dB(A) as detailed in supplied data sheets (i.e. Data for "Electrical Room EX Fan" Building A Site Noise Sources spreadsheet). Provision of in line attenuation offering the following minimum sound reduction has been assumed:

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Splitter	6	8	13	15	18	12	9	8
Filter	0	2	2	2	4	7	7	12

Note D It is assumed the relevant L_w associated with the roof fan(s) is 84dB(A) as detailed in supplied data sheets (i.e. Dannan Data "Data Hall AHU" Building A Site Noise Sources spreadsheet). Provision of atmosphere side attenuation to reduce the exhaust L_{wA} level of 74dB as detailed in Table 1 is required.

Element	Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Attenuator	6	12	15	20	20	20	20	20
Filter	0	2	2	2	4	7	7	12

Note E Assuming generator housing dimensions of 17m (L) x 4m (W) x 4m (H). Data based on CAT data supplied in relation to previous sites.

Note F Additional attenuation due to 20m stack and additional bends assumed.

Note G Acoustic enclosures will be provided for external pumps in order that the stated noise levels in Table 10.4.2 are achieved.

Source	L_{wA} - Octave Band Centre Frequency								dB (A)
	63	125	250	500	1k	2k	4k	8k	
Roof Fan Note H	61	70	78	81	77	77	75	68	86
AHU Louvres	43	59	60	62	60	59	56	45	68
Electrical Room Extract Fan Note I	43	63	62	62	50	46	29	17	67
Catcher Room Extract Fan Note I	43	63	62	62	50	46	29	17	67
Generator Intake Note J	81	80	76	73	63	61	55	69	85
Generator Rear Note J	84	78	68	67	69	67	70	62	86
Generator Stack Note K	84	78	68	67	69	67	70	62	86
Generator Sides & Roof Note J	78	87	86	82	76	65	53	55	91
220kVA Transformer Note L	58	70	73	78	76	72	67	57	82

Table 3 *L_{wA} levels Utilised in Noise Model – Building B and C*

Note H *SAE-DUB064 sound source Noise Test Ext.PDF. For the purposes of this assessment it has been assumed that all fans are operating on 80% duty (this results is some 5.5dB reduction in fan noise).*

Note I *6054-DUB064-CRAH UNITS - SOUND CALCS - 250Pa ESP - REV A - 23-03-2018*

Note J *Assuming generator housing dimensions of 15m (L) x 3.6m (W) x 3. 7m (H). Data based on Cummings data.*

Note K Additional attenuation due to 20m stack and additional bends assumed.

Note L The following extract from *the "EirGrid Evidence Based Environmental Studies Study 8: Noise – Literature review and evidence based field study on the noise effects of high voltage transmission development (May 2016)* states the following in relation to noise impacts associated with 220KvA transformer installations:

"The survey on the 220kv substation at Gorman indicated that measured noise levels (LAeq) were approximately 43dB(A) at 5m from the most affected boundary of the substation. This is marginally above the WHO night-time threshold limit for preventing disturbance to sleep (i.e. 42dB). Spectral analysis of the noise from the Gorman substation demonstrated that there are a number of distinct tonal elements to noise in the low to mid frequency range. To avoid any noise impacts from 220kV substation at sensitive receptors, it is recommended that a distance of 20m is maintained between the nearest site boundary and the nearest sensitive receptor."

Considering the distance between the 220kV substation and the nearest off site locations of some 240m noise from this installation is not predicted to be an issue off site.

Source	L_w - Octave Band Centre Frequency								dB (A)
	63	125	250	500	1k	2k	4k	8k	
Admin AHU Outlet	47	65	67	81	85	82	81	70	89
Admin AHU Top	41	59	61	74	78	76	72	62	81
Admin AHU Side	41	59	60	74	77	75	71	62	81
Admin AHU End	37	55	57	70	73	71	67	58	77
VRF Condensers	57	69	75	84	82	80	78	75	88
Split Condenser	38	50	56	65	63	61	59	56	69
Extract Fans	61	68	75	77	75	74	77	73	83
ER Condensers	--	62	66	67	71	69	61	52	75
Main Gens Side	74	77	87	76	74	70	66	73	88
Main Gens Front	79	84	83	66	64	68	81	99	99
Main Gens Rear	69	72	82	71	69	65	61	68	83
Main Gens Top	74	77	87	76	74	70	66	73	88
Main Gens Discharge	83	86	87	77	75	76	78	97	98
Exhaust Outlet	84	95	97	89	90	90	86	74	101
House Gens Side	80	96	89	95	95	96	90	94	103
House Gens Front	78	86	86	86	88	89	83	78	95
House Gens Rear	84	94	77	69	68	66	66	76	95
House Gens Top	86	100	97	96	97	97	92	93	105
House Gens Roof - Discharge	84	97	81	62	64	65	70	93	98
House Gen Exhaust Outlet	68	77	70	70	69	69	64	58	80

Table 4 L_{wA} levels Utilised in Noise Model – Building F and G

Note The generator area is enclosed by an acoustic louvre of the following sound insulation performance.

Sound Insertion Loss dB – Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
6	7	10	12	18	18	14	13

Source	L_w - Octave Band Centre Frequency								dB (A)
	63	125	250	500	1k	2k	4k	8k	
Admin AHU Inlet	38	52	60	66	60	57	54	52	68
Admin AHU Outlet	46	62	73	77	79	76	70	66	83
Condensers	51	64	67	73	77	74	69	63	81
Generator Sides	82	89	95	89	84	74	63	65	97
Generator Inlet	81	85	89	79	67	63	68	90	94
Generator Top	73	88	91	93	95	96	95	86	102
Generator Discharge	80	86	85	73	76	74	69	88	92
Generator Stack	61	76	79	81	83	84	83	74	90

Table 5 L_{wA} levels Utilised in Noise Model – Building E

Figure 1 Image of Developed Noise Model.

APPENDIX 10.5 – COMMENT ON INDICATIVE MASTERPLAN DEVELOPMENT

In order to inform the current assessment consideration was given to the development of the lands to the west considering the indicative masterplan. The primary purpose of this in terms of noise is to give a level of comfort that the overall development can operate within the proposed noise criteria outlined in this assessment and to allocate a 'proportion' of the noise criteria to the current proposal.

In relation to Scenario D and E these consider day to day and emergency operations associated with the indicative masterplan development. Source noise levels for the buildings to the west of the site are based on the day to day and generator plant detailed in Table 4 in Appendix 10.4.

Figure 10.4 in the main chapter highlights the nearest noise sensitive locations where predictions have been carried out to. Various noise contours are also presented for the various scenarios in order to demonstrate the noise impact of the Proposed Development over a wider area.

The results of the iterations of the noise model are presented in Table 1. The results are assessed against the criteria in Table 2. Note all plant will be selected such that no tonal noise emissions are evident at noise sensitive locations.

Location	Predicted dB $L_{Aeq,T}$	
	Scenario D	Scenario E
R01	36	54
R02	36	53
R03	39	52
R04	39	52
R05	40	53
R06	40	52
R07	40	52
R08	40	51
R09	40	52
R10	38	49
R11	38	46
R12	36	44
R13	38	48
R14	47	50
R15	36	54

Table 1 Predicted Plant Noise Levels for Various Scenarios (Indicative Masterplan)

Location	Scenario D			Scenario E		
	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?
R01	36	40	✓	54	55	✓
R02	36		✓	53		✓
R03	39		✓	52		✓
R04	39		✓	52		✓
R05	40		✓	53		✓
R06	40		✓	52		✓
R07	40		✓	52		✓
R08	40		✓	51		✓
R09	40		✓	52		✓
R10	38		✓	49		✓

Location	Scenario D			Scenario E		
	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?	Predicted dB $L_{Aeq,T}$	Criterion dB $L_{Aeq,T}$	Complies?
R11	38		✓	46		✓
R12	36		✓	44		✓
R13	38		✓	48		✓
R14	47	55	✓	50	N/A	✓
R15	36		✓	54		✓

Table 2 Comparison of Predicted Noise Levels vs. Adopted Noise Criteria

In relation to the full development of the site indicative modelling on the indicative future development has been considered. The future building at the north end of the site is identical to buildings F and G. The following conclusions are reached:

Scenario D All locations are within the relevant adopted daytime and evening limits by a significant margin. All locations comply with the adopted criterion of 40dB $L_{Aeq,T}$ in relation to day to day operations. Figure 1 presents a noise contour for Scenario D.

Scenario E All locations are within the relevant adopted emergency operation limit in the rare event that a power loss to the site occurs. Figure 2 presents a noise contour for Scenario E.

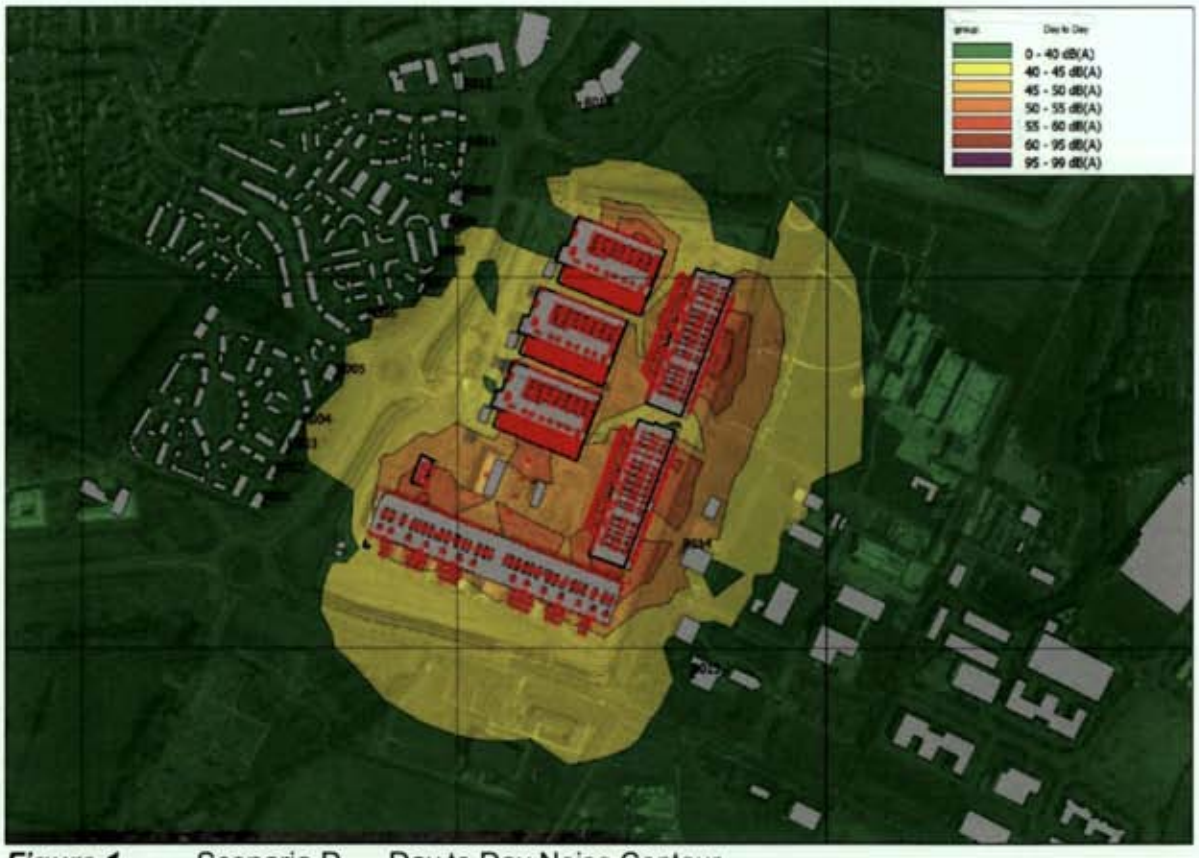

Figure 1 Scenario D Day to Day Noise Contour

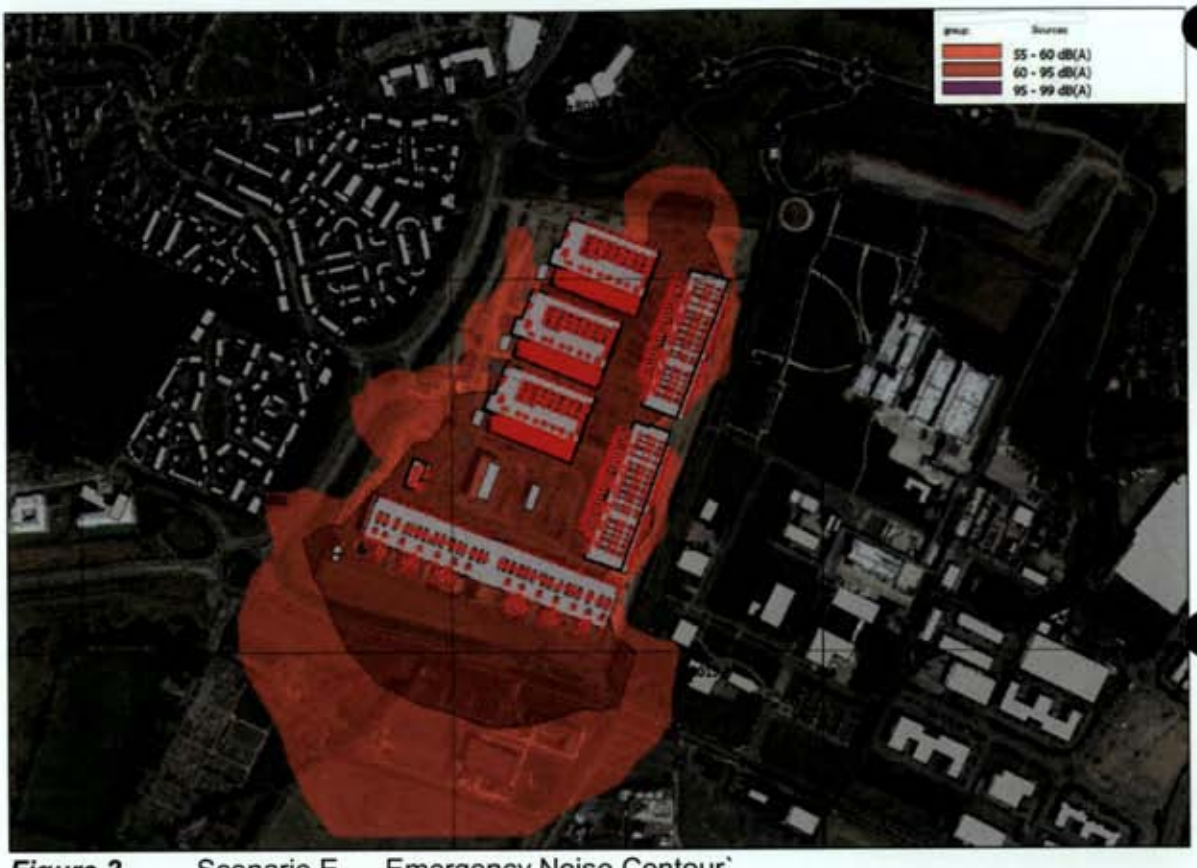

Figure 2 Scenario E Emergency Noise Contour`

APPENDIX 10.6 – INDICATIVE CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN

This Noise and Vibration Management Plan (NVMP) details a *'Best Practice'* approach to dealing with potential noise and vibration emissions during the construction phase of the development. The Plan should be adopted by all contractors and sub-contractors involved in construction activities on the site. The Site Manager should ensure that adequate instruction is provided to contractors regarding the noise and vibration control measures contained within this document.

The environmental impact assessment report (EIA Report) conducted for the construction activity has highlighted that the construction noise and vibration levels can be controlled to within the adopted criteria. However, mitigation measures should be implemented, where necessary, in order to control impacts to nearby sensitive areas within acceptable levels.

Nearby sensitive properties in the vicinity of the Proposed Development are summarised in Figure 10.5.1 below:

Figure 10.5.1 Sensitive Receptors

Construction Noise Criteria

As referenced in the EIA Report prepared for the site, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the National Roads Authority (NRA) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*[3] which indicates the following criteria and hours of operation.

Days and Times	Noise Levels (dB re. 2x10-5 Pa)	
	$L_{Aeq(1hr)}$	L_{Amax}
Monday to Friday 07:00hrs to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00hrs to 14:00hrs	65	75

Table 10.5.1 Construction Noise Limit Values

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

Construction Vibration Criteria

It is recommended in the EIA Report that vibration from construction activities to off-site residences be limited to the values set out in Table 10.5.2. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

Table 10.5.2 Construction Vibration Limit Values

Hours of Work

The proposed general construction hours are 07:00 to 19:00hrs, Monday to Friday and 08:00 to 14:00 on Saturdays. However, there are also weekday evening works proposed (19:00 to 22:00hrs), permission for which will be required from Fingal County Council.

Weekday evening activities should be significantly reduced and generally only involve internal activities and concrete pouring which will be required during certain phases of the development. As a result noise emissions from evening activities are expected to be significantly lower than for other general daytime activities.

Best Practice Guidelines for the Control of Noise & Vibration

BS5228 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- control of noise sources;
- screening;

[3] *Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004* , National Roads Authority.

- hours of work;
- liaison with the public, and;
- monitoring.

Detailed comment is offered on these items in the following paragraphs. Noise and vibration control measures that will be considered include the selection of suitable plant, enclosures and screens around noise sources, limiting the hours of work and monitoring.

Selection of Quiet Plant

This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

General Comments on Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that *"as far as reasonably practicable sources of significant noise should be enclosed"*. In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators. Demountable enclosures will also be used to screen operatives using hand tools and will be moved around site as necessary.

In practice, a balance may need to be struck between the use of all available techniques and the resulting costs of doing so. As with Ireland's Environmental Protection Act legislation, we propose that the concept of *"best available techniques not entailing excessive cost"* (BATNEEC) be adopted. Furthermore, proposed noise control techniques should be evaluated in light of their potential effect on occupational safety etc.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are all directly relevant and hence are reproduced in full. These recommendations will be adopted on site.

> *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas. Special care will be necessary when work has to be carried out at night.*
>
> *Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.*
>
> *Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*

Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.

Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.
Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."

All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen should be bent around the source. The height of any screen should be such that there is no direct line of sight between the source and the receiver.

BS5228 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier should be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice screens constructed of materials with a mass per unit of surface area greater than 7 kg/m^2 will give adequate sound insulation performance.

In addition, careful planning of the site layout should also be considered. The placement of site buildings such as offices and stores and in some instances materials such as topsoil or aggregate can provide a degree of noise screening if placed between the source and the receiver.

Vibration

The vibration from construction activities will be limited to the values set out in Table 2. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage, these limits may need to be reduced by up to 50%.

Liaison with the Public

The Contractor will provide proactive community relations and will notify the public and sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. The Contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.

A designated noise liaison should be appointed to site during construction works. Any complaints should be logged and followed up in a prompt fashion. In addition, prior to particularly noisy construction activity, e.g. rock breaking, piling, etc., the site contact should inform the nearest noise sensitive locations of the time and expected duration of the works.

Noise Monitoring

During the construction phase consideration should be given to noise monitoring at the nearest sensitive locations.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2007: *Acoustics – Description, measurement and assessment of environmental noise* and be located a distance of greater than 3.5m away from any reflective surfaces, e.g. walls, in order to ensure a free-field measurement without any influence from reflected noise sources.

Vibration Monitoring

During the construction phase consideration should be given to vibration monitoring at the nearest sensitive locations.

Vibration monitoring should be conducted in accordance with BS7385-1 (1990) *Evaluation and measurement for vibration in buildings — Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings* or BS6841 (1987) *Guide to measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock*.

The mounting of the transducer to the vibrating structure should comply with BS ISO 5348:1998 *Mechanical vibration and shock – Mechanical mounting of accelerometers*. In summary, the following ideal mounting conditions apply:

- the transducer and its mountings are as rigid as possible;
- the mounting surfaces should be as clean and flat as possible;
- simple symmetric mountings are best, and;
- the mass of the mounting should be small in comparison to that of the structure under test.

In general the transducer will be fixed to the floor of a building or concrete base on the ground using expansion bolts. In instances where the vibration monitor will be placed outside of a building a flat and level concrete base with dimensions of approximately 1m x 1m x 0.1m will be required.

APPENDIX 10.7 – NOISE MODEL PARAMETERS

Prediction calculations for noise emissions have been conducted in accordance with *ISO 9613: Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation, 1996.* The following are the main aspects that have been considered in terms of the noise predictions presented in this instance.

Directivity Factor: The directivity factor (D) allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. In this case the sound power level is measures in a down wind direction, corresponding to the worst case propagation conditions and needs no further adjustment.

Ground Effect: Ground effect is the result of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on source height receiver height propagation height between the source and receiver and the ground conditions. The ground conditions are described according to a variable defined as G, which varies between 0.0 for hard ground (including paving, ice concrete) and 1.0 for soft ground (includes ground covered by grass trees or other vegetation) Our predictions have been carried out using various source height specific to each plant item, a receiver heights of 1.6m for single storey properties and 4m for double. An assumed ground factor of G = 0.5 has been applied off site. Noise contours presented in the assessment have been predicted to a height of 4m in all instances. For construction noise predictions have been made at a level of 1.6m as these activities will not occur at night.

Geometrical Divergence This term relates to the spherical spreading in the free-field from a point sound source resulting in attenuation depending on distance according to the following equation:

$$A_{geo} = 20 \times \log(\text{distance from source in meters}) + 11$$

Atmospheric Absorption Sound propagation through the atmosphere is attenuated by the conversion of the sound energy into heat. This attenuation is dependent on the temperature and relative humidity of the air through which the sound is travelling and is frequency dependent with increasing attenuation towards higher frequencies. In these predictions a temperature of 10°C and a relative humidity of 70% have been used, which give relativity low levels of atmosphere attenuation and corresponding worst case noise predictions.

Temp (°C)	% Humidity	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10	70	0.12	0.41	1.04	1.92	3.66	9.70	33.06	118.4

Table 10.6.1 Atmospheric Attenuation Assumed for Noise Calculations (dB per km)

Barrier Attenuation The effect of any barrier between the noise source and the receiver position is that noise will be reduced according to the relative heights of the source, receiver and barrier and the frequency spectrum of the noise.

11.0 LANDSCAPE AND VISUAL

11.1 INTRODUCTION

This chapter provides an assessment of the impacts of the Proposed Development on the landscape and visual aspects of the receiving environment.

A full description of the Proposed Development and the construction methodology is provided in Chapter 2 (Description of the Proposed Development).

This chapter is accompanied by a set of Photomontages of the Proposed Development which are included as Appendix 11.1.

The following aspects are particularly relevant to the landscape and visual assessment:

- Design:
  - Form and massing of the Proposed Development;
  - Façade on all above ground structures; and
  - Cognisance of how design elements impact on Views of the Proposed Development and any effects on the receiving environment, including landscape character.
- Operation:
  - Views of the Proposed Development and any effects on the receiving environment, including landscape character.
- Construction:
  - Views of the Proposed Development and any effects on the receiving environment, including landscape character; and
  - Loss or change of existing features that contribute to the receiving environment.

11.2 METHODOLOGY

11.2.1 General

The landscape assessment has considered the likely significant effects of the Proposed Development on the landscape as an environmental resource and the visual assessment has considered the effect of visual change on receptors. Landscape and visual effects have been considered for the construction and operation of the Proposed Development.

Further, to support the assessment, a series of photomontages, illustrating the physical and visual appearance of the Proposed Development, has been prepared from a range of publicly accessible locations that are representative of the more open views in the surrounding environment. The Photomontage views are included as Appendix 11.1.

The following guidelines were considered and consulted for the purposes of the report:

- EPA EIA Report Guidelines 2022
- EPA Draft Advice Notes for EIS 2015
- The Landscape Institute/ Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment (3rd Edition);
- European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018); and
- Fingal County Development Plant 2017 – 2023.

The methodology used for the landscape assessment entailed:

- Desktop studies of the site in relation to its overall context locally, regionally and nationally; and
- Visiting the site and its environs in June 2022 to assess the following:
    - Quality and type of views in the area;
    - The extent of the visual envelope, i.e. the potential area of visibility of the site in the surrounding landscape; and,
    - The character and quality of the surrounding landscape in relation to the position of the Proposed Development.

11.2.2 Categorisation of the Baseline Environment

The landscape and visual assessment involved visits to the site and its environs in June 2022 to review the nature and scale of existing development surrounding the site, to identify landscape features, local character and land uses, to identify key views to and from the Proposed Development, and to note receptor sensitivity.

This site based assessment was augmented by reviewing aerial photography, publications and reports and project information included within the application and in this EIA Report.

11.2.3 Impact Assessment Methodology

The landscape and visual impact assessment for the Proposed Development takes account of the character and nature of the existing site and its surrounds, the location of sensitive landscapes and visual receptors, the sensitivity and significance of the site, and its vulnerability to change.

The classification of significance of effects or impacts as set out in Figure 1 below as included in EPA EIA Report Guidelines 2022, and on the professional experience of the author in carrying out landscape and visual assessments for over 25 years.

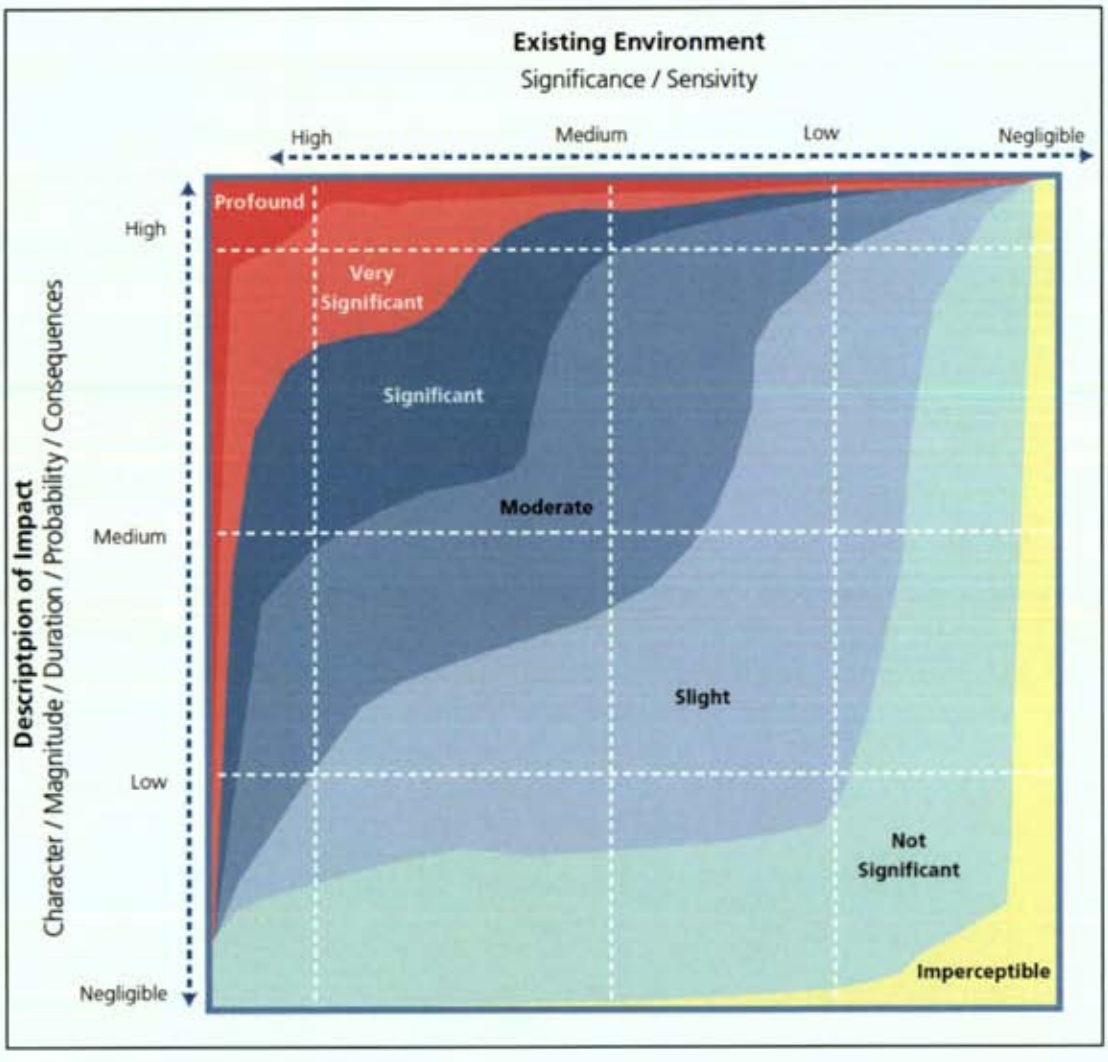

Figure 11.1 Significance of Effects, extract , Figure 3.4, EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, May 2022.

The significance of effects are considered in this assessment, where appropriate in accordance with those descriptions outlined in the EPA guidance as set out in Table 1.2 of Chapter 1 (Introduction).

11.3 RECEIVING ENVIRONMENT

11.3.1. Site Context

The site is located c. 1.5km north of Mulhuddart village in west Dublin, and extends to c. 13.14 hectares set within a wider overall development land of c. 26.14 hectares. The overall lands are the subject of recent and ongoing development and previously granted planning permissions including:

- Data Centre Building A (ABP Reg. Ref.: PL06F.248544 / FCC Reg. Ref.: FW17A/0025) which is built and operational;
- Data Centre Buildings B and C (Fingal County Council Reg. Ref.: FW19A/0087) at an advanced stage of construction; and,
- GIS Substation and Building D (ABP Reg. Ref.: VA 06F.306834) which are built and operational.

The Proposed Development site is bound to the south by existing Data Centre Buildings A; to the east by Data Centre Buildings B and C that are currently under construction; to the west by the R121; and to the north by undeveloped land and Cruiserath Drive. A Gas Insulated Switchgear (GIS) building (Building D) with associated electrical infrastructure (permitted under ABP ref. VA06F.306834) has recently been constructed within the southernmost portion of the Proposed Development site.

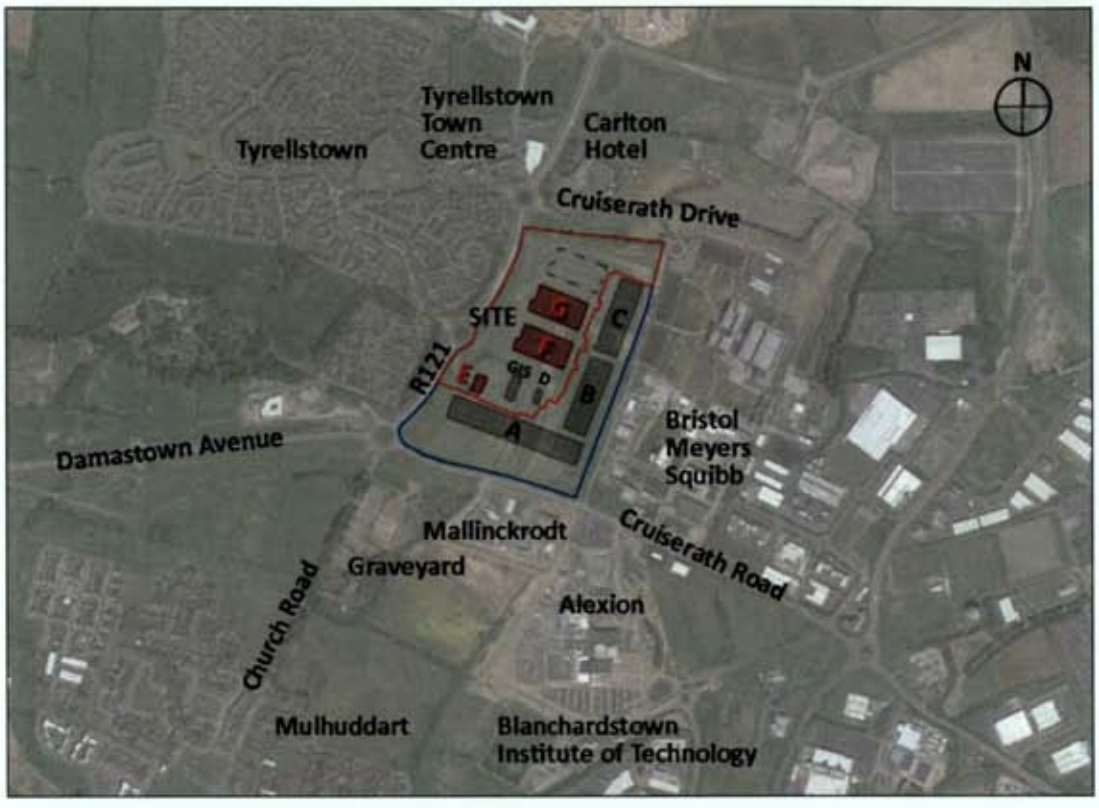

Figure 11.2 *Proposed Development site location and boundary*

The lands are located at the north western extent of an expansive industrial, extractive, energy and employment district that extends c. 4.0km northwest from the M50 motorway. Lands to the immediate south and east are occupied by large-scale contemporary high-tech industrial facilities such as Mallinckrodt, Alexion and Bristol Meyers Squibb. Further east and southeast, a strongly industrial character is defined by a wide range of modern and more conventional industrial facilities, substantial electricity substations, networks of high voltage electricity pylons and cables, as well as Huntstown Power Station and Quarry.

The R121 bounds the western edge of the development site and comprises a four lane dual carriageway set within a c. 35.0m wide corridor including pedestrian and cycle facilities. The western and northern edges of the development site adjoining the R121 and Cruiserath Drive comprise manmade earth berms typically rising 2-5m in height and planted with mixed woodland.

The western side of the R121 comprises a linear open space that varies from c. 20m to 40m in width and comprises mature mixed woodland. The Curragh Hall, Ballentree and Bishop's Orchard settlements are located closest to the R121 and immediately inside the woodland and open space running along the R121. The nature and cross section of the R121 presents a substantial physical and visual disconnection between the residential and industrial lands. The wider residential development at Tyrellstown

continues beyond these settlements and is characterised by high quality residential buildings arranged along meandering tree-lined compact streets that limit any long distance visibility beyond the residential development.

Tyrellstown Town Centre and the Carlton Hotel are located to the north of the development site and to the west and east of the R121 respectively. The Town Centre is arranged with its frontage around a central plaza area and has limited visual connection with the R121 or the development site. The Carlton Hotel is located on the northern side of the tree-lined Cruiserath Drive and has an extensive landscaped surface carpark that provides an additional buffer between the hotel buildings and the development site to the south.

Figure 11.3 *View along Cruiserath Road to the south of the overall development lands illustrating the completed Data Centre Building A and southern perimeter landscaping*

Figure 11.4 *View across the R121 looking eastwards towards the development site boundary and showing the existing perimeter landscaped berm.*

Figure 11.5 *View of linear open space and mature woodland between R121 and Curragh Hall Crescent looking south.*

Figure 11.6 *View of mature woodland along western side of R121 looking north.*

Figure 11.7 *View along Cruiserath Road to the north of the site illustrating the tree lined character of the street and additional adjoining site landscaping.*

Figure 11.8 *View from entrance gate to Mulhuddart Cemetery at Church Road looking east and showing the 110kV pylons, ESB substation and Alexion beyond the cemetery in the foreground.*

11.3.2 Development Site

The Proposed Development site comprises the north western portion of more expansive development lands that have been the subject of a number of planning permissions, construction activity and operation of Data Centre buildings since 2017.

The southern part of the overall lands has been developed and is operational, comprising Data Centre Building A, internal access roadways, attenuation pond, structural and soft landscaping and ancillary site development works.

The eastern portion of the overall lands is presently at an advanced stage of construction with Data Centre Buildings B and C.

The Proposed Development site comprises the balance of the overall lands which are in use partially as a temporary construction compound and for construction car parking associated with the completed and ongoing construction works. Building D (the Gas Insulated Switchgear (GIS) substation building) is located in the southernmost portion of the Proposed Development site. Archaeological test trenching has been undertaken throughout the balance of the lands and temporary stockpiles of topsoil have been formed. Additional internal access roads and associated civil engineering works permitted under the previous planning permissions have been partially constructed.

The Proposed Development site, by virtue of being part of earlier planning permissions, site enabling works and construction activity, is characterised as a construction site with landscaped perimeter mounds along the western and northern sides. Other than on the established perimeter landscape berms, there are no trees or other vegetation within the site. Similarly, there are no natural watercourses on site.

11.3.3 Landscape Planning and Land Use Zoning

The site, together with its wider surrounds, are **Zoned HT: High Technology** in the Fingal County Development Plan, with the objective to…*Provide for office, research and development and high technology / high technology manufacturing type employment in a high quality built and landscaped environment*. Lands to the north, east and south of the site are similarly zoned.

The HT zoning is aimed at providing a location for high end, high quality, value added businesses and corporate headquarters. An emphasis on exemplar sustainable design and aesthetic quality will be promoted to enhance corporate image and identity.

Lands to the west of the site and on the western side of the R121 Road are **Zoned RS: Residential**…. *To provide for residential development and protect and improve residential amenity* and are buffered by a strip of land **Zoned OS: Open Space**…*To preserve and provide for open space and recreational amenities.*

To the northwest of the site, across the R121, is **Zoned LC: Local Centre**… *To protect, provide and/or improve local centre facilities.* To the southwest of the site is a strip of land **Zoned GE: General Enterprise**… *Provide opportunities for general enterprise and employment.*

The established BMS facility is located immediately to the east of the site and has expanded northwards in recent years. Mallinckrodt and Alexion have both completed substantial new pharmaceutical facilities on lands along the southern side of Cruiserath Road to the south of the site.

An ESB sub-station is located on lands south of the site across the Cruiserath Road, and Mulhuddart cemetery is located between the sub-station and Church Road. The Blanchardstown Institute of Technology and the residential settlements to the north of Mulhuddart are further south of the substation and cemetery.

There are no specific amenity objectives on the site. Likewise there are no protected trees, woodlands or hedgerows, protected views or protected structures pertaining to the site.

11.3.4 Consented and Planned Development on or Adjoining Development Site

Appendix 3.1 of Chapter 3 of the EIAR includes a list of planning applications on a part of the site or within 1km of the site that have received planning approval from Fingal County Council in the past 5 years.

Many of the developments listed are located too far from the site or are of a scale or nature as to be not relevant to the assessment of potential significant cumulative landscape and visual effects in combination with of the Proposed Development.

The following development is considered relevant to this assessment by virtue its immediate proximity to the development site and potential to be part of the visual environment associated with the site,

- Planning Register Reference: FW18A/0121, granted 13th November 2018, for a two-storey office building with landscaped roof on lands along Cruiserath Drive, immediately north of the development site and south of the Carlton Hotel; and

In addition, it is noted that there is a planned development by others of a 220kV GIS substation on lands at Kilshane Road, Kilshane, Finglas, c. 6.0km to the southeast of the Proposed Development which is understood will be submitted to An Bord Pleanála as a Strategic Infrastructure Development application in the coming months. This development will connect into the national transmission grid via a spare bay on the existing GIS substation building within the Proposed Development site.

Construction of the future Kilshane transmission line in the vicinity of and on the Proposed Development site may overlap with the construction of elements of the permitted and Proposed Developments on the site. The nature of establishing a connection into the existing GIS substation within the Proposed Development site is such that cumulative construction effects would be temporary, localised and would not give rise any significant cumulative landscape and visual effects. Similarly, the nature of the connection is such that in operation, there would be no potential cumulative landscape and visual effects.

Cumulative landscape and visual effects are dealt with in Chapter 16 of the EIAR.

11.3.5 Landscape and Visual Significance and Sensitivity

The site is not considered to be significant or sensitive from a landscape and visual aspect. The lands are appropriately zoned, located within the environment of an established and continually evolving business park.

The development site is bounded and partially occupied by existing and emerging large-scale high-tech developments to the east and south. The existing Data Centre Building A to the south of the site along the Cruiserath Road and associated perimeter landscaping has established large scale high-tech development at this location. The

GIS substation and Data Centre Buildings B and C, currently in operation or at an advanced stage of construction, are further contributing to the emerging high-tech character of the overall development site.

The Carlton Hotel lies to the north of the site along Cruiserath Drive, and planning has been granted for a two-storey office development under a landscaped green roof along the northern site boundary.

Residential developments and other amenities are located on the western side of the R121 which by virtue of separation by the R121, are not considered significant or sensitive to the development.

As can be seen from Figure 11.2 above, the Proposed Development will be located centrally with the overall development lands and enclosed within the lands to the south and east respectively by Buildings A, B and C. Additionally, the R121 comprises existing landscape berms and mature woodlands along its eastern and western sides respectively that provide strong screening between the development site and the established residential areas west of the R121.

While the terrain within the Proposed Development site is nominally flat, lands west of the R121 fall sharply along Damastown Avenue towards Damastown, Church Road towards the Tolka Valley and Mulhuddart and westwards across the established residential areas at Tyrellstown. The reducing ground levels are such that views from these areas towards the more elevated Proposed Development site are foreshortened and largely obstructed by the intermediate rising terrain and any built or natural features. Potential visibility of the Proposed Development from the west quickly reduces with distance from the lands.

Lands to the east of the Proposed Development site are in industrial, commercial, educational and infrastructural uses and are inherently less sensitive to developments such as the Proposed Development as the entire area is characterised by large scale buildings set in campus and business park styled sites. Cruiserath Road is heavily tree lined with early mature Lime trees that establish a boulevard character along the road and substantially limit visibility to the large scale buildings located either side of the road.

These characteristics have been considered in identifying suitable locations from which to prepare photomontages oof the Proposed Development and for submission with this EIAR.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The Proposed Development consists of the construction of three Data Centre Buildings E, F and G towards the north western portion of the overall development lands. Data Centre Buildings F and G will each have a gross floor area of 20,582 sq.m. and parapet heights of 19.8m.

- Data Centre E will be ancillary to Data Centre Buildings F and G with a floor area of 1,425 sq.m. and a parapet height of 13.1 m together with a single back-up generator and associated flue. Emergency generators and associated flues will be provided within compounds adjoining each of the three data centre buildings (1 no. for Data Centre E, 19 no. for Data Centre F, and 19 no. for Data Centre G);

The Proposed Development will also include diesel / renewable diesel storage and filling areas to serve the back-up generators and ancillary structures including two MV buildings and water storage tanks. Subject to availability, it is expected that fuel for the

Proposed Development will be renewable diesel. Site development work will include construction of internal roads and circulation areas, footpaths and parking facilities, and will include underground foul and storm water drainage utilities, and associated landscaping, planting, lighting, bollards and camera poles.

It is noted that construction of Data Centre Building A has already delivered the overall site access from the R121, perimeter security fencing and structural perimeter landscape berms with extensive tree planting and soft landscaping.

The Proposed Development will extend the high-quality high-tech character of the existing and ongoing development on the overall lands. Buildings E, F and G will be finished using high-quality design, materials and finishes that are informed by the existing and emerging buildings. Building elevations will be finished using lighter coloured projecting planes set in front of darker coloured recessed planes so as to disrupt the overall scale of the buildings and create more visual interest.

The proposed landscape design reinforces the existing landscaped perimeter berms and integrates storm water attenuation and wetland areas to mitigate visual impacts and provide visual amenity both to the public realm and for staff and visitors within the facility.

The main landscaping features are native woodland, bio retention pond and wetland areas, wildflower meadows and tree rows and clusters to provide primary screening. Fully grown mature trees will be planted at the initial building stage. All tree and plant species proposed are native. Green walls will be used around visible plant areas to assist in the visual integration of such areas within the overall site development area.

A full description of the Proposed Development is provided in Chapter 2 (Description of the Proposed Development).

11.5 LIKELY SIGNIFICANT EFFECTS

New development has the potential to impact on the immediate site environs or the surrounding site context, or both. The quality of impacts can be positive, neutral or negative, and the significance of impacts is determined by the particular characteristics of the development and the existing context.

The Proposed Development will involve construction of additional Data Centre buildings and associated site development works within an overall development site area that already includes established and emerging Data Centre building and associated developments.

The lands are zoned for such development and are also part of a much broader context of established and emerging contemporary high-tech and conventional industrial facilities to the east and southeast and with established residential settlement to the west.

Construction of the Proposed Development will be phased with Buildings E, F and G commencing in Q2 2023, Q1 2025 and Q1 2025 and continuing for 12, 15 and 28 months respectively.

11.5.1 Do-Nothing Scenario

In the event that the Proposed Development does not proceed, Data Centre Building A, the GIS substation Building D will continue to operate as at present and Data Centre Buildings B and C will be completed, commissioned and become operational. The existing temporary construction compound and construction car parking facility would be decommissioned and the north western portion of the site would remain unchanged until such time as an alternative development consistent with the land use zoning is granted permission and constructed.

11.5.2 Assessment of Effects During Construction

As noted above, Building A is already operational and Buildings B and C are under construction. The GIS substation is also operational. Parts of the overall development site perimeter landscaping have been implemented together with parts of the internal site landscaping associated with the operational buildings. A construction compound and construction car parking facility are located centrally with the overall lands and the balance of the overall development lands has been cleared and archaeological test trenching carried out. Parts of the overall site infrastructure including surface and foul drainage, internal access roadways and other civil works have been implemented under the previously granted planning permissions. The undeveloped north western part of the overall development lands presents as a construction site.

Effects during construction of the Proposed Development will therefore arise from extending the actual construction activity into the north western part of the overall lands.

During construction of the Proposed Development which will take place on a phased basis, potential landscape and visual effects will arise from:

- Relocation of existing temporary contractors compound and contractors car parking towards the north of the site;
- Site establishment, including site grading, cut and fill, provision of fencing and site hoarding, etc.;
- Earthworks to establish formation levels for construction;
- Excavation for foundations and underground utilities;
- Stock-piling of topsoil and subsoil for later reuse in landscaping and/or offsite removal for appropriate reuse/recovery/disposal;
- Access and egress of construction traffic for material import and export;
- Erection and operation of tower cranes;
- Construction traffic movement on site;
- Construction site lighting;
- General construction activity, including construction and security personnel, and construction machinery;
- Gradual and phased emergence of the Proposed Development on the site;
- Provision of landscaping and planting etc.; and
- Completion and commissioning of the development.

Effects on Landscape Character

Effects on landscape character during construction will be temporary to short term, and will generally vary from ***slight/not significant*** to ***moderate***, and from ***neutral*** to ***negative***.